From Dung to Dollars:
Lessons for development and implementation of market based trading instruments in agriculture - the case of Lake Taupo nitrogen trading

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ABSTRACT

Abstract

Market based instruments (MBI) for environmental management are often revered as a means to amalgamate economic development with positive environmental outcomes and policy makers argue that the neoliberal ideology behind MBIs promote entrepreneurial responses to complex environmental issues (Bailey, 2007). Despite the prevalence of MBI in a broader shift toward neoliberal approaches to environmental management, political ecologists argue disparity exists between the ideology of neoliberal projects and the outcomes of MBI.

This thesis aimed to test political ecology exploration of MBI and their underlying neoliberal ideology. It investigates the extent to which critical political ecology literature reflects the preliminary outcomes of the implementation of a nutrient trading program, a form of MBI, to manage and remove nitrogen (N) from the catchment of New Zealand's largest lake, Lake Taupo. This thesis argues that despite the theoretical claims of MBI by neoliberal advocates, MBI fail to account for and manage the nature-society relationship which results in multiple failures of MBI.

Analysis confirms a number of political ecology claims. For example this thesis reveals how nature and environmental issues in the Taupo catchment cannot be understood in isolation from the political, ecological and economic contexts within which they are actively produced, contested and reconstructed through discourse (Bryant and Bailey, 1997; Escobar, 1999; Castree, 2001). This study finds instances of the negative outcomes of MBI commonly critiqued by political ecologists, and confirms the proposal that contradictions in neoliberal environmental governance theory exist on two levels; firstly, through the use of market principals to guide environmental management decisions, and secondly, as an outcome MBI have the potential to create and perpetuate negative socio-economic inequalities. In addition the case study finds that MBI face challenges in modelling and managing complex ecological phenomena, and may inadvertently create unintended consequences and perverse incentives to environmental protection.

This study highlights the point that in overlooking the socio-economic and environmental factors, policy makers may underestimate the true costs of MBI policy, as revealed by this study. In addition findings unique to the case study such as market incentives of the nutrient trading program under RPV5 are seen to have encouraged expansion of large scale dairy farms in the catchment and the spatial concentration of N emissions. These findings prompt further research around the use of NTPs to achieve comprehensive land use change in New Zealand's pastoral farming catchments

Keywords: Neoliberal environmental management, market based instrument, Resource Management Act 1991, agricultural emissions, nitrogen, farming, water resource management, environmental justice.

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Rosemary Pauline Bartle
18th August 1952 – 6th May 2011
Ride in peace Mum.

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LIST OF ABBREVIATIONS

List of Abbreviations

EC Environment Court

EW Environment Waikato

LTPT Lake Taupo Protection Trust

LTWQP Taupo Water Quality Project

MAF Ministry of Agriculture and Fisheries

MEA Maori Economic Authority

MBI Market Based Instrument

MfE Ministry for the Environment

MOU Memorandum of Understanding

N Nitrogen

NDA Nitrogen Discharge Allowance

NTP Nutrient Trading Program

RMA Resource Management Act (1991)

RPV5 Regional Plan Variation 5

TDC Taupo District Council

WRC Waikato Regional Council (EW)

GLOSSARY OF TERMS

Glossary of Terms

Benchmarking:	The processing of putting your farm data through Overseer to establish a Nitrogen Discharge Allowance.
Farming activities:	The grazing of animals or the growing of produce, including crops, market gardens and orchard produce but not including planted production forest and ancillary grazing of animals or cropping.
Hectare:	An area of land sized 100m by 100m, or 10,000m^2.
NDA:	Nitrogen Discharge Allowance – determined (in kg/ha/yr) for your farm based on your year of highest leaching during the benchmarking period of July 2001-June 2005.
NMP:	Nitrogen Management Plan – a plan that is required to continue farming which details how your farming practices meet your property's NDA. This can be the data and management practices of your highest leaching year if you want to continue your existing operations or it can be a new set of data which alters your onsite farming practices but does not exceed your NDA.
Non-farming activities:	Use of land for conservation, forestry, erosion rehabilitation, domestic gardening.
Overseer:	The scientific program prepared by AgResearch, Fert Research and the Ministry of Agriculture and Forestry (MAF) through which your farm information is processed to calculate a nitrogen discharge allowance for your property
Resource consent:	A report and consent with a list of conditions which must be met in order to discharge nitrogen in the Taupo catchment.
Permitted Activities:	Activities which do not require a resource consent.

(Source: Environment Waikato: 2010)

‘‘The real comparison one must make in contemplating a regulatory intervention is that between an admittedly imperfect market and what will inevitably be imperfect regulation. Until it is recognized that this is the dilemma before us, we will be dissatisfied with either approach’’

(Paul Portney, 1990)

Chapter 1 INTRODUCTION

1. Introduction

New Zealand faces a unique resource dilemma. A significant decline in the quality of New Zealand's freshwater lakes and streams over the last 30-50 years has been associated with non-point source emissions from agriculture. This issue is compounded by the resistance of farmers to be regulated and the absence of clear guidelines for non-point source emissions from land use activities under the New Zealand Resource Management Act (1991). As such regulatory approaches to managing non-point source emissions have faced stiff opposition because of the restrictions regulation would put on land use and land use practices. In order to reconcile the differences between the continued profitability of farming and maintenance of New Zealand's freshwater quality, regulators are looking to new and innovative ways to reduce the impact of non-point source emissions from agriculture. This has prompted the consideration of market based instruments (MBI), a form of policy instrument which uses price and other economic variables to incentivise emitters to reduce emissions and achieve more sustainable land use practices.

MBI represent a neoliberal policy to environmental management. In response to growing consensus amongst neoliberal advocates, environmental economists and governments on the need for more efficient environmental management, market based approaches to emissions management appear to be spreading rapidly and growing in intensity (Stavins, 2003). Economists claim MBI such as tradable systems for point and non-point emissions provide flexibility to dischargers, and the potential for greater cost-effectiveness than traditional command-and-control regulation in attaining specific emissions reduction targets (Crutchfield et al., 1994; Malik et al., 1994; Wang, et al. 2004). Neoliberal advocates propose that the establishment of private property rights, pricing of environmental commodities and the use of market mechanisms for allocation of

resources will in theory solve environmental problems instilling effectiveness in environmental management.

Despite the prevalence of MBI in a broader shift toward neoliberal approaches to environmental management, disparity exists between the ideology of neoliberal projects and the outcomes of MBI. More recently, academic research and evaluations of MBI have revealed a number of shortfalls of MBI approaches. Multidisciplinary political ecology (PE) approaches have recently begun to explore the underlying assumptions of MBI and their empirical outcomes. PE highlights some of the inherent contradictions of MBI revealing the contentions of underlying neoliberal philosophies. PE approaches have shown that prescriptions of MBI often tend to be over simplistic, misleading, and hyperbolic and have led to contradictory and perverse social, economic and environmental outcomes.

The belief that MBI provides a politically salient, environmentally effective and economically sustainable solution to the resource dilemma of agricultural non-point source emissions, has seen at least one nutrient trading program (NTP) implemented. Many regulatory authorities have considered their wider application throughout New Zealand's agricultural catchments. It is therefore important that PE research is undertaken. PE literature on MBI provides a suitable theoretical and empirical literature base to review the underlying theory and empirical outcomes of MBI in order to explore concurrent themes with the case study. Due to the importance of pastoral agricultural sector to the New Zealand economy, the government and regulatory authorities must carefully consider the balance between the adaptation of agriculture to emissions constraints and the continued profitability of farming. This has become a contentious, discursive and value driven issue. This study provides necessary holistic insights into the constraints of agricultural MBI, using discourse analysis.

1.1. Case study

Lake Taupo is the largest lake in New Zealand and it is well known for its cultural and economic values (Environment Waikato, 2007). Historically, Lake Taupo had extremely low levels of nitrogen, which limited the growth of nuisance plants in its waters (Hall and Matheson, 2004). Over the past 50 years the change to more intensive agricultural land use has increased the amount of nitrogen entering the lake through groundwater tables and directly through streams in the catchment. In turn, this has

encouraged growth of certain weed and nuisance slimes in shallow water. Non-point source emissions from agricultural activities in the catchment are seen as the manageable source of N emissions.

Protecting the lake is seen as an important issue to the people in Taupo and the wider regional community. Water quality is consistently identified as the most important environmental priority facing the Waikato region (Stewart et al, 2000). Environment Waikato's (2007) 'Protecting Lake Taupo – a Strategic Partnership' outlines the need to look into land and human activities for the necessary changes to protect the lake as there are significant activities that can be managed and reduced. As a result, a cap on permissible nitrogen discharges has been introduced with the goal of achieving a reduction of manageable nitrogen discharges by 20 percent by 2020. Under this cap, new and existing businesses have the flexibility to operate, provided that nitrogen leaching from manageable sources does not increase. Given practical unsuitability and farmers resistance towards using a regulatory approach, EW decided upon the use of a NTP to allow flexibility under the cap and the investiture of a public fund to reduce 20 percent of the manageable discharges of nitrogen from pastoral land (Environment Waikato, 2003; Yerex, 2009). Under the NTP, all rural land owners are allocated a nitrogen discharge allowance (NDA). Any land user wanting to increase their NDA is required to purchase nitrogen credits from another landowner who does not require all of their allocated nitrogen. All nitrogen discharges must be accounted for using AgResearch environmental modelling software Overseer (Environment Waikato, 2007). Although promising a more suitable approach to reducing N emissions in the catchment, preliminary outcomes reveal NDA trading may not deliver on its theoretical promises.

1.2. Objectives of research

The aim of this study is to explore the similarities and themes between Regional Plan Variation 5 (RPV5) and the predominantly PE critique of other neoliberal environmental governance mechanisms, in particular, MBI. This research utilizes the set of social, economic and environmental considerations of PE, and focuses on two research questions and two hypotheses.

1) Do the neoliberal theories attached to MBI accurately reflect and manage the nature-society relationship?

2) Does the ‘neoliberalisation’ of nature through MBI deliver what underlying neoliberal environmental governance assumptions promise – more efficient and cost effective environmental governance?

3) Test the hypothesis that manipulation, resistance and delay to implement RPV5 is congruent with the uncertainties, contradictory outcomes and justice implications of neoliberal environmental governance and MBI.

4) Explore the hypothesis that MBI inadvertently have the potential to perpetuate negative socio-economic inequalities, face challenges in modelling and managing complex ecological phenomena, and may inadvertently create unintended consequences and perverse incentives to environmental protection.

These research questions reflect the goal of this thesis - to provide a preliminary exploration of a NTP. Utilising a PE framework for interpretation of the case study the subsequent results, discussion and conclusions will provide an important contribution to the literature. In order to explore these research questions, analyses will focus on the factors affecting effective implementation of RPV5, explored in the literature review. The key concerns affecting the effective implementation of MBI are outlined in the diagram below:

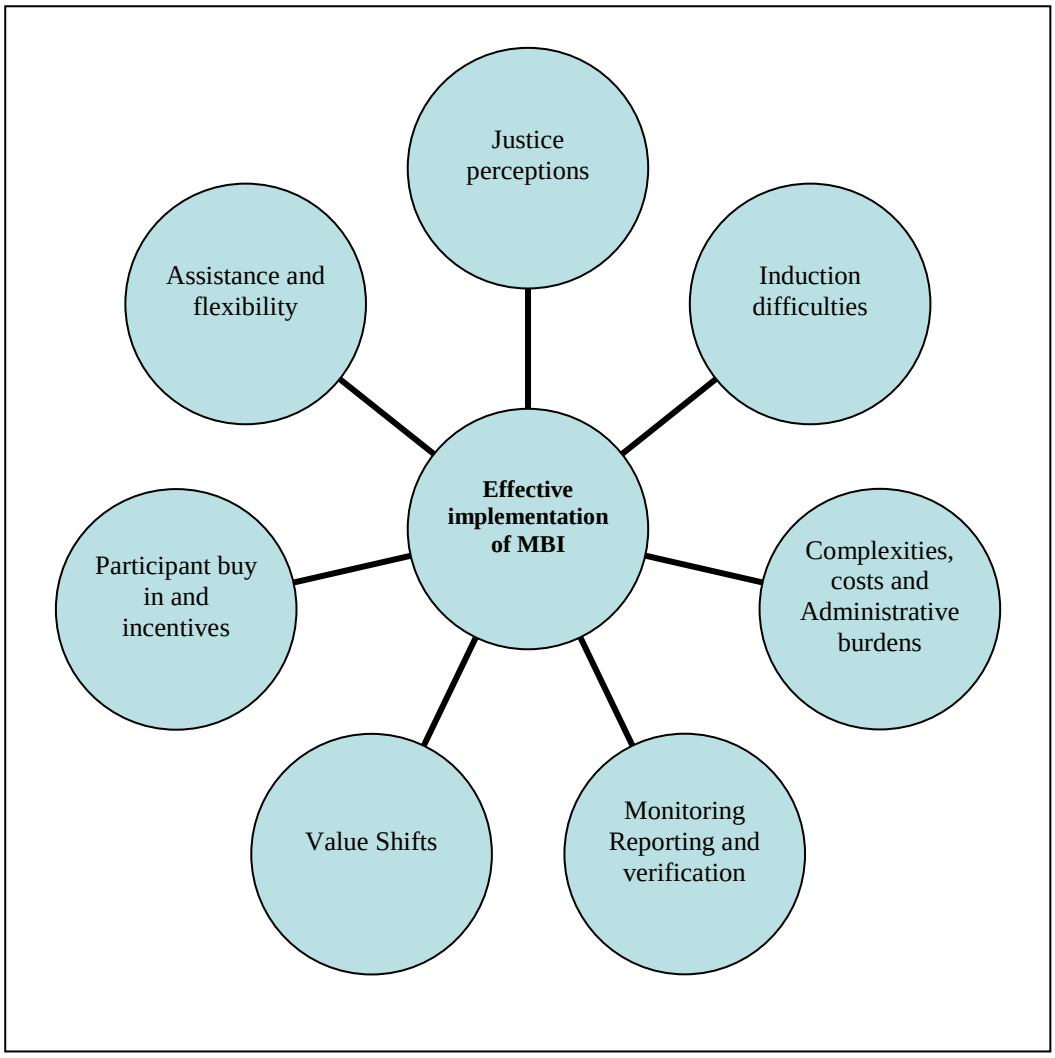

Figure 1 - Shows key factors affecting the implementation of MBI (Source: Authors own, 2011)

The exploration of these research questions was undertaken by selecting a sample of stakeholders of RPV5. The participants sought for this study were key stakeholders and personnel involved in and affected by RPV5. Key individuals were identified from local government, stakeholder organisations, farmers and other stakeholders, and other farming groups.

The interview data will then be analysed using narrative analysis, a form of discourse analysis, in an attempt to gain insight into the issues of establishing and the preliminary outcomes of RPV5. The expectation was that this study will generate insights into the obstacles and outcomes of RPV5 and the NTP contributing to a unique critique of neoliberal environmental theories and a better understanding of the dynamics of MBI in agriculture and the outcomes of NTP.

1.3. Thesis outline

Following the introduction in chapter one, chapter two will begin the literature review drawing upon literature from the field of PE and neoliberal environmental governance. It will explore the interdisciplinary field of PE and its key elements. This will demonstrate the ability of the PE framework to inform a complex and holistic understanding of the nature-society relationship, resource scarcity and environmental conflict issues. Furthermore, it will be shown that PE provides a suitable approach to establish and explore the underlying assumptions of MBI in the third chapter. Secondly, chapter two will begin to explore neoliberal philosophies towards environmental governance, utilising a PE approach to critically explore neoliberal theories and subsequent policy prescription in MBI. The PE perspective will reveal that the 'neoliberalisation' of nature is often over simplistic, misleading, and hyperbolic and has led to contradictory and perverse social, economic and environmental outcomes. Chapter two will demonstrate the need to consider the inclusion of important socio-environmental factors and a variety of actors, values and approaches in the neoliberal policy debate.

Chapter three begins to explore neoliberal environmental policy, specifically MBI. It will critically explore the underlying environmental economic assumptions of MBI, assumptions attached to private property rights, pricing of environmental commodities and the use of market mechanisms for environmental management that will in theory solve environmental problems. This approach will provide evidence that reveals the shortcomings of MBI can often be associated with flaws in the underlying logic of market approaches more generally. It will become evident throughout this chapter that the underlying scientific and economic assumptions of MBI may contradict policy goals of environmental protection. This will suggest that overlooking economic, spatial, social and environmental factors has led to barriers of effectiveness for market based approaches to environmental management. As evidence will suggest, this has led to further environmental degradation, and negative social, economic and environmental consequences. It will become apparent that instances of injustice may lead to resistance towards implementing and manipulation of MBI.

Chapter four will introduce New Zealand's neoliberal environmental planning regime and national and local policy contexts with a key focus on the effects based planning regime of the RMA and freshwater management. Chapter four will then identify

how a particular configuration of governance, land and land management practices, has led to the current resource dilemma of a decline in New Zealand's freshwater lakes and streams. It will reveal that management of non-point source emissions of N from pastoral agriculture is a highly discursive and contested political issue. The following sections will explore the specific environmental issue of the case study and introduce the market based NTP of RPV5 in the Lake Taupo catchment. Review of the discursive nature of this particular issue will subsequently justify the methodological approach to research in the second half of the chapter four. Chapter four will then identify, outline and justify the methodology and specific methods to be used for data collection and analysis. It will become clear why qualitative discourse analysis is particularly relevant and suitable for the case study. It will be revealed that the analytical strategy of examining key stakeholder narratives will allow identification of important information about the case study to aid in answering research questions.

Chapter five will present and critically discuss the research results. Utilising PE and narrative discourse analytic perspectives chapter five will examine the common themes that have emerged from narratives in relation to key themes established in the literature review. PE exploration of narratives will reveal the complex facets of this resource issue and provide important insights into the potential effectiveness of MBI policy in agriculture. Chapter five will specifically focus on the initial challenges of the policy development process and initial implementation of RPV5. Important links will be revealed between the political failures of neoliberal environmental governance, underlying contradictions of MBI and barriers to effectiveness, resistance to MBI and their modification. Themes covered in chapter five include the effects of wider spatial and temporal scales, historical and institutional factors, social and economic factors and science and knowledge based assumptions.

Chapter six continues the presentation of the results and discussion presenting narrative analysis of the case study. Chapter six will present a number of research findings which support PE claims that whilst MBI attempt to use neoliberal economic theory to manage the nature-society relationship, an important disparity emerges between the ideologies of neoliberal environmental management and the observed outcomes of MBI. Focusing on the preliminary outcomes of RPV5 and implementation difficulties, analysis will reveal a number of underlying contentions, justice issues and unexpected and perverse outcomes. The narratives will suggest that PRV5 has the potential to provide

incentives and outcomes perverse to environmental protection in addition to negative social justice issues. Finally, analysis will provide critical conclusions on the effectiveness of the NTP under RPV5 and possible future implications for NTP in New Zealand Agriculture.

The final chapter provides a conclusion of the study, the findings, and the implications of this research. Recommendations for further research are also suggested.

Chapter 2 LITERATURE REVIEW

Political ecology and neoliberal environmental management

2. Political ecology and neoliberal environmental management

The industrial revolution (c.18th – 19th century) marked a shift in the human-nature relationship. Regulatory authorities began to recognise the need for management of anthropogenic pollution and as such began the employment of command and control pollution control efforts. This approach to environmental management (EM) prescribes explicit measures regarding pollution control levels or methods (Starvins, 2003). It has been argued that command and control approaches to EM are overly costly and allow firms and individuals very little flexibility in achieving environmental policy goals (McCarthy and Prudham, 2004; Starvins, 2003). In response to increased demands for flexibility and efficiency in the means to achieving policy goals, market based principals have been employed by policy makers to encourage firms through market signals to mutually achieve EM policy goals. Governments and business both advocate the use of MBI for pollution control efforts and as such Market Based Instruments (MBI) for EM have begun to spread rapidly, diversify and grow in intensity (McCarthy and Prudham, 2004; Starvins, 2003). Informing this theoretical shift towards market principals and economic drivers of efficiency in environmental governance theory was neoliberalism. Only recently has a small yet growing body of academic research began to explore the contentions associated with Neoliberal ideology through to its specific embodiment in 'market environmentalism'. Furthermore, very little academic research has explored the emerging political ecology (PE) of neoliberalism, an emerging topic in literature that expands upon contradictory social and environmental aspects of market based EM. Utilising appropriate aspects of a PE framework to investigate the nature-society relationship, the purpose of chapter 2 is to expand upon the critique of market based Neoliberal environmental governance theory and associated policy prescriptions.

Chapter 2 will cover two broad, interconnected topics. Firstly, PE literature will be explored to show how this interdisciplinary field informs a complex understanding of the nature-society relationship (Sections 2.1 and 2.2). Section 2.1 will introduce PE as a framework to explore this relationship and the subsequent environmental conflict and resource scarcity caused by a number of political, economic and ecological factors. Following, section 2.2 will introduce the four key elements of a PE investigation which are utilised to explore resource issues. Secondly, in section 2.3 the neoliberal philosophy towards environmental management will be introduced. Subsequently a PE approach will be used to criticise neoliberal environmental governance and its associated prescriptions of market based EM in section 2.4. It will be shown that neoliberal environmental governance has a tendency to overlook the importance of political and environmental issues. This PE perspective will show that the problem with the 'neoliberalisation' of nature is that it is often over simplistic, misleading, and hyperbolic which may undermine the goals of resource protection providing contradictory social, economic and environmental outcomes. This will demonstrate the need to include considerations of important socio-environmental factors and a variety of actors, values and approaches in the neoliberal policy debate.

2.1. Introduction to Political Ecology

This section will introduce political ecology as a substantive and expansive field of inquiry into the human nature relationship. Exploring its origins in section 2.1.1 will show that PE provides researchers an appropriate tool to thoroughly explore the nature society relationship of resource issues, taking into consideration political, ecological, social and multiple scale factors. Section 2.1.2 will explore the usefulness of a PE framework for interpreting issues involving resource scarcity and conflict. In this respect, these sections will reveal that a PE framework may provide a more in depth analysis of resource issues shed light upon factors that play an important role in this relationship that other research methodologies often fail to consider.

2.1.1. Political Ecology: a framework to explore human-nature relationship:

Political ecology, first coined by anthropologist Eric Wolf (1972) is considered a broad interdisciplinary approach that provides unique theoretical, methodological and

empirical insights, which can be used to critically examine and unravel complex human-environment interactions (Castree, 2006; Muldavin, 2008). Formed at a juncture between radical development geography, cultural ecology, and political economy, political ecologists Wolf (1972), Blaikie (1985), Greenberg and Park (1994) and Hershkovitz (1993) worked with the strengths of these fields to form the basis of PE. PE has drawn much from cultural ecology, a form of analysis often shaped by Marixan theoretical considerations, which emphasises how culture depends upon, and is influenced by, the material conditions of society (Walker, 2005). In the 1980s, PE underwent cross disciplinary development, acknowledging the inherently political nature of environmental problems and borrowing extensively from a political economy framework approach (Budds, 2004). The union of these intellectual theories within the bounds of the PE framework marks the beginning of a drastically restructured and complex form of socio-environmental analysis (Robbins, 2004). This new approach integrates the concerns of ecology and a broadly defined political economy (Blaikie and Brookfield, 1987). It has been argued that nature society relations are better understood through political economy with a focus on the social relations of production under capitalism offered by Cultural Ecology theory (Robbins, 2004).

PE enquiry diverges from other forms of analysis of the human nature relationship in that it views this relationship is inherently political and affected by natural and social factors at multiple scales. PE insights into human-environmental issues are hailed as an alternative to what is widely understood and accepted by apolitical approaches. At the heart of political ecology lies the notion that politics inherently should be "put first" in any attempt to understand the human-environment may be linked (1998: 80). PE achieves this by offering a complex and holistic consideration of the multitude of possible factors affecting socio-environmental issues. Johnston et al (2000: 590) defines PE as "an approach to, but far from a coherent theory of, the complex metabolism between nature and society", although any attempt to define PE risks excluding some aspect of the PE approach (Castree, 2008b). There is no single methodology or set of theoretical concepts that can be used to define PE research (Neumann, 2009). However, distinguishable features such as multi-scalar analysis, political economic analysis, historical analysis, discourse analysis, ethnography and ecological field studies with an emphasis on the narrative rather than the descriptive are often seen as the hallmark of political ecology (Bryant, 1998; Neumann et al., 2009).

PE has found success as a framework for interpreting local resource issues by providing critical, as well as alternative theoretical, insight into the interplay between the environment and political, economic and social factors (Bryant, 1998). At the core of the political ecology framework lies a complex nexus of, environmental, social, economic and political processes and the influence of temporal and spatial scales (Bryant and Bailey, 1997). PE focuses on issues of power relations, recognising the importance of exploring the relationship between environmental impacts and cultural processes within their specific political and economic contexts. As Bryant (1998: 89) emphasises, "research has sought primarily to understand the political dynamics surrounding material and discursive struggles over the environment in the third world". In this way PE has emphasised local, minority, and indigenous knowledge while moving away from privileging a Western nature-culture dichotomy. In doing so PE has become a way of incorporating a sense of social and environmental justice into environmental struggles (Forsythe, 2008). PE also places emphasis on the consideration of the unpredictability of nature in influencing nature-society interactions.

Borne from Marxian theoretical influences which emphasise the consideration of social, political and economic relations of power distribution, PE in its earliest stages took shape through critical analysis of a number of key influential and strongly narrative theories. Utilising ethnographic case studies, PE begun to review early perspectives regarding human nature interaction, common property and the carrying capacity of the environment which commonly alluded to a solely local and human cause of environmental degradation and resource scarcity. Theories such as Hardin's (1968) *'tragedy of the commons*[1] (TOC) and Ehrlich's (1968) *'population bomb'* placed the responsibility for resource issues almost entirely upon the rational decisions of local resource users and managers. Empirical examples supported the claim that such conclusions were overly simplistic (Bryant, 1998; Robins, 2006; Castree, 2008a). Such

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1 The tragedy of the commons refers to a dilemma first described by Garrett Hardin in the journal *Science* in 1968. The article describes a situation in which multiple individuals, acting independently, and solely and rationally consulting their own self-interest, will ultimately deplete a shared limited resource even when it is clear that it is not in anyone's long-term interest for this to happen. Source - Garrett Hardin, "The Tragedy of the Commons", *Science*, Vol. 162, No. 3859 (December 13, 1968), pp. 1243-1248

theories provided inadequate explanation of resource issues as they ignored the many, ecological, social and political factors which play apart in human-nature relationship. It can be argued that a number of PE inquiries have stemmed from critical exploration and subsequent debate of the inadequacies of these theories. With its emphasis on extra local processes, the agency of nature and the distribution of power and resources, PE inquiries allude to some of the aspects of local environmental issues that are influenced by wider political and natural processes. As such PE has largely debunked a number of these key early theories. More recent efforts of critical PE scholarship have been towards debunking the interpretation of climate change issues and discourse (discussed further in section 2.2.2).

PE began to take shape in studies which politicised nature-society interaction through ethnographic fieldwork in small, agrarian communities in rural, developing nations (Neumann, 2009). This early research was to shape the predominant emphasis in PE with a focus on the wider socio political causes of the destruction of the environment, including resource degradation and resource scarcity. PE research emphasises the difficulty of defining degradation, in addition to the socio-political construction of the environment from a range of constructivist positions (Robins, 2006). An early example of this is Blaikie's (1985) *The Political Economy of Soil Erosion in Developing Countries*, which was an influential and early rejection of explanations for resource degradation, which emphasised exclusively local cause. Through the examination of wider contextual, political and social pressures acting upon local resource managers to extract surpluses from land, Blaikie (1985) defeated the argument that soil erosion in the African case study was the result inappropriate land management by local resource users, and instead argued that land degradation could be traced back to colonial policies of land appropriation. In this and later work, Blaikie reconceptualised land management as an inherently political, rather than a neutral and purely environmental or cultural adaption, issue. In effect, Blaikie's (1985) work on soil erosion in Africa politicised the human-nature relationship and in this respect is considered to have defined the new approach towards PE. PE has since proved to be a useful analytical tool to investigate the diverse range of factors that must be considered when exploring socio-environmental issues.

PE finds its place in politicising and challenging normative assumptions of the human-nature dichotomy (Walker, 2005). Thus PE has structure a re-examination of many other earlier axiomatic nature-society interactions, challenging what environmental

managers and scientists had previously taken for granted (Neumann et al., 2009). In conjunction to the exploration of the complex system of interrelated factors affecting resource management, resource related conflict also constitutes a major focal point of political ecology and will aid PE theory to provide an appropriate tool to explore neoliberal environmental governance in this study.

2.1.2. Political Ecology: a framework to explore environmental conflict and resource scarcity

Despite the high level of diversity that exists within the field of political ecology, between its substantive focus, epistemology and method, the causes of resource related conflict and policy responses continue to be a major analytical focus of political ecology (Turner, 2004). Political ecologists have consistently challenged popular notions supported by other similar schools of thought that resource scarcity is at the root of resource struggles (Robbins, 2004). Turner (2004) argues that PE provides a more comprehensive theoretical exploration than apolitical schools of thought, which strongly influence policies on environment and rural development, for example common pool resource theorists, property rights theorists, environmental security perspective, political economy, cultural ecology. Characteristically, these schools view the struggle over resources in a supply and demand situation, assuming that resource scarcity is the primary cause of conflict over resources (Turner, 2004). Whilst these schools have contributed widely to the understanding of rural resource conflict, they often ignore other important influential factors to resource conflict (Turner, 2004).

Political ecologists have made major contributions toward more multidimensional, complex views about the genesis of resource-related conflict (McCarthy, 2002). In order to expand upon the narrow conclusions of the resource scarcity thesis, a growing body of PE literature explores key issues surrounding resource struggles, in both developed and developing nations, which are specific (but not exclusive) to rural environments (see: Blaikie, 1985; Blaikie and Brookfield, 1987; Bryant and Bailey, 1997; Neumann, 1998; Peet and Watts, 1993, 1996; Rocheleau, 1995; Wolf, 1972, 1997). Certain themes are consistent across the study of rural resource conflicts, these include;

> ...access to and control over resources; marginality; integration of scales of analysis; the effects of integration into international markets; the centrality of

> livelihood issues; ambiguities in property rights and the importance of informal claims to resource use and access; the importance of local histories, meanings, culture, and `micro politics' in resource use; the disenfranchisement of legitimate local users and uses; the effects of limited state capacity; and the imbrications of all these with colonial and postcolonial legacies and dynamics. (McCarthy, 2002: 1283)

Whilst acknowledging resource scarcity plays a vital role in resource conflict, PE expands upon the overly simplistic notion that resource conflict is solely a response to a dwindling pool of resources (McCarthy, 2002; Turner, 2004). It does this by refocusing and broadening research inquiry into wider influential aspects of environmental conflict. Through an analysis of the discursive and physical manifestations of resource struggles, political ecologists have emphasised the diverse influences acting upon environmental conflicts (see: see: Blaikie, 1985; Blaikie and Brookfield, 1987; Bryant and Bailey, 1997; Neumann, 1998; Peet and Watts, 1993, 1996; Rocheleau, 1995; Wolf, 1972, 1997). Turner (2004) argues growth in knowledge and understanding of socio-environmental issues has contributed to the notion that environmental struggles are also a result of underlying power structures, which affect resource distribution. McCarthy (2002) concludes that PE essentially views resource related conflict as social conflict in the broadest sense of the term and is associated with struggles to gain access to natural resources and struggles resulting from the use of natural resources. This is not only shaped by environmental change and resource scarcity but also by the discursive struggles attached to such change.

The discursive aspects of resource struggles are a substantial focus of PE literature. PE identifies the divergent interests, powers and vulnerabilities of different social groups. PE studies have successfully utilised publicly expressed resource conflicts as examples where these underlying structures of power and interests are revealed (as shown by; Watts, 1983; Peluso, 1990; Neumann, 1998;). Such enquires have helped to illuminate political, social, economic and natural processes that affect socio-environmental issues (discussed in section: 2.2.1) over local, global and temporal scales (discussed in section: 2.2.3) and the influence of ecological factors upon the human-nature relationship (discussed in section 2.2.4). Furthermore PE focuses on the discursive nature of resource issues to interpret local perceptions of resource issues (discussed in

section 2.2.2). In this way, PE places perceptions of resource scarcity in context to other influencing factors.

2.2. Key elements of a PE investigation

The following section will explore four key areas of PE human-nature investigation to build a theoretical foundation that will be drawn upon to guide inquiry in this research thesis. These include: (1) the role of social, political and economic variables; (2) the role of discourse and the socio-political construction of nature; (3) the influence of spatial and temporal scale; and (4), the agency and role of nature in human-environment interactions. Creating a preliminary understanding of these areas of political ecology inquiry will aid in developing a more holistic and complex understanding of the case and strengthen the interpretive quality of research output.

2.2.1. The role of social, political and economic factors in human-environment interactions:

One of the defining traits of PE borrows from the neo-Marxian school of thought, exploring unequal relations of production and power and how this can shape human interactions with nature. Neo-Marxian theory has been used by political ecologists to interpret multi-scale political factors that effectively tie global political processes to variables at the local scale. Focusing on land degradation, Brookfield and Blaikie (1987) are widely recognised for instigating modern political ecology investigative inquiries; through linking political economy with ecology. A central argument of Blaikie and Brookfield's (1987) work was that ecological problems were at their core, social and political problems, and not technical and managerial issues, and should not continue to be treated as such. This claim demanded a theoretical foundation for analysing complex social, economic and political relations within which environmental change is embedded. Robins (2004) argues that PE's insight into the role that social, political and economic variables play in human environment interactions is the most important aspect of a modern PE approach, as these variables are seen to undeniably shape the outcome of human-nature interaction.

PE has provided valuable insight into social and political aspects in critical response to apolitical explanations of environmental degradation. Robins (2004) argues that PE's unique interpretation of social, political and economic factors provides a

framework to interpret both resource appropriation and resource degradation, which heeds the inherently political nature of these resource issues. In its response to politicising resource use issues, PE has based its response on questions about wealth distribution, social patterns of accumulation, interclass relations, the role of the state, patterns of land ownership, and control over access to natural resources (Neumann, 2009). In relation to this response, Bryant and Bailey (1997) distinguish three fundamental assumptions. Firstly, PE observes that non homogenous political, social and economic differences and the costs and benefits associated with environmental change, are distributed unequally. Secondly, PE scholarship recognises that this unequal distribution has a tendency to reinforce or reduce existing social and economic inequalities. Bryant and Bailey (1997:28) claim that "any change in environmental conditions must affect the political and economic status quo". Third, the unequal distribution of costs and benefits and the reinforcing or reducing of pre-existing inequalities holds political implications in terms of the altered power relationships that result (Bryant and Bailey, 1997).

An example of the application of PE to understanding the role of social, political and economic factors in resource issues is the interpretation by PE theorists that neoliberal processes are a new form of imperial or colonial control, as new resources are identified, expropriated and assigned using private property rights, commodified, and exported to support capital accumulation by powerful interests (Liverman and Villas, 2004). In this way, PE provides a framework that identifies the changes in political and economic structures, power relations in markets and property rights, as well as ideas and discourses that promote Neoliberal policies (as will be discussed in later sections in this chapter). Investigative techniques, such as discourse analysis (discussed further in the next section) provide political ecologists with an appropriate framework of interpretation to critically evaluate institutions, policies and management practices, in light of the advances in social-political theory and empirical research provided by PE studies.

2.2.2. The role of discourse and the socio-political construction of nature:

PE's focus on social, political economic and environmental discourses, and the production of knowledge, has established an increased emphasis on the relationship between human-environment interactions and discourse (Bryant and Bailey, 1997).

While debate about the role of discourse analysis in the field of political ecology continues, it has become widely recognised for its merits and insights over the past decade or so (Neumann, 2009). Discourse analysis is concerned with investigating how language and written texts are used to shape and influence behaviour, stressing the desires, imaginaries, ideologies and metaphors that work to produce discursive products that both reflect and shape relations of power (Lees, 2004). This allows analysts to go 'beyond the face value aspects of what is said or written' (Hastings, 1999: 104). In this way political ecologists use discourse analysis to uncover the motivations, drivers and barriers behind the perceptions and responses to environmental issues. This research emphasises the importance of exploring and revealing the ways in which the environment and environmental problems are discursively constructed (Neumann et al., 2009). One example of using discourse analysis is to reveal the inherent conditions behind contested discursive issues, including the implicit assumptions or values held by actors and the priorities they attach to the problem (Lees, 2004). Discourse analysis provides a core analytical technique in PE, which is vital to bridging the gap between the materiality of nature and the socio-cultural processes embedded within it (Harvey, 1996; Bryant and Bailey, 1997). As Castree (2001) asserts, when you understand the role and nature of discourse, you can understand the role it plays in the nature-society relationship.

Discourse analysis has provided political ecologists with an effective way to explore the discursive power struggles of stakeholders to understand the decisions that communities make about the natural environment in the context of their political environment, economic pressures and cultural norms (Blaikie, 1995). Of particular concern to the discourse analysis that will be undertaken later in this thesis is the implementation of MBI (market based instruments), which modify power relations between different actors in relation to resource use. As such, institutionalised changes to resource access may impinge on resource use and rights (Bryant and Bailey, 1997; Budds, 2004). For example, a number of studies have demonstrated issues of water management and privatisation within the PE tradition, such as Budds (2004) study of the Chilean model of neoliberalised water regime. Budds (2004) example has shown that water rights under neoliberal governance ideologies have the tendency to be permissive, the case also illustrates how large-scale farmers exert greater control over water, while peasant farmers have increasingly less access. These have raised important questions about the control and management of resources and in whose interest it is determined (Laurie and Marvin,

1999; Bakker, 2002; Budds, 2004). Analysis of stakeholder discourse plays an important role in understanding the (unequal) power relations and politics that underpin processes of environmental change and the socio-political and environmental implications of changing how natural resources are allocated and managed. Empirical analysis of key stakeholder discourse places specific emphasis on the effect of resource allocation upon the interests of "weaker" social actors (Budds, 2004). PE may bring a sense of social justice to resource struggles by 'shedding light' on unequal power relations and changes to economic and political disparity, resulting from the introduction of MBI (Turner, 2004) (as will be discussed in chapter 3).

In addition to exploration of discursive struggles over nature, the prevailing position within political ecology accepts the existence of a natural world that is independent of human perceptions of nature and recognises that our knowledge of nature is always situated, contingent and mediated through the social construction of nature (Blaikie, 1995; Blaikie, 2001; Castree, 2001). The more recent concept of "social nature", considered by Harvey, (1996), Pepper (1996), Escobar, (1999) and Castree (2001), challenges the western notion that nature should be considered as external or separate from society. Castree (2001) claims that the concept of social nature avoids the polar opposites of technocentric EM and radical ecocentrism. These theories both dichotomise society from nature whilst PE more clearly emphasises the social, economic and political processes that transform nature, conceptually and physically. PE provides insight into understanding the limits of theory, knowledge and scientific claims (Oels, 2004). PE questions the validity of "truth" and "reality", arguing that science can never be free from positionality (Castree, 2001). In particular, PE questions the role of "science" to provide knowledge about how nature works and how best to manage it, given the impossible neutrality of scientists (Castree, 2001) and other socio-political discourses concerning the environment (Oels, 2004). Environmental discourses have material and power effects, as well as being an effect of material practices and power relations (Peter and Oels, 2005).

Haas (1992) further expands upon this proposal claiming that environmental problems, such as climate change, are often not self-evident and are typically not defined in common sense language but rather in the technical language of epistemic communities. Thus information or evidence is disseminated via a top down approach. An issue many authors reiterate is that the discourses and metaphors of climate change are constructed globally and facilitated by a specific governmentality that renders it fundamentally

governable as an issue that needs to be addressed (Haas, 1992; McCarthy, 2006; Oels, 2003; Peter and Oels, 2005). The articulation of environmental problems beyond local evidence of climate change requires conceptual frameworks within which environmental problems become global socially constructed discourses. As such a PE approach to understanding popular discourses and social constructions of climate change will prove useful in later analysis. Also of importance to PE research are spatial and temporal geographies of scale and the role they play in shaping the human-nature relationship.

2.2.3. Spatial and temporal scales in nature-society interactions

Core to the PE approach are the related ideas of spatial heterogeneity, inter scalar connectivity, and scale dependent processes. Generally, scale and space are socially produced rather than ontologically given (Neumann, 2008). Recognition of the overarching influence of temporal and spatial scales has featured prominently in PE and remains a crucial point of analytical reference. To analyse the effect of scale variables upon resource issues, this thesis will draw upon the findings and theories of a number of scalar studies. PE analysis of scale has blurred the traditional lines drawn between north and south, city and countryside, and nature and society. Attention to scale as an object of analysis under a political ecology approach has become increasingly important over the past 30 years as diverse processes associated with globalisation have involved a rescaling of political, ecological, cultural and economic relationships (Brenner, 1999).

Inherent political scale factors were first warranted significant recognition in Blaikie's (1985) account of how agrarian societies deal with the social and ecological demands of an external capitalist economy (Bebbington, 1999). This study drew attention to the influence of multi-scalar factors in context of non-equilibrium ecology. Zimmerer (1994: 117;) claims ''attention to multiple scales is now de rigueur'' in PE. It is recognised that what happens in local places is impacted by social and environmental variables at different ecological and political scales. Brown and Purcell (2005) maintain that the field of political ecology has long been engaged in methodological debates about various scales of analysis but only recently has scale become an object of inquiry. Through this analysis of multiple scale factors, PE has begun to offer an explicit understanding of human–environment dynamics of particular scalar configurations, and how those configurations are produced, undone, and reproduced through political struggle (Brown and Purcell, 2005).

Brown and Purcell (2005) also warn that more often than not, the properties of scale have been implied rather than explicitly analysed, which has often resulted in misleading assumptions. They suggest that a closer engagement with a growing literature in geographical political economy that takes scale and ‘‘the politics of scale’’ as a specific analytical focus would help to avoid what they call the “local trap”, which many scholars have expressed concern with (see: Bebbington, 1995, 1996; Mohan and Stokke, 2000; Herring, 2001; Myers, 2002; cited in Brown and Purcell, 2005). PE argues that these outcomes may also be caused by political groups as a strategy to pursue particular agendas. As Bulkeley (2005) argued that the account of the geographies of environmental governance tends to take space and scale for granted as pre-given and contained natural entities. As Swyngedouw (1997: 169; cited in Brown and Purcell, 2005) argues, ‘‘the theoretical and political priority’’ in scale research ‘‘never resides in a particular geographical scale, but rather in the [social] processes through which particular scales become (re)constituted’’. In this way environmental problems can also be observed to be multi-scalar issues. For example if all forest owners in a watershed clear-cut forests, a resource and an option for use would be eliminated for decades, and there may be indirect effects of soil erosion and reduced water quality as a result that may last much longer (Norton, 1992). Environmental problems like this can then be understood as multi-scalar, or cross-scale spill-over problems.

Another key feature of PE interpretation is the importance of spatial and temporal scale in analysis of ecological change and its influence upon forms of EM (discussed further in the next section and section 3.2). Scale mismatch in human-environment relationship is described by Cash et al (2004) as perhaps the archetypal scale problem, a problem of fit between human institutions that do not fit coherently on to the ecological scale of the resources, either in space or time. Trans -boundary pollution issues and transient fish management problems fit into this category. More recently political ecologists have explored temporal scale mismatch. Temporal scale mismatches arise, for example, in cases where short electoral cycles conflict with long-term planning needs (Young, 2003). As will be shown in the next section, the agency of nature plays an important role in this scalar mismatch between human politics and ecological change.

2.2.4. The agency of nature and its role in shaping society-nature interactions:

Unlike other schools of thought discussed, PE explicitly explores the role of nature is both shaped by and shapes the outcomes of EM issues. One key assumption of cultural ecology largely disputed by PE theorists was that ecosystems were characterised by homeostasis and equilibrium (Neumann, 2009). Common belief for most of the twentieth century was that in the absence of disturbance, ecological communities would ultimately attain a stable state of equilibrium. Anthropogenic or natural disturbances to achieving this equilibrium were considered unnatural and should be avoided. This view of ecosystems held that cultural adaption was the key to understanding complex nature-society interactions, however, conclusions drawn from homeostatic ecosystems theory tended to ignore the impact of environmental phenomena on social factors (Wolf, 1972; Greenberg and Park, 1994). The Study of ecology suggests that natural ecosystems can display signs of chaotic function and disequilibria but also adaption and punctuated equilibrium (Sprott *et al*, 2005). Such unpredictability in nature suggests it may be difficult to stabilise, predict and manage such systems by human intervention (this has important implications for MBI and will be explored in more detail in chapter 3). The addition of non-linear analysis to PE considerations showed that ecosystems rarely respond as expected to human intervention and management (Robbins, 2004). Non-equilibrium ecology replaced "assumptions of equilibrium, predictability and permanence, with instability, disequilibria, non-linearity and chaotic fluctuation" (Neumann, 2009: 230). It is now understood that non-linear change and disturbance is natural and may actually serve a vital function in ecosystems (Sprott *et al*, 2005). It is for this reason that PE provides a suitable exploration of natural phenomena to explore the logical contradictions of neoliberal environmental ideology and its material failures.

Central to PE concerns is a vast empirical body of evidence documenting the fundamental unpredictability of nature and the inability of EM systems to account for this (McCarthy and Prudham, 2004). This is especially true for EM systems that rely on environmental economics theory and ecological measures of environmental goods or harm (discussed further in Chapter three). One arm of this research shows that naturally occurring biogeochemical cycles form a major component of the unpredictability found in nature. Inherent contradictions of environmental economics as a structured form of management often find it difficult to account for this unpredictability in nature, which becomes more evident over wider temporal and spatial scales (Oreskes, 2004). This has

implications for managing resources as well as for understanding the agency of nature in shaping human-environment interaction.

PE is advocated as an appropriate method to account for this unpredictability in human-environment interactions. To do so, a PE approach regards the environment as a relational agent of change (Castree, 2008b). PE draws upon non-equilibrium ecology to deal with uncertainty in nature and in this way, offers alternative insights into environmental responses to market based management actions, in addition to those predicted by economists and other political implementers of such EM mechanisms.

2.2.5. Conclusion:

From the previous analysis it has become clear that modern PE represents a synthesis of non-equilibrium ecology and social science as the basis for treatment of nature-society research. Within this synthesis four distinct themes have emerged, these are; the production and utilisation of environmental knowledge in conventional science, insights of non-equilibrium ecology which has brought renewed emphasis and provided insights into nature's role in shaping human-environment interactions, the importance of spatial and temporal scale in both non-equilibrium ecology and social theory, and the critical evaluation of the institutions, policies and management practices in light of the advances in non-equilibrium ecology and social theory. PE treatment of the nature-society relationship has provided critiques as well as alternative theoretical insight into the interplay between environmental, political, economic and social factors and an understanding of the pluralities and interconnectedness of society, economy and nature.

Little scholarship has explicitly explored and theorised the connections between neoliberalism and the environment in most industrialised nations, despite the emergence of market based solutions to environmental problems. Liverman and Vilas, (2006) claim assessment of MBI are often thwarted by limited socio-political data and a lack of detailed and balanced case studies. With little exception, inevitably wider contextual analysis is required to complete the broad critical reviews of Neoliberal instruments and as such PE provides a framework to investigate these important "...changes in political and economic structures, power relations in markets and property rights, as well as ideas and discourses that promote neoliberal policies" (Liverman and Villas, 2006: 333). PE provides a more systematic approach to reviewing neoliberal environmental governance

mechanisms – advancing the understanding of nature and unsettling attempts to control nature and thus complimenting neoliberal criticisms. PE provides a grounded theoretical framework to inform policymakers of the complexities surrounding human-nature interaction and thereby contributing to better understanding of environmental governance issues and the use of market instruments in environmental and resource management. The next section will complete the critique of neoliberal environmental governance, giving a full account of the influence, role and agency, of social, political and economic processes, discourse and scale over neoliberal theory and practical applications.

2.3. Neoliberal Governance

In this section, two complementing paths of enquiry will explore the neoliberal governance ideology that has shaped market based forms of EM. Section 2.3 will introduce the reader to neoliberal EM. Section 2.4 will then reveal PE critique and interpretation of neoliberal EM theory and policy mechanisms. This will explore the forces and reasoning that drive the current global trend to include neoliberal ideologies within the realm of EM policy frameworks through market environmentalism. It will be shown how neoliberal idealists have radically rewritten the priorities of environmental policy for more effective environment regulation. These include more cost-effective and efficient EM policy that also provides environmental goals. Exploration of neoliberal environmental ideology using a PE perspective will demonstrate the importance of interpreting and accounting for the nexus of interacting variables in nature-society interactions, which affect and are affected by, neoliberal governance.

2.3.1. Defining Neoliberalism:

Despite the familiarity of the term, neoliberalism is hard to define. Neoliberalism is often regarded as a political and economic philosophy, which loosely represents a complex assemblage of political philosophy, ideological commitments, discursive representations, and institutional practices (McCarthy and Prudham, 2003). Neoliberal philosophy originates from the analysis of Friedrich Hayek and Milton Friedman. It is embodied in a subset of economic and social policies based on neoclassical theories of economics, which minimise the role of the state and maximise the individual rights of the private business sector. Neoliberal theory and practices have been propagated by highly specific class alliances and organised at multiple geographical scales to encourages

economic prosperity and entrench individual rights. Neoliberalism has been popularised by arguments that greater economic efficiency is achievable in markets that are free to operate unregulated in comparison to inefficiency and high administrative cost of government intervention in a regulated economy (Baker, 2005). The global spread of Neoliberal theory has been translated into economic principles, practices and technical ideas. Neoliberal ideology prioritises the flow of capital and control of resources on the basis that market competition is the best regulator of the economy and responsibility of wellbeing is placed at the individual level (McCarthy and Prudham, 2003).

The global reach and adoption of neoliberal theory is undeniable and as McCarthy and Prudham (2003) claim, neoliberalism has become the most powerful ideological and political project in global governance to arise in the wake of Keynesianism. Neoliberalism is theoretically and empirically grounded in the philosophies and governance patterns of both developed and developing nations. Common forms of neoliberalism encompass neoliberal policy reforms such as privatisation of state enterprises, deregulation and the securing of property rights, reduction of trade tariffs and opening up to foreign investment (Bakker, 2005). These policy reforms seek to transfer control of the economy back to the public sector under the guise that markets operate more efficiently when free from government intervention (McCarthy and Prudham, 2003). Neoliberalism has since become an internationally prevailing paradigm of political practice and policy prescription. It has entrenched the use of markets, efficiency, consumer choice, transactional thinking and individual autonomy, and shifted risk and responsibility from centralised governments to the market and individual, as a means of ensuring social, economic and environmental wellbeing (Ong, 2006). More recently neoliberal ideology has been transferred to other realms of governance, such as environmental governance, through market environmentalism. This transfer of neoliberal ideology is endorsed as a mode of resource management that its proponents argue delivers "a virtuous fusion of economic growth, efficiency and environmental conservation" through market principals and means (Bakker, 2005: 543).

2.3.2. The Neoliberalisation of Nature through market environmentalism:

The natural environment may not have been part of the original neoliberal world view of Hayek and Friedman, but it is inextricably linked to neoliberal policies and

economic activity. For example, manufacturing sectors depend on water for extractive or waste disposal uses (Liverman and Vilas, 2006). Neoliberal governance philosophy has spread to the management and control of environmental and natural resources, in a growing belief in market rather than state led solutions to social and environmental problems. The transfer of neoliberal principals emerged globally as a political policy response to economic pressures and a means to restore economic stability in a time of economic crises. These reforms were soon extended into non-economic areas of public policy, setting the scene for bold innovation in environmental institutions (Buhrs, 2003). Proponents of market environmentalism assert that environmental goods will be more efficiently allocated if treated as economic goods through establishing private property rights, employing markets and competition over resources as allocation mechanisms, and incorporating environmental externalities through pricing (Larner, 2005). This process of prescribing market principals to aspects and the management of the environment is often referred to as the 'neoliberalisation of nature' (McCarthy and Prudham, 2003; Castree, 2008a).

McCarthy and Prudham (2003) and subsequently many others, have referred to this extension of neoliberal ideology as the process of the "neoliberalisation of nature" through the forces of market environmentalism in which the school of Environmental Economics has played a major role. A key divergence between traditional forms of neoliberal governance and new emerging forms of environmental Neoliberalism is that market environmentalism often requires reregulation rather than deregulation (Castree, 2008b). Castree (2005) asserts that neoliberalism is not easily definable. It has become axiomatic among researchers that they are in fact investigating a spatio-temporally variable process of neoliberalising nature rather than a fixed and homogenous process. Heynen and Robbins (2005: 2) define nature's neoliberalisation in the following terms:

> [The neoliberalisation of nature comprises] ... governance, the institutional political compromises through which capitalist societies are negotiated; privatization, where natural resources ... are turned over to firms and individuals; enclosure, the capture of common resources and the exclusion of the communities to which they are linked; and valuation, the process through which invaluable and complex ecosystems are reduced to commodities through pricing.

Fundamental to the neoliberalisation of nature is the assignment and protection of private property rights and the privatisation of natural resources. This takes shape in the privatisation and commodification of un-owned, state-owned, or common property resources such as forests, water, and biodiversity (Liverman and Vilas, 2006; Castree, 2008a). Market environmentalism builds upon Hardin's principle, arguing that the solution to the tragedy of the commons is to allow individuals to take over the property rights of a resource, essentially privatising it where the cost of polluting the commons is directly reflected in property. As Castle (1978) argued, the control of externalities of non-exclusive resources should be the focus of the existence or absence of property rights. Neoliberalism thus assumes that land and other resources such as forests are most efficiently managed by private owners. For example, timber and wild species such as fish have long been commodified and sold in the market. It is important to note that this theory assumes property owners will make rational economic decisions based upon property rights. The underlying philosophy is that property rights and resource owners will aim to protect the capital value of property, inexorably to protect their own private interests. In line with this rationalist theory, resource users would endeavour to control negative externalities, however political ecologists have revealed this is not always the case. Other market forces, non-economic and seemingly non-rational factors contribute to decisions (this will be discussed in detail in chapter three).

Critics of common property theory argue that the free market often fails to effectively manage common pool resources (McCarthy and Prudham, 2003; Liverman and Vilas, 2006; Castree, 2008a; Adler, 2009). It is claimed that the assignment of private property rights as a solution to the TOC is often confronted by changes in resource availability, which place property rights under 'stress'. This has in turn resulted in major policy issues related to market based environmental policy mechanisms with respect to land and water rights, the ocean fisheries, and more recently, the atmosphere and emissions (discussed further in the next section). Literature suggests that the neoliberalisation of nature, assigning private property rights and application of market principals to forms of environmental management has undoubtedly played a role in providing more effective solutions to environmental problems in terms of efficiency and cost effectiveness (Starvins, 2003). However, it has been argued that idealistic propositions of market environmentalism are unreasonable and overlook the basic

principles of policy making, involving multiple actors, power struggles, the agency and unpredictability of nature and the spatio-temporal variability of these factors.

The next section will begin to explore a growing body of PE inquiry which has begun to challenge and provide a complex assessment of the often simplistic application of market principals to forms of EM. Scholars have consistently challenged the notion of market environmentalism and the application of economic principals to EM as it is considered, "over simplistic, misleading, and hyperbolic" (Blumm, 1992: 372). This has led to uncertain and contradictory social and environmental outcomes (Mansfield, 2004; Prudham, 2004).

2.4. Critical insight into neoliberal environmental policy

Although neoliberal ideology advocates the efficiency of the market, free from government intervention, this is the exact argument many scholars pose against neoliberalism. This section will present criticism from a number of scholars and will demonstrate that market environmentalism has resulted in uncertain and contradictory social and environmental outcomes. PE insight will demonstrate the ideologies behind neoliberal EM are often inadequate to account for and manage the diverse range of influences affecting nature-society interactions. This section will show that a PE framework is a suitable to explore the underlying neoliberal governance and market principals employed by MBI due to the inherently political and ecological nature of environmental issues (This theme will be built upon further in Chapter three). The growth of neoliberal environmental governance theory has led to a major expansion in the use of MBIs and voluntary agreements at national and international levels. Yet, despite the prevalence of these instruments in a broader shift toward neoliberal approaches to environmental policies, Robertson (2004) claims there are countless examples of logical contradictions and material failures of the Neoliberal project. Liverman and Vilas (2006) proclaim that neoliberal policies in general seem to lack empirical analysis and supporting data necessary for balanced case studies. Critical insight provided by PE and other critical schools of thought have revealed the disparity that exists between actual and intended outcomes of neoliberal policy measures (McCarthy and Prudham, 2004).

The misadventures and contradictions of neoliberalism are well-chronicled, and furthermore political activism has indicted neoliberalism as a political, economic and

environmental debacle (Wainwright et al., 2000; cited in Henderson and Norris, 2008). A review of literature suggests that the alleged failures of MBIs and market based environmental trading systems in particular are connected to the contradictions and uncertainties embedded in its parent ideology; neoliberal theory (McCarthy and Prudham, 2004). Various political and ecological contradictions and tensions arise in the course of reconfiguring social relations to nature that counteract the proclaimed effectiveness of neoliberal policy measures (McCarthy and Prudham, 2004). Ackerman and Gallagher (2000) argue that there are a number of theoretical contradictions behind market-based environmental policy which fail to address basic environmental protection objectives. Contradictions in neoliberal environmental governance theory exist on two levels; firstly, through the use of market principals to guide environmental management decisions. Secondly, market based allocation of resources may lead to new injustices, be costly in administration, and have the potential to entrench and actively encourage unsustainable environmental values rather than change them. From this observation, three critical themes of the theoretical and practical shortfalls of market environmentalism become evident: (1), an omission of socio-political consideration; (2), the use of market principals in the management of the environment; and (3), the influence of inherent environmental factors of unpredictability and scale.

Firstly, market environmentalism's simplistic policy prescriptions often ignore the uneven distribution of resources and wealth amongst different groups in a society in a general failure to include socio-political considerations in policy development and implementation processes (Bakker, 2005). The direct effects of these policy changes impose a structural modification of rights and change the relationship among those who hold rights, either within the private sector or between the public and private sectors. An example of a neoliberal approach is provided by Budds (2004) in an investigation of water use rights in Chile, which illustrates how neoliberal policy can further exasperate disproportionate power relations between resource users. Chile has experienced the neoliberalisation of its water use rights by privatising and assigning private property rights over water resources. Budds (2004) found that large-scale farmers exert greater control over water, while peasant farmers have increasingly less access. Budds (2004) argues that these outcomes are facilitated by the omission of social considerations within the framework of the Water Code (2001; cited in Budds, 2004). Through his examination of social equity and the environmental aspects of water resources management in Chile,

Budds (2004) suggests that the omission of these issues from the international debates on MBIs, as water rights markets, has resulted in disproportionate distribution of political power and income. This has provoked significant social injustices and as such, is cause for concern.

2.4.1. The privatisation, commodification and marketisation of nature

The establishment of private property rights directly influences the management of natural resources such as land, water, forests and fish as well as the newly defined resources of carbon and biodiversity (Liverman and Vilas, 2006). Liverman and Vilas (2006) claim this is especially the case when privatisation is associated with the neoliberal philosophies such as the commodification and sale of nature's services and rights to pollute are allocated, both which implies intrinsic values can be attached to natures commodities. Under neoliberal management property rights are established over natural resources, so that the benefits of such natural resources as biodiversity and the atmosphere can be valued and traded. Daily and Ellison (2002; cited in Liverman and Vilas, 2006) claim:

> Thus market-based mechanisms have been endorsed as the most effective method of protecting ecosystems whereby a forested watershed can generate income as a store for carbon and water, as an ecotourism or park destination, as a biodiversity prospecting zone of value to pharmaceutical and food industries, or as a source of sustainability-produced wood products.

The assumption here is that the market will set a price on these resources or ecosystem services that reflect intrinsic environmental value of protecting the environment or using it sustainably. Fundamental contradictions of nature's neoliberalisation exist in the concept of nature as a commodity. Polanyi's theorising of nature as a ''fictitious commodity'' remains a powerful ecological critique of liberal and now neoliberal capitalism. The illusion of nature as a fictitious commodity is driven by the divorce of markets from social regulation and driven by the politics of neoliberal schemes which create the 'illusion' that nature is a commodity, entirely produced and regulated by market forces (McCarthy and Prudham, 2004). Bakker (2005) found that under the self-regulating market of liberal capitalism, market signals alone are insufficient in governing the allocation of nature to meet economic and competing social demands,

for example clean drinking water, as nature itself is not a commodity produced for sale. Thus, the penetration of commodity relations and market circulation into the social (re)production of nature is made problematic by the ‘‘un-produced’’ character of nature (Bakker, 2005), in the sense that ecological production remains central to social production (Castree, 1995).

Whilst some argue that the commodification of nature and assignment of property rights encourage more efficient management and use and conservation of resources others believe that common property is better managed by governments and regulation as markets do not place enough value on environmental quality or the services that ecosystems provide (Liverman and Vilas, 2006) let alone do these services have an intrinsic or distinguishable market value. PE structures arguments against the assignment of private property rights in that these solutions fundamentally ignore the wider contextual socio-political and environmental factors which influence the management and use of resources. One example of neoliberal governance in support of private property rights as a form of environmental protection is found in Australian farming Land care groups which support the devolution of resource management to community based care groups. What Lockie and Higgins (2007) call a Neoliberal environmental hybrid form of EM ties promotion for sustainable land management to the maintenance of productivity at the farm level. Wallington and Lawrence (2008) claim attempts to combine often competing and contradictory imperatives under the rubric of single political problem has contributed to the failure of such attempts to achieve their desired outcomes. In the case of Land care groups in Australia there has been a failure of voluntary approaches to generate collective outcomes at ecologically significant scale due to ad hoc outcomes. Critics of common property theory question the emphasis placed upon personal responsibility by resource managers. Through empirical studies scholars often criticise the assignment of property rights in that they more often than not create a dubious sense of ownership responsibility and public ownership of the problem which subsequently produces ad hoc outcomes (see: Lockie and Higgins, 2007; Wallington and Lawrence, 2008).

Dietz *et al* (2003) has found this is similar to the privatisation of previously commonly owned resources. Where these resources which have been traditionally managed by local organisations are enclosed and privatised in order to “protect” such resources. Dietz *et al*, (2003) claims these initiatives often ignore the pre-existing

management, and can appropriate resources and alienating indigenous (and frequently poor) populations. In effect, private or state use may result in worse outcomes than the previous management of commons.

Critiques of property rights theory propose that fundamentally property ownership is the problem. Critics of assigning private property rights as the solution to TOC have pointed out that many commons, such as the ozone layer or global fish populations, have proven extremely difficult or impossible to privatize and manage (McCarthy, 2004). Dorfman (1974; cited in Castle, 1978) was one of the first scholars to dispute the claim that property rights were the solution to the social dilemma of the TOC. Dorfman (1974; cited in Castle, 1978) emphasised that the presence or absence of property rights should not be the fundamental way of viewing the problem of resource scarcity but rather insists that attention should be paid to the physical independence of nature upon externalities of resource use and socio-political discourses surrounding the effects of property rights on the utilisation of a resource. Supporting these claims Van Vugt *et al* (1996) explain that key to structural solutions to social dilemmas is both the environment and the personal belief and discourses of key stakeholders. Van Vugt *et al* (1996) found that where stakeholders are constrained by wider social, economic and political pressures or they believe they are not capable of performing collectively desired action they do not become effective environmental stewards of resources and the likely positive net gain from the participation of local resource users is little or none (Van Vugt *et al*, 1996).

2.5.Conclusion:

This chapter has firstly demonstrated PE's proficiency in interpreting the nature-society relationship and has secondly explored the capacity of neoliberalism to shape new approaches to environmental and resource management and the resulting socio-political and environmental outcomes. PE moves towards fundamental questions regarding who produces nature and with what social and ecological outcomes. The output of such research stresses the need for political, rather than technical or policy, solutions to environmental problems (Escobar, 1999; Castree, 2001). Contrary to PE findings, it is increasingly argued that the need for more efficiency in the management of natural resources and EM has resulted in the adoption of neoliberal policies in the management of the environmental realm.

So far the review of literature has shown that neoliberalism, despite becoming one of the most powerful ideological and political projects in global governance (McCarthy and Prudham, 2004), is widely criticised in academic literature. Many scholars have challenged the notion of market environmentalism, claiming that its prescriptions are over simplistic, misleading and hyperbolic, and that it has led to uncertain and contradictory social and environmental outcomes (Blumm, 1992; Funk, 1992; Mansfield, 2004; Prudham, 2004; Castree, 2001; McCarthy and Prudham, 2004).

Whilst the literature suggests that market approaches to EM may have some role in finding effective solutions to environmental problems in terms of efficiency, it has been argued that the idealistic propositions of neoliberalism and market solutions are unreasonable and often overlook the basic dynamics of policy making, including: unequal power relations in networks of actors (Richardson, 2000; Budds; 2004); the agency and unpredictability inherent in nature (Sprot *et al* 2005; Castree, 2008a); and the overarching influence of multiple scale factors (Blaikie and Brookfield, 1987). Compounding these factors Liverman and Vilas (2008) claim that neoliberal policies in general lack empirical analysis and supporting data necessary for balanced case studies.

In summary, political ecologists have contributed to a fairly comprehensive sense of how and why neoliberal environmental governance operates today and importantly, have identified the omission of pertinent nature-society relationship issues from the neoliberal policy debate. In review of the logical contradictions and material failures of the neoliberal project, there is a need to reconsider the technical prescriptions, process and outcomes of neoliberal environmental governance ideals, and the practice of market environmentalism. This burgeoning academic critique supports the call to consider and include a variety of actors, values and approaches in the policy debate, consultation and implementation process. As these factors lie at the core of the PE approach, it has been suggested that a PE framework provides an opportunity to explore and complete these criticisms. This taken into consideration, the next chapter will utilise a PE perspective to provide a comprehensive exploration of MBI, how they operate, their intended effects, and their operational outcomes, in an effort to shed light upon lessons for effective implementation.

Chapter 3 LITERATURE REVIEW

Market Based Instruments

3. Market Based Instruments

In response to growing consensus amongst neoliberal advocates, environmental economists and governments on the need for more efficient environmental management, market based approaches appear to be spreading rapidly and growing in intensity (Stavins, 2003). However, academic research and prognostic evaluations of Market Based Instruments (MBI) have only recently begun to emerge (Gustafsson, 1998; McCarthy and Prudham, 2004; Mansfield, 2006; Henderson and Norris, 2008; Castree, 2008). Of particular interest are the underlying assumptions of MBI. Scholars from a number of different schools of thought including political ecology claim the academic effort to understand the dynamics that may either drive or inhibit effectiveness in market based responses to environmental issues to date, has been limited (McCarthy and Prudham, 2004; Mansfield, 2006; Henderson and Norris, 2008; Castree, 2008). This research has revealed that a number of social and political factors have been overlooked when looking to employ MBI. As consequence, political resistance and modification of MBI during the policy development phase is common in order to secure political acceptability of proposed instruments (Mansfield, 2006; Henderson and Norris, 2006). As such, the modification of MBI for political saliency often involves a reduction of restrictions imposed by the instrument upon individuals and business which has important implications upon the effectiveness of MBI and their political outcomes in practice (Henderson and Norris, 2008).

As chapter two has shown, Political Ecology provides a suitable approach to establish and explore the underlying neoliberal undertones of MBI. This chapter begins by exploring the neoliberal theories of environmental management that underlie MBI in section 3.1. Section 3.2 will use a political ecology framework of interpretation to

critically explore the underlying assumptions that the assignment of private property rights, proper pricing of the environment and extensive use of market mechanisms in environmental management (EM) will in theory solve environmental problems. This approach will reveal evidence that links the shortcomings of MBI to flaws in the underlying logic of market approaches more generally.

It will become evident throughout this chapter that the underlying knowledge and economic assumptions of MBI often contradict policy goals of environmental protection. In section 3.3., empirical evidence from a number of MBI will suggest that overlooking economic, spatial, social and environmental factors has led to injustices. It will be revealed that many complex socio-political factors, the unpredictability and agency of nature and the effect of multiple spatial and temporal scale effects all affect neoliberal governance. Evidence will suggest that these flaws in MBI have the potential to lead to perverse socio-political outcomes and potential injustices in section 3.3. Lastly it will be shown that as a result of perceived injustices, political opposition and modification can new environmental issues as a consequence of political opposition to and modification of MBI policy, this will be explored in section 3.4. It is important to note that examples of other MBI will be used to explore these claims. Fisheries quota management systems (QMS) and emissions trading schemes (ETS) provide a longstanding and comprehensive body of PE literature on MBI. Therefore emphasis will be placed on utilising these examples in this chapter.

3.1. Neoliberal theories for environmental management

The following sections will critically explore the underlying environmental economics theories of MBI and reveal a number of contradictions of their underlying assumptions. Core to these market-led initiatives are a number of assumptions regarding the valuation of the environment, property rights and rational choice theories and scientific knowledge based assumptions. Critical exploration of MBI literature will provide empirical evidence that the actual function of MBI may in fact contradict many of the basic economic hypotheses derived from market theories. This section will begin with an introduction to the common economic and knowledge based assumptions of MBI.

3.1.1. Market Based Instrument theory

Environmental policies typically combine a goal with a means to achieve that goal (Stavins, 2003). Conventional regulatory policies and market based instruments form the two most common approaches to environmental and resource distribution. Conventional forms of environmental regulation are often referred to as command and control approaches. These approaches are 'top down' prescriptive forms of regulation such as emissions standards, specifications, and limits. Such approaches have been widely criticised across critical economic and academic literature as being costly to implement and allowing relatively little flexibility in the means of achieving goals in addition to restricting technological innovation (Stavins, 2003; Gruin, 2003). As Gruin, (2003) concluded, command and control approaches result in "no firm-level gains from discovering and applying new technologies, since all producers will use the same technology" and therefore create both environmental and economic constraints, whilst restrictions on technology also hinder competition.

Alternatively MBI approaches intend to reduce inequalities, create fairer markets and address social needs (Stavins, 2003). Advocates argue it is for these reasons that market based approaches to environmental management and resource distribution are becoming an increasingly popular means of achieving environmental goals such as pollution control (Stavins, 2003, Henderson and Norris, 2006). A common argument for free trade and private markets derives from economic theories which suggest that the costs of pollution and environmental degradation are more efficiently controlled by market mechanisms for a number of reasons. According to economic theory underlying market environmentalism, environmental degradation is an ecological and social cost not included in the cost of production (as a negative externality of production). It is widely argued that when well-designed MBIs, such as tradable permits or emissions charges, when designed appropriately, can effectively internalise the cost of pollution in the cost of production through "harnessing market forces" (OECD, 1998; cited in Stavins, 2003). Free-market approaches are based on internalising costs through the polluter pays principle or by allocating quotas for pollution or resource use that could be used, saved, or traded, they encourage firms and individuals to participate in reducing emissions or pollution by undertaking pollution control. As such price signals are intended to provide incentives for businesses and individuals to act in ways that further not only their own

financial goals but also environmental aims such as reducing waste, cleaning up the air, or reducing water pollution (Stavins and Whitehead, 2005: 229). Cap and trade schemes for trading carbon and nitrogen emissions units are an example of a price signal which internalises the cost of emissions as a proponent of production and thus provides an incentive to minimise environmental impact. Thus individuals and businesses are expected to act entrepreneurial, finding the most cost effective way to reduce their impacts such as through the use of pollution reduction technologies (Bakker, 2005). In this way proponents of market environmentalism believe environmental goods will be more efficiently allocated if they are treated as economic goods and managed by market principals such as; establishing private property rights, employing markets as allocation mechanisms, and incorporating environmental externalities through pricing. Simultaneously, FME attempts to address concerns over environmental degradation and the inefficient use of resources, suggesting that markets and private property rights can be deployed as the solution rather than being the cause of environmental problems (Bakker, 2005).

MBI are intended to include environmental costs and benefits in the cost of production and consumption of goods or services (Stavins, 2003). MBIs achieve this through taxes or charges on processes or products, or by creating property rights and facilitating the establishment of a proxy market for the rights to emit and offset emissions (Henderson and Norris, 2008). For instance, in complying with obligations under the Kyoto Protocol to reduce and manage greenhouse gas emissions, the New Zealand Government has employed the New Zealand Emissions Trading Scheme (NZ ETS). This market based cap and trade instrument places a price on emissions of greenhouse gasses and forestry sequestration of carbon as positive and negative externalities of production associated with anthropogenic climate change. Tradable permit schemes allocate a uniform value for each unit or proxy for environmental goods or bads (explained further in the next section). Under a market based tradable permit scheme, permits are a form of property right and as such can be bought or sold; allocated permits are traded between firms to meet goals of MBI policy. Therefore, permits are often capped to a desired level to stop aggregate increases in emissions, for example for the right to emit greenhouse gasses under the NZ ETS. The intention of tradable permits is to allocate the right to use or emit positive and negative environmental externalities by managing the level at which they are allocated or used. MBIs do this by allowing a number of abatement options while

creating uniformity in price for each unit (or proxy for) environmental goods and bads. It is often argued that when well designed, MBIs such as tradable permits or emissions charges such as the European Union Emissions Trading Scheme (EU ETS) function effectively by harnessing market forces. They encourage firms and individuals to participate in reducing emissions or pollution, thus partaking in pollution control efforts that are in their own interests to collectively meet policy goals (Stavins, 2003). A number of important principals that underlie MBI in order to encourage appropriate environmental behaviour through price signals and the function of private property rights over nature (Stavins, 2003). These are outlined in the following sections.

3.1.2. Underlying assumptions of Market Based Instruments:

A number of authors have observed that resource managers looking to implement MBIs often hold a number of hypotheses and economic assumptions regarding environmental resources and their management to be objectively true (see: Stavins, 2003; McCarthy and Prudham, 2004; Mansfield, 2006; Henderson and Norris, 2008; Castree, 2008). As was explored by Blaikie and Brookfield (1987), Mansfield (2006) observed that resource managers advocating market approaches often believe that existing problems are caused by traditional open access property regimes and the absence of property rights over limited or degradable resources. A market based policy response to these resource issues generally entails three fundamental assumptions. Firstly, an assumption that components of the environment can and must be valued, and that monetary valuation is the best form. Secondly, property rights over resources need to be defined. Third, the employment of MBI in resource management is justified by this economic theory and scientific knowledge and modelling. The following sections will review these proponents.

3.1.2.1. Valuation of environmental externalities:

Valuation and quantification of environmental externalities form two essential components necessary for implementing MBI. As previously stated, proponents of MBI argue that the environment and the services it provides are not fully 'captured' in commercial markets nor adequately valued in terms comparable with economic services and manufactured capital. Economists argue that the environment is often given too little weight in policy decisions because the environment is not valued in the same way as

other forms of capital stocks (Costanza et al, 1997). Value is added or subtracted via the pricing mechanism of markets and price determined by supply and demand of externalities. This is intended to relay accurate information to producers and consumers in regards to the relative value of externalities (McCarthy and Prudham, 2004). In order for these values to be taken into account by resource users, private property rights must be assigned to resources and externalities. Hence, monetary values are essential to provide a price signal to resource users.

In order for environmental markets to function effectively with prices that reflect the cost of environmental degradation, or protection as a result of externalities, there must be sufficient incentive for resource users to manage externalities. Proponents of market environmentalism believe this problem can only be solved through the assignment of private property rights and the creation of markets for resources and externalities of production. Swinton et al. (2007: 248) highlight that ‘‘food, fibre and fuel have market prices that provide both incentives to produce those environmental goods as well as measures of their value to society. But many other environmental goods (and bads) lack markets.” In these cases, Spangenberg and Settele (2010) suggested that MBIs have been introduced to translate non-market environmental services into financial assets traded on markets. MBIs attempt to link the economic rationality of firms’ self-interest through property rights. Spangenberg and Settele (2010) explain the rationality is that if externalities are priced and the costs transferred to developers then it becomes economically irrational to produce externalities and will in turn encourage behaviour to offset or reduce such externalities. In this way, the ownership of positive environmental outcomes or externalities are environmental “goods”, which are rewarded by appropriate monetary incentives. These are often sinks into which emissions are discharged, such as rivers, oceans and the atmosphere. On the other hand, negative externalities are environmental “bads”, which are more commonly known as pollutants to be punished with appropriate monetary disincentives. The inclusion of forestry in the New Zealand Emissions trading scheme (NZ ETS) is one such example. In this example, carbon fixing by forests is made a tradable good; the market establishes a price and thus a value for this service. Under the NZ ETS, firms emitting greenhouse gasses then pay for ‘carbon stored’ in the forest (MfE, 2007). By linking positive and negative environmental externalities to a firm’s pricing structure it is expected that resource users will react rationally to price signals. In this way the value imposed on property rights by

environmental goods and bads is intended to reflect the value of externalities and their production.

3.1.2.2. Private property rights and behavioural assumptions:

Property rights are another concurrent theme of MBI and are intrinsically linked to the Tragedy of the Commons (Hardin, 1968) theory that resource users will degrade environmental resources for personal gain unless it is not rational to do so. The underlying theory of MBI assumes environmental problems are caused by a lack of markets and in particular, a lack of property rights within markets (Mansfield, 2006). Principally, environmental economics theory maintains that conventional markets with unpriced environmental externalities fail to allocate environmental resources effectively, and as such, constitute an important instance of market failure (Hanley *et al*, 2007). This lack of property rights creates externalities that include negative environmental problems, which are not included in the cost of production. In turn this lack of property rights over externalities does not incentivise environmental protection as firms do not bear the costs of their actions. Thus, assigning property rights and forming markets is not only seen as a solution to existing environmental problems but also as a preventative measure (Mansfield, 2006). As such, Starrett (2003: 101) argued that ‘‘the establishment of property rights is a necessary precursor to the use of markets.”

Underlying economic theory of MBI views environmental protection and degradation as positive and negative externalities with ecological and social costs and benefits not included in the costs of production or consumption (Liverman and Villas, 2006; Stavins, 2003). For economists, these examples of market failure result from a lack of secure property rights to natural capital and environmental externalities. As such neoliberal market theorists dictate the assignment of property rights to natural capital and environmental externalities as an obvious solution. The solution proposed assumes that through the definition of private property rights and secondly, the rational decision making of stakeholders, based upon the costs and benefits of producing environmental externalities and the value of property resource users will make the right decisions regarding the production of environmental externalities. In this way market based policies relying on the rational decisions of resource users are intended to link the economic rationality of firm’s self-interest to environmental outcomes through property rights. As Anderson and Leal (2001: 4) described, assigning property rights over natural

resources "[impose a discipline] on resource users because the wealth of the property owner is at stake if bad decisions are made''. Rational economic choice theory dictates that where economic decisions are made regarding environmental externalities and resources, actors take into consideration the financial costs and benefit outcomes of such decisions (Stavins, 2003). Property rights allegedly represent the most appropriate and effective way of achieving environmental policy goals by inducing rather than commanding changes in behaviour (see Anderson and Leal, 2001; Stavins, 2003). Such claims are heavily dependent on the rational decisions of stakeholders (Anderson and Leal, 2001), and as Dasgupta (2010) argues, positive and negative environmental externalities are expected to be influenced by and share the same logic.

3.1.2.3. Knowledge based assumptions:

In addition to the economic assumptions outlined, MBI also require scientific modelling and knowledge of the environment under market management (Reid et al., 2005). Scientists have used economic discourse outside of the guise of science to make their case heard. For example, this applies to talking about ecosystem services rather than ecosystem function, viewing ecosystem benefits as externalities which accrue to those who are not paying for them. It is argued that scientists, by employing market based discourses, convey to decision makers the scientific principals and subjective classification of ecosystems in a way they hope will stimulate decision makers to act (See: Reid et al., 2005).

Discourse plays an important role in the legitimisation of MBI and associated science. Economic assumptions and discourses promote the efficient use of resources through competition, as discussed in chapter two. MBI can be seen to rely on a so called 'linear model' of policy development, which relies on scientific knowledge to inform policy decisions. For example, the maximum sustainable yield model (MSY) is a model for QMS fisheries management which relies on the assumption that equilibrium can be achieved between fishing effort and stock size. This is effectively a linear transition, from the acquisition of scientific knowledge regarding a resource, to its application in a model for management and subsequent use to inform policy decisions. This linear model is based on first getting the science 'right', as a sufficient, if not necessary, basis for decision making (Oreskes, 2004; Sarewitz, 2004). In this way environmental economics relies on knowledge based assumptions and on a linear model of science to reclassify

ecosystems in line with economic discourses (Sarewitz, 2004). Spangenberg and Settele (2010) conclude that modelling environmental externalities creates knowledge, definitions and popular scientific discourse, regarding to the physical states, structures and processes of the environment.

3.1.3. Conclusions

This section has revealed three core underlying philosophies of MBI. Firstly, MBI require the commodification of ever increasing spheres of nature. This involves valuation in order for pricing mechanisms and the function of the market to work effectively. Positive and negative externalities of production must be given value in order to send price signals to producers and consumers. Secondly MBI require the assignment of private property rights over environmental resource and externalities. This inherently relies upon rational choice theory, that in order to achieve environmental protection goals of MBI policy, resource users must make rational choices based upon the values associated with property rights over resources and externalities. Lastly the underlying assumptions of MBI rely on linear application of scientific models to market instruments and policy in order to determine appropriate levels of resource use or extraction.

Although these principals would seem to provide an effective alternative to command and control approaches, many political ecologists argue that MBI often fail to achieve their intended outcomes. The second half of this chapter will provide examples of the barriers to MBI effectiveness, namely those associated with the material consequences of a failure for MBI to account for the political ecology of resource issues. The importance of understanding the political ecology of resource-use issues will become apparent through analysis of real world examples of MBI.

3.2.Barriers to MBI effectiveness:

Many policy makers hold unrealistic expectations about the capacity of MBls to deliver cost-effective outcomes. Economic analysis inherently overlooks unintended and perverse outcomes of neoliberal theory. The second half of this chapter will provide examples of the barriers to MBI effectiveness, namely those associated with the material consequences of a failure for MBI to account for the political ecology of resource issues. The importance of understanding the political ecology of resource-use issues will become apparent through analysis of real world examples of MBI. Importantly political and

environmental phenomena link two constituent parts of MBI policy. Stavins (2000) asserts that nearly all policy instruments consist of two parts of a greater whole: a goal, for example environmental protection, and secondly a means to achieve that goal, being the market instrument (Stavins, 2000).

Many of the underlying assumptions of MBI policy overlook pertinent natural and political aspects of resource issues. A growing body of theoretical and empirical literature has begun to critique the underlying assumptions of MBI such as market design elements, valuation of pervasive environmental externalities and critiques of private property rights. The following sections intend to purvey the subsequent barriers and difficulties MBI face as a consequence. There are a number of reasons why MBI may fail to achieve economic, political and environmental effectiveness in practice. Assumptions of MBI which may often contradict the goals of resource protection have important material consequences. Such material consequences affect specific elements of market instruments and as will be shown, may provide insight into the effectiveness and appropriateness of MBI more generally.

This section will explore how political ecology may shed light upon the complex causality behind environmental issues and the complexity of the functions of nature which call the simplifications of MBI theory, into question (Gustafsson, 1998). Thus it will be demonstrated that the political ecology of resource issues may be used to address the limitations of the market mechanism in regards to: coping with the functions and services of nature; as defined and enforced by property rights; an on-going reliance upon government intervention, incongruous with self-functional market logic; difficulties between the pervasiveness of externalities conditioned by the public goods characteristics of natural resources; difficulties in processing and developing information required for MBI and high transaction costs which may compromise the effectiveness and question the appropriateness of MBI (Gustafsson, 1998; Mansfield, 2006). Together this evidence will argue challenges to the validity of some of the basic propositions of market approaches to EM.

3.2.1. Contentions underlying property rights and rationalist assumptions

At the core of market approaches to environmental management, property rights, and the valuation of environmental commodities and externalities have received much criticism. Consensus arises amongst critiques of the valuation of environmental externalities and associated MBI assumptions including: an inability to accurately value externalities and an ignorance of the non-economic values of the environment; imperfect information necessary for comprehensive valuation; and a reliance upon the rational decision making of stakeholders associated with private property rights (Anderson and Leal, 2001; Stavins, 2003; Barkmann et al, 2008; Spangenberg and Settele, 2010). Spangenberg and Settele (2010: 334) have argued against valuation and assignment of private property rights to externalities due to the inherent complexity of resource user's economic decisions. They argue that the assumption that resource users will react rationally to economic incentives is inherently flawed as unexpected economic incentives have often proved counteractive to resource protection. Many authors claim there is a complex milieu of factors that contribute to resource users decisions outside of economic values that may render simple valuation of pervasive environmental externalities and the assignment of property rights under MBI unpredictable (O'Neil 1997). O'Neil (1997) claims that valuation does not capture non-economic values attached to the environment, whilst others (see: Spangenberg and Settele, 2010) argue simply that such values cannot be attributed to the environment and as such, valuation should simply not be attempted.

The underlying assumptions surrounding the assignment of property rights have received critique from a broad range of scholars from different disciplines (Budds, 2004). An example is that non-economic (and seemingly non-rational) decisions may undermine the purpose of valuation and assignment of property rights. Firstly, the literature indicates that property rights and monetary incentives and disincentives do not always induce rational responses from resource users. Secondly, the market mechanism itself has been found to provide perverse incentives to environmental protection. For example a polluter may continue to pollute even if it is not economically rational to do so as MBI may provide a perverse incentive to do so. Stavins (2003) found that the standard theory of rational choice has failed in a number of instances in the SO2 allowance trading program in the Clean Air Act amendments of 1990. Stavins (2003) argued that in at least two instances firms had continued to pollute although at first it appeared it was not economically rational to do so, more pervasive incentives under the MBI drove firms to continue to pollute.

Robbins (2004) argues that resource users are driven by a vast array of economic and non-economic incentives, which are often too complex to predict and may undermine the capacity for MBIs to guide rational resource use decisions. In some cap and trade systems, Stavins (2003) claims resource users were found to continue polluting even where there are believed to be sufficient economic disincentives not to do so. Robins (2004) has argued that the problem herein is that MBI focus attention on managing the economically relevant parts of nature, in doing so often overlook social and environmental needs. In another example, disadvantaged groups, which have less capacity to protect the environment, have been found to exploit the environment where the prospect of short-term gain presides over longer term consequences (see: Blaikie and Brookfield, 1987). As such, the significance of social and environmental aspects and needs may be discounted in important management decisions. This is often a contentious issue as non-economic environmental values play an important role in stakeholder and management decisions regarding the environment (McCarthy and Prudham, 2004). Guerrero (2008: 2) argued there is a need to include socio-political and non-economic values in MBI.

The distribution of property rights and the value of certain environmental externalities and goods have also been found to create complex systems of perverse incentives to environmental protection, much to the disarray of MBI proponents. Perverse incentives to environmental protection efforts are found in a number of mechanisms. Review of market based quota management systems (QMS) in fisheries present longstanding examples of the outcomes of economics, the assignment of property rights, and scientific modelling. QMS have influenced the management of fishing stocks since the 1950s in some of the first attempts to implement MBI. Mansfield (2006) found, in the case of the Pollock fishery, congruent with other fisheries Quota Management Systems (QMS) internationally, that whilst the MBI provided fishers with the flexibility to spatially and temporally disperse fishing activity in order to preserve the resource, it was questionable whether this translated into the actual incentives to do so. Mansfield (2006) and others (for more general discussions see: Ackerman and Gallagher, 2000; Robins, 2004) found that regulatory authorities have admitted that instruments can spatially and temporally concentrate fishing activity, leading to hotspots of activity that were previously non-existent. There are examples of this in QMS, efficiencies of scale have resulted in spatial clustering of fishing activity. Spatial clustering in QMS an

example of the market working to scales of economic efficiency and has resulted in the depletion of a number of fish species (Mansfield, 2001; Dietz et al, 2003; Mansfield, 2006;). This is an unintended economic consequence of the market at work under QMS and demonstrates the unpredictable outcomes of environmental markets resulting in perverse and unintentional incentives. Fundamentally, Ackerman and Gallagher (2000) argued that the market does not guarantee that producers will do the right thing, protecting environmental values; it only ensures that those who do the wrong thing will be punished through economic disincentives. In isolation, MBIs may struggle to address all externalities and MBIs often face unfathomed consequences through the distribution of property rights.

These findings contradicts the hypothesis that markets and private property rights provide the right mix of incentives to lead to environmental protection. Rather, markets have proven their potential to create complex economic incentives which lead to perverse and contradictory economic and environmental outcomes which may undermine the purpose of MBI and environmental protection. Market incentives and property rights therefore do not always ensure resource users will do the right thing as MBI have shown the propensity to create perverse incentives contrary to resource protection. Further complicating this relationship between MBI and property rights are knowledge based assumptions and scientific assumptions regarding the human nature relationship, explored in the next section.

3.2.2. Market design elements and institutional capacity

A review of market-based instruments overseas reveals that while different environmental problems require tailored solutions, there are specific design elements that are critical to their performance. Such elements include; transaction costs, incentive strength, monitoring and measurement, compliance and enforcement and administrative burdens and complexities (Bailey, 2007; Henderson and Norris, 2008). These aspects of a market mechanism are all integral elements together that make up the framework of permit based MBI and determine their effective implementation. There are a number of reasons why tradable permit schemes may fail to achieve intended cost savings in practice (Bolduc, 2004). This is because the existence and function of markets for environmental externalities and commodities are in part determined by these design elements.

There are a number of important constraints upon market functions of MBI. Firstly the presence of transaction costs has an effect on the ability of stakeholders to actively participate in trading as intended (Stavins, 2003). Second, information dissemination such as the price of permits, the ability to identify trade partners, and the ability to negotiate an exchange, are all possible constraints on the effective function of the market. An example where information dissemination has positive results is in the Hunter River Salinity Trading Scheme in Australia, where an online trading system has made trading cheaper and easier (Stravins 2003). In contrast, the absence of an over the counter service (OTC) to buy and sell units in the New Zealand Emissions trading scheme has meant, to date, that facilitating the trade of New Zealand Kyoto Units (NZUs) has been costly, requiring the use of market intermediaries such as brokers and traders, thus adding additional transaction costs which has reduced the number of possible transactions. Stavins (2003) concludes that market structure and information dissemination are therefore critical considerations in order to ensure cost effective trading may be established.

It is for these reasons that a number of authors echo the same argument that all classes of MBI require adequate compliance and enforcement (Stavins 2003; Bolduc, 2004; Mansfield, 2006; De Cara and Jayet, 2008; Henderson and Norris, 2008). Even where measurement accuracy is guaranteed, a failure to enforce compliance can seriously hamstring the ability of an instrument to assure environmental and economic outcomes (Bolduc, 2004). This requires in essence the cost of non-compliance to exceed the cost of abatement options. Therefore, penalties need to be high, automatic, and well enforced (De Cara and Jayet, 2008). Effective auditing systems and well-designed compliance incentives help to reduce enforcement costs. Some cases where compliance cannot be guaranteed may require further regulation to ensure the function of instruments and compliance. Mansfield (2006) observes market instruments have oftentimes required the use of regulatory backstops. Such regulatory backstops have been considered incongruous with free market logic, although are often essential to ensure compliance. These essential elements of MBI have the potential to perpetuate the costs of compliance.

Huber et al. (1998) argued that although the theoretical literature show that MBIs have lower compliance costs than CAC approaches, many countries are finding that administrative costs associated with MBI are actually higher. Huber et al. (1998) found that monitoring requirements and other enforcement activities characteristic of CAC

measures are still necessary in MBI, furthermore additional administrative efforts may also be required to cope with the design and institutional changes arising from MBI implementation. Huber (1998); Guerin (2003) and Mansfield (2006) have all found institutional capacity plays an important role in MBI success.

Huber (1998) claims a common misconception is that MBI are a ready substitute for CAC approaches. Cases in Latin America and the Caribbean for example have demonstrated that MBI cannot provide a quick panacea for the problems of CAC approaches. "MBI require, strong institutions, adequate legislation and effective monitoring and enforcement" (Huber et al., 1998: 2). Firstly institutional constraints or capacity dilemmas which constrain regulatory components to effectively implement policy have proved that MBI implementation remains pervasive. Institutional weakness in Latin America such as underfunding, inexperience and lack of political will have limited the effective implementation of MBI. Secondly Huber et al. (1998) found that administrative intensity of MBI remained high, similar to CAC approaches. Huber et al. (1998: 37) observed that "Monitoring requirements, legal design requirements, public consultation needs and enforcement or collection needs of MBI are not always noticeably different from CAC approaches." Monitoring and measurement for example are also dependent upon the technical and scientific expertise of, or access to such expertise by regulatory authorities. Guerin (2003) found without this expertise systems like the MSY model in QMS may fail to achieve its intended resource protection, adversely leading to further degradation of resources. Thus some regulatory elements are required and MBI are simply not a replacement for weak CAC or absent CAC approaches, as such, Huber et al. (1998) concluded, a strong institutional base is a prerequisite for MBI implementation.

Mansfield (2003; 2006) found that institutional constraints to MBI implementation may remain pervasive in MBI research and thus the use of holistic political and ecological outcomes focused inquiry may reveal such limitations in institutional capacities. Mansfield (2006) and Castree (2008a) indicate that underlying institutional capacity is the emphasis placed upon scientific and knowledge based assumptions of MBI. The limitations underlying knowledge based and scientific assumptions place on the capacity of MBI to achieve resource protection goals will be explored in the next section.

3.2.3. Critique of scientific and knowledge based assumptions:

Knowledge based assumptions in MBI have often overlooked pertinent factors that competition over resources and getting the science right do not necessarily lead to the intended outcomes of MBI. Sutton (1999) reveals there has been an ongoing debate within political science on whether policy making is a linear process or characterised by a more chaotic process of political, practical and socio-cultural forces. Knowledge based assumptions regarding the efficiencies of market allocation of resources and the linear model of science has been justified as an appropriate method of informing political decision makers to justify market approaches.

Advancements in scientific modelling have prompted resource managers to expand the employment of such models (Sutton, 1999; Oreskes, 2004). Modelled science intended for environmental management often requires the use of emissions precursors as direct measurement is impractical. The use of emissions proxies or precursors has proven sufficiently challenging to MBI achieving efficiency goals. The New Zealand Emissions Trading Scheme (NZ ETS) provides evidence for the need of emissions proxies and some of the inherent difficulties underlying MBI. The NZ ETS is an all-sectors scheme and includes the sequestration of carbon in trees. Carbon sequestered by forests is seen as an important part of climate change policy, providing a relatively cost effective way of offsetting emissions (Hamburg, 2000; Ruddell et al., 2007). The limitations of modelled data and the use of emissions precursors provide a significant obstacle for accuracy in MBI due to inherent uncertainties in the science required for measurement and estimation (Muhovic-Dorsner, 2005; Halsnaes and Shukla, 2008). The science in combination with economic systems of valuation can therefore only reflect the current knowledge of ecosystems which are inevitably variable and likely to change with development of science over time (Spangenberg and Settele, 2010). These uncertainties in MBI science present a significant barrier to achieving public acceptance of market based policy, this is especially the case for market based climate change policy, such as emissions trading. Spangenberg and Settele (2010) claim this has eventuated in a ‘questionable’ body of MBI science often used by competing interests.

MBI are founded upon an inherent reliance on the scientific capacity for accurate monitoring and measurement (Robertson, 2006). Enormous ecological variability present in nature means MBIs are effectively based on a science that to the best of our knowledge

reflects this inherent variability. The complexity of natural phenomena under MBI management has presented significant obstacles for the faculty of MBI science to accurately measure and model expected environmental outcomes of market instruments. In this way the linear model of science and scientific modelling in environmental economics may contradict the functional aspects of environmental phenomena where modelling inaccurately reflects ecological variability and its outcomes as seen in the MSY example. For example Doubleday (1976; quoted in Christie, 1999) states, "in the presence of fluctuations in production, attempts to remove the MSY yield each year from a stock leads to a disaster." Furthermore Christie (1999) states that MSY models based on historical data are fundamentally flawed in that they lead to severe overfishing in years of poor species reproduction. Furthermore the failure of MSY to incorporate fisheries economics is said to lead to overfishing and overcapitalization (Mansfield, 2003). Thus underlying scientific assumptions of MBI models may fail to deliver intended goals of sustainable resource use.

The absence of accurate underlying science and the shortfalls of economic assumptions can undermine the capacity of MBI to meet their environmental goals (Henderson and Norris, 2008). Despite such modelling displaying an inherent inability to predict and manage the contradictory functions of environmental economics versus natural functional aspects of ecosystems they continue to be used. For example the linear MSY scientific modelling and QMS economic assumptions have failed to deliver their intended resource preservation.

Unfortunately, no mechanism exists that can guarantee that the behaviour of nature, environmental-economic modelling and the function of the market are adjusted to nature's functions, other than by pure chance (Barkman et al, 2008). Limitations in the understanding of wider ecological processes under the management of MBI have proven to be significant obstacles to the effective function of market mechanisms. Extensive literature documents the observed natural interdependence of ecosystems which may invalidate economic and expert scientific claims and modelling (Gustafsson, 1998, Barkman et al, 2008). O'Neil (1997) argues essentially there is insufficient information about environmental processes and externalities to completely depend on modelled data. A basic principal for any market to function effectively is access to perfect information, whereas MBI science inherently relies upon models based on information to determine quota or value levels that are often imprecise (O'Neil and Splash, 2000). Diffuse non-

point source emissions and fugitive resources such as fish and Greenhouse gas emissions have proven less amenable to such modelling under MBIs. These cases thus present a particularly interesting challenge for MBI design.

MBI science faces particular difficulty in cases with spatially and temporarily differentiated data, such as when it is used to manage diffuse, non-point source pollution similar to the management of transient, mobile or fugitive resources such as fisheries QMS (Mansfield, 2001; Dietz and Ostrom, 2003). Here, assumptions about the resource stock must be made. This is because measurement of non-point source emissions from industry requires the use of modelled data and emissions precursors, as actual measurement of emissions is administratively constrained. De Cara and Jayet, (2008) insist that the apparent level of discrepancy between actual ecological processes and modelled data in these examples limits the potential effectiveness of instruments to monitor, measure and control abatement levels. As such the linear approach to scientific understanding of environmental externalities and the assumptions that underlie MBI have become inherently problematic. An example of the effect of imperfect information is found in the case of the Pollock fishery, where the science behind quota levels relies on imperfect and incomplete information about the total ecosystem under management. The result has led to the degradation of a species associated with the Pollock fishery, thus revealing the often unfathomed and unintended consequences of QMS and MBI more generally (Mansfield, 2006). As such Oreskes (2004) has argued that the linear model of science is an inaccurate characterisation of the environment and often an undesirable approach to the relationship between science and decision making, as policy doesn't simply emerge from scientific understandings. Getting the science right is often used as a justification for scientific based approaches, thus science becomes a convenient means to remove disputes in the language of science in the policy debate, to the possible detriment of both science and policy (Pielke, 2004). Pielke (2004) claims the subsequent uncertainties in science are then often utilised as mode of opposition to MBI.

An additional constraint of the scientific approach of MBI is that scientific modelling does not appropriately account for spatial and temporal variation. Observed natural variability over spatial and temporal scale is often a key variable in critique of the science behind MBIs. Just as Sprott et al, (2005) find that naturally occurring biogeochemical cycles exhibit unpredictability in nature and suggests it may be difficult to stabilise, predict and manage by human intervention, fishieries management of diffuse

resource exhibit similar shortfalls. As such, the natural variability inherent in nature becomes most evident over wider temporal and spatial scales. This will be discussed in detail in the next section.

3.2.4. Spatial and temporal scale constraints to MBI:

The role of spatial and temporal scales in the nature-society relationship as mentioned in section 2.2.3 has featured prominently in PE and remains a crucial point of analytical reference. A number of important PE inquiries into MBI have revealed the important role multiple spatial and temporal scales play in both shaping MBI and imposing important constraints on their successful function. Firstly, research into scale factors of MBI has revealed that a number of markets for the many forms of natural capital do not function well or simply do not exist because of scale factors (Dasgupta, 2010). Secondly, scalar mismatch between the modelled function of ecosystems and the actual ecological outcomes present management issues of MBI.

Dasgupta (2010) points out that spatial scale plays a significant role in environmental markets. For example, the cost of negotiation becomes too high where economic interactions take place over large distances. Stavins (1995) observes that spatial and temporal scale in combination with the subsequent economic constraints, present a lack of competition in the permit market and have prevented a number of sulphur dioxide schemes in the United States from functioning as expected in modelling and ex-ante evaluations. Extra-local influences are also seen to affect local institutions for environmental governance through the transfer of neoliberal governance ideals (see: Dietz et al, 2003). Global emissions trading schemes are a popular example of global transference of governance mechanisms. The global spread of ETS exemplifies the effect of global scales in the transfer of policy (Dietz et al, 2003). Furthermore it is important to understand the role historical factors play in the role of resource issues as Blaikie (1987) found, temporal historical factors have played an important role in resource issues.

MBI function is also constrained by the human-nature scalar mismatch (Cash et al. 2004) as cited in chapter two. Scale and temporal factors of ecological variability and ecosystem function have also proven challenging to the functions of market instruments. The fugitive nature of resources such as fish, and diffuse or non-point source pollutants such as carbon and nitrogen have led to difficulties in determining and defining

boundaries and manageable limits. Similarly it has been argued that failure of science to sufficiently monitor and model non-point source pollution has led to no greater or little change in aggregate levels of pollution (See: Muhovic-Dorsner, 2005). The example of MSY in QMS demonstrates the tendency of scientific modelling and market based assumptions regarding the environment to be undermined by the spatial and high temporal variability in the movements of fugitive fish stocks which is not very well understood. The MSY model for fisheries management places as a key objective that removals should be as large as possible but nevertheless sustainable (Punt and Smith, 2001). Due to the migratory nature of the fish stocks, scalar factors have been widely recognised to undermine the effectiveness of components of QMS such as resource management zones, boundaries and seasonal targeting of stocks as well as MSY models based on such scale definitions (for general discussion see: Parson, 2006; Dietz et al, 2003; Mansfield, 2001; Mansfield, 2006). MSY models have resulted in many examples of overfishing and desolation of resource stocks (Punt and Smith 2001; Mansfield, 2006).

Whilst MBI rely on scientific models to predict environmental outcomes, critical literature has revealed that whilst the environment is inherently unpredictable, MBI essentially rely upon environmental models of equilibrium to manage environmental resources. These models have proved untrustworthy in a number of examples. The example of MSY in quota management and the unpredictability of naturally occurring biogeochemical cycles demonstrate the tendency of scientific modelling and market based assumptions regarding the environment to be undermined by the spatial and temporal variability of fugitive resources which are not well understood.

3.2.5. Conclusion

This section has provided critique of the key assumptions underlying MBI, including property rights, science and the valuation of the environment. Neoliberal advocates have argued that property rights provide rational incentives to resource users that should lead to further protection of property and therefore resources and the environment. On the contrary, MBI have shown that resource users do not always act rationally in accordance to property rights. Rather it has been observed that a mix of market incentives and cultural needs have proven the potential to create complex economic incentives with subsequent environmental implications contradicting MBI

goals. Market incentives and property rights, therefore, do not always ensure resource users will do the right thing.

In addition exploration of the science underlying MBI has revealed that science is only capable of reflecting the current knowledge of ecosystems which are inevitably variable and likely to change with development of science over time. This chapter has so far revealed the problems MBI science is twofold. Firstly, whilst the environment has displayed inherent complexity and interconnectedness of phenomena, MBI science innately compartmentalises the environment. It has been shown that due to ecological variability, nature does not often conform to the confines of such classification. Secondly, critics have argued that linear application of scientific discourse and understandings simultaneously ignores the politicisation of science. Therefor the linear application of science to justify MBI and shortfalls of economic assumptions can undermine the capacity of MBI to meet their environmental goals. Furthermore uncertainties in MBI science present a significant barrier to achieving public acceptance of market based policy. Although science plays an important role in MBI, it is well acknowledged that science alone is insufficient for delivering effective and legitimate decisions on effective implementation of MBI (Pielke, 2004; Sarewitz, 2004). The varying and sometimes perverse incentives created through the mix of economics and science has demonstrated the limits of such approaches.

In addition critics have shown multiple spatial and temporal scales play a role in both shaping MBI and imposing important constraints on their successful function as scale factors can restrict market function. Spatial and temporal mismatch has been seen to disrupt the expected effectiveness of MBI in practice also. These flaws in MBI assumptions have led to new instances of resource issues with socio-political consequences. Assessment of MBI is therefore important in uncovering these issues. However, a predominance of economic analysis of MBI has, to date, meant that very few case studies have challenged the legitimacy of MBI assumptions based on the theoretical lessons discussed. The next section will explore some of the socio-political consequences of MBI and the environmental justice implications of MBI.

3.3. Socio-political consequences of MBI and environmental justice implications

McCarthy and Prudham (2004) believe the connections between neoliberalism, environmental change and environmental politics, are all deeply, if not inextricably, interwoven. Yet, there is a lack of scholarly analysis of the socio-political consequences of MBI. Low and Gleeson (1998) argue that due consideration must be given to EJ issues. Where the majority of analysis of MBI has focused on economic criteria, there is an inherent tendency to overlook the political and justice implications of MBI (Low and Gleeson, 1998). Stavins (2003) implores due consideration must be given to affective consequences of the redistribution of resources and power through market instruments their impacts upon the economy, industry and stakeholders. Henderson and Norris (2008) claim there is usually rearrangement of costs and benefits among stakeholders following the implementation of MBIs. As such, growing disparity between the goals of MBI and those of society, the economy, and the environment as a whole, has been highlighted in EJ debates (see: Muhovic-Dorsner, 2005). EJ is defined as "the fair treatment and meaningful involvement of all people regardless of race, colour, sex, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies" (Miller and Tyler, 2003: 5). Bryant (1995: 6) claimed "Environmental justice is served when people can realize their highest potential." A growing body of literature critiques MBIs because of their potential to create new injustices, further exasperating power relations and struggles, imposing additional costs upon stakeholders and entrench rather than changing values (Halsnaes and Olfhoff, 2005; Walker and Bulkeley, 2006; Halsnaes and Shukla, 2008).

This section will explore the relationship between the contradictory social and political outcomes of MBI and perceptions of injustice and social inequity. It will present cases that have exhibited the potential for inequitable outcomes. This includes exploration of a number of EJ issues associated with tradable permit schemes. These include: barriers to entry into the market, the redistribution of administrative costs and burdens, outcomes counteractive to economic development of communities, perpetuation of the inequitable distribution of wealth among individuals and groups, further marginalisation and exasperation of structural inequalities and localized concentrations of emissions. Subsequently, the wider environmental justice (EJ) implications of MBI policy will be presented.

3.3.1. Barriers to entry into the market

MBI have shown the potential to inadvertently create barriers to entry into markets. Exploration of QMS literature exposes the reality of these implications. Guerin (2003) found that Inter Changeable Quota and QMS around the world have the potential to marginalise smaller stakeholders creating barriers to entry into markets. The introduction of QMS has bought about new injustices by effectively privatizing what was previously a public resource, and thus creating barriers for new fishers to enter the market (Guerin, 2003). Hernes et al., (2005) claims controversies over distribution of access rights, such as who should be beneficiaries and what the relevant criteria for awarding such benefits, are a prominent feature of fisheries management. Although an effective management device for limiting access and preventing a 'race for fish', Hernes et al. (2005) claim that QMS is still a property rights system that divides by including some whilst excluding others, it is for this reason that they are so controversial. Guerin (2003) found that in Canada Inter tradable quota systems had the potential to create barriers to entry for smaller fishers to enter the market where they were previously operating unrestricted. As such barriers to the market are often seen as an unjust outcome of QMS.

Therefore Young and McCay (1995) claim that social concerns for equitable outcomes are so strong that market based property rights systems under MBI have been implemented with features within property rights allocation mechanisms, that seek to preserve community perceptions of equity during the initial period of structural adjustment. These attempts to achieve equitable outcomes usually take the form of special considerations to achieve equity through the redistributive allocation mechanism.

3.3.2. Perpetuation of inequities, structural inequality and marginalisation

Injustice may result as an outcome and lack of 'fair treatment' for, in particular, people and social groups who are already marginalised and disadvantaged further by MBI (Guerin, 2003; Walker and Bulkeley, 2006). As such the social justice implications of MBI include the redistribution of wealth and power within and between communities and institutions (Low and Gleeson, 1998). Even if a particular rights based system prevents the worst case scenario – the tragedy of the commons – it still may be criticised from a justice perspective as some stakeholders lose relative to what they would have gained

under any alternative property rights distribution regime (Kymlicka, 2002). An example is provided by Hernes et al., (2005) who claims that all fisheries management regimes have underlying equity implications in the shape of different distributional effects and thus issues of social justice. Market distributed water rights also provide many case examples of this issue, as a number of examples of MBI approaches for the distribution of water rights have overlooked social and environmental needs with dire consequences (see: Bauer, 1997). Bauer (1997) found that the marketization of water rights as a form of MBI in Chile meant that water distribution rights became alienable. This has resulted in inequalities in water access to low socio-economic groups and has perpetuated structural inequalities (Bauer, 1997).

Emissions' trading is also seen to perpetuate the inequitable distribution of wealth among the nations of the world. According to Hadjilambrinos (1999), the price of environmental externalities should be determined by supply and demand in the market. In practice however, the price has often been determined by the buyers, and not by market interaction. Accordingly, MBI pose the danger of perpetuating structural inequity (Hadjilambrinos, 1999). Hadjilambrinos (1999) demonstrates that existing political power structures and struggles over resources may be perpetuated by marketization of nature. The example of emissions trading highlights this assumption. Although the intention of emissions trading is to regulate GHG emissions, recent scholarship has highlighted the impact of emissions trading initiatives on other social, economic, and ecological issues (Byrne et al., 2002; Kerr, 2003; Bailey and Rupp, 2004). In particular there has been an impact of emissions trading on land-use practices, decisions, and rights. Due in part to the inherent complexities of land-use initiatives, the inclusion of agriculture and forestry in the Kyoto protocol has been a contested and controversial issue (Schlamadinger et al., 2007).

The potential of carbon forestry plantations to perpetuate structural inequity is demonstrated by a number of global experiences in afforestation. Smith and Scherr, (2003) pointed out that forestry plantations in many parts of the world have ignored local land rights, providing inadequate compensation or causing involuntary resettlement of communities. Furthermore, the use of carbon revenues to support forestry plantations could put at an even greater economic disadvantage more diversified land uses by local communities, which may be more environmentally sound and suitable for local communities (Smith and Scherr, 2003). Accordingly, Smith and Scherr (2003) contend

that as a result of emissions trading, existing disparities in income and political power could be exacerbated. As the next section will demonstrate, the inequitable distribution and marginalisation of communities through market allocation of resources often provides outcomes for local communities that are counteractive to economic development of those communities.

3.3.3. Outcomes of MBI counteractive to economic development of communities

A number of studies have found MBI to be counteractive to the economic development of communities. Resource users often see MBI as counteractive to economic development as they impose economically restrictive policy upon resource users. Henderson and Norris (2008) claim that in order to reconcile economic and environmental objectives of MBIs, substantial compromises must be made to ensure better instrument selection, design and implementation. It is increasingly recognized that achieving positive environmental benefits requires the support of land owners and resource users, facilitated by initial government assistance and non-restricting policy (Bailey, 2007). Henderson and Norris (2008) conclude that it is essential that policy makers understand the economic and administrative burdens MBIs place upon resource users.

Panayotou (1995) found in a review of the employment of MBI in developing countries such as the Philippines, China and India, examples where MBI impose economic constraints on development. These cases are of particular concern and call for underdeveloped and inefficient markets and institutional and administrative constraints call for careful selection of specific economic instruments that fit, or are adapted to fit the country's special circumstances. Developed countries may also find MBI impose restrictions upon local communities opposing to development. Inter tradable quota systems in Canada provide one such example. Young and McCay (1995) found the goal of economic efficiency in inter tradable quota to clash with social goals such as maintaining rural communities in Canada. As such the ability of MBI to impose restrictions upon development should be of particular concern for MBI design and implementation. Of further concern to MBI design and implementation are claims that

MBI have the propensity to redistribute the administrative costs and burdens of environmental management, as will be explored in the next section.

3.3.4. Redistribution of administrative costs and burdens

A commonly held belief is that MBI are more economically efficient and environmentally effective than command and control (CAC) approaches. In practice however many countries are finding that the administrative costs associated with MBI implementation are in fact more costly than CAC alternatives (Huber et al., 1998). Huber et al., (1998) argue this is because MBI can potentially pass the costs of administrative burdens onto resource users as additional administration efforts may be required to cope with the design and institutional changes arising from MBI implementation. Researchers have found that MBI have the potential shift the cost of environmental management and administration upon resource users. As such a number of examples have shown the potential to impose new costs, administrative burdens and complexities upon resource users (Bailey, 2007; Henderson and Norris, 2008). Huber et al., (1998) found this to be the case with MBIs in Columbia where monitoring requirements and other enforcement activities characteristic of CAC measures were still necessary for MBI and in some cases passed onto the resource user. Furthermore, the Harvard Research Institute (1999) also found that many agricultural MBI instruments in China have potential to create injustice by shifting the weight of administrative burdens from Government to resource users.

Henderson and Norris (2008) conclude that it is essential that policy makers understand the economic and administrative burdens MBIs place upon resource users. MBI which have overlooked the complexities of administering the instrument have shown a tendency to be costly in administration and the potential to entrench and actively encourage unsustainable environmental values rather than change them (Ackerman and Gallagher, 2000). Therefore thorough and open evaluation of the potential effectiveness of the policy instrument is essential. A further justice outcome of MBI may result in spatial outcomes of emissions distribution, as will be explored in the following section.

3.3.5. Localized concentrations of emissions

Environmental injustice may also result where emissions trading leads to disproportionate localized concentrations of emissions or 'emissions hotspots'. Soanasos claim this can result in environmental injustice – in which disadvantaged populations share a disproportionate share of environmental risks of these concentrations. Pollution trading in California's RECLAIM scheme has inadvertently led to higher public health risks in certain areas because it concentrates pollution in neighbourhoods surrounding polluters which tend to be lower income communities (Drury et al, 1999). Another example from the United States is the emissions trading Acid Rain Programme. Whilst this scheme has been hailed as a success for cost efficiency and reducing aggregate pollution, critics such as Corburn (2001) contend the program is insufficiently attentive to the harmful localised concentrations of Sulphur dioxide trading can create. Furthermore critics argue the scheme may perpetuate the disproportionate pollution burdens already facing similarly spatially concentrated lower-socio economic groups (Corburn, 2001). As such Klepeis and Vance (2008) found that in light of the potential contradictions between the tenets of neoliberalism, social welfare and regional environmental outcomes, there is a need to address unique regional and spatial human-environment conditions.

3.3.6. Conclusion

As discussed, social injustice may take many forms under MBI. It has been shown that MBI inadvertently create barriers to entry into markets which has the potential to marginalise smaller stakeholders. It has also been shown that MBI have the potential to redistribute wealth and power within and between communities and institutions. Thus MBI have the potential to perpetuate structural inequity between stakeholders and groups as shown by a number of examples. As such studies have shown MBI may be counteractive to the economic development of communities. Furthermore it has been revealed that MBI have a tendency to lead to a redistribution of administrative costs and burdens from resource managers to resource users. Environmental injustice may also occur where emissions trading leads to localised concentrations of emissions. These points highlight the importance of assessing the possible socio-economic impacts on local communities. Spangenberg and Settele (2010: 333) conclude that although MBI may appear to promote conservation and sustainable use, economic instruments may actually undermine these attempts as they do not address needs, social fairness and equity in resource use.

As this section has shown the results of marginalising social considerations in the assessment and application of MBI have severe consequences for both the political saliency and success of MBI policy. In this context, it is evident that economic policy can no longer remain disconnected from environmental and social policy. Thus, MBI can only play a limited role in integrated ecosystem management, and in no way replace a management system incorporating social concerns and challenges. Section 3.4 will now explore the consequences of stakeholder perceptions of inequity and potential injustice. as described by Young and McCay (1995) it will be shown how social concerns for equitable outcomes are so strong that market based property rights systems under MBI have often included provisions through allocation mechanisms for example to ensure more equitable outcomes. Jarvie and Solomon, (1998), Hahn (2000) and Bolduc (2004) argue this highlights the pressure upon regulators to ensure more equitable outcomes through MBI which often results in the modification of policy.

3.4. Resistance and modification of MBI – barriers to effective implementation

With the incidence of injustices explored in section 3.3 it is important to explore the political propensity of stakeholders to resist and seek to modify MBI policy. Researchers have explored a number of barriers which prevent successful implementation of MBI. There are a number of reasons why MBI may fail to achieve economic, political and environmental effectiveness in practice. As discussed, the underlying assumptions of MBI policy overlook pertinent natural and political aspects of resource issues. It accordance it is important to explore the political arenas within which policies are designed, modified and implemented. An important lesson reveals that the primary objectives of environmental outcomes and cost effectiveness will always be constrained by political realities (Henderson and Norris, 2008). As described by Young and McCay (1995) it will be shown how social concerns for equitable outcomes are so strong that market based property rights systems under MBI have often included provisions through allocation mechanisms for example to ensure more equitable outcomes

3.4.1. Resistance to MBI implementation

As further consequence to the issues addressed, the real world barriers to MBI become apparent through implementation. The fear of social and economic injustice has

encouraged opposition to MBI. Public groups are widely known to disrupt the policy creation and implementation process, bogging down the regulatory process with lawsuits, submissions, protests and petitions. Bolduc (2004) indicates that, increasingly, economists are beginning to expand analysis beyond economic avenues to fully consider how the function and effectiveness of MBI are impacted by the role of key stakeholders and their influence in decisions. Evidence suggests that resistance to MBI implementation is a major obstacle to MBI success. Jarvie and Solomon (1998) and Daniels (1996; cited in Jarvie and Solomon, 1998) recommended that in order to avoid increased risk of disturbance to the policy implementation process in closed door negotiations, which the public may view as unethical, there is a need for unitary public consultation to be included where possible. The Boulder Creek program for effluent trading in Australia actively encouraged public participation in the consultation and policy implementation process, which generated public support for non-point reductions and increased public approval of regulatory agencies (Jarvie and Solomon, 1998). Jarvie and Solomon (1998) concluded that regulators should have an open door policy when they meet industry. If the public is not allowed at negotiating meetings, they often perceive that dishonest regulation is occurring.

Growing recognition of the potential injustices in MBI, along with the limitations of MBI expressed previously, has led to resisting implementation and the modification of MBI during the policy implementation process. MBI are inherently characterised by conflicts of interest and values. Scientific understandings are frequently used to justify a range of competing political agendas. Oreskes (2005) argue that under the linear model both sides argue about science as a proxy for debating the worth and practicality of climate change policies. The failures in the scientific justification for political measures under the linear model can therefore encourage political debate over the justification for climate change policy in light of these uncertainties. Subsequently, uncertainties in science surrounding MBI have been used by market sceptics to justify opposition to the implementation of climate change MBI. Rather than political consensus, what emerges is typically gridlock (Pielke and Oreskes, 2005). As a result, MBI policy alternatives often fail to overcome scientific debate (Sarewitz and Pielke, 2000).

The process of enacting environmental policies frequently meets resistance from those that it imposes restrictions upon (Parsons, 2006). Climate change policies provide a popular example. The public consultation process also provides opportunities for

political power to influence the shape and direction of market based policy by modifying policy and subsequent outcomes. In public policy making the options which influence decision making have implications for the trade-off between early and delayed action, the prospects of deadlock and conflict and the distribution of costs and benefits (Parson, 2006). Mansfield (2004), McCarthy (2006) and Prudham (2004) acknowledge that resistance to emissions trading is congruent with uncertainties and contradictory outcomes of neoliberal environmental governance. For example in In Germany efforts to set up national emissions trading schemes were faced with considerable industry resistance, and modification and concessions were given to industry in the form subsidised emissions permits (Biermann et al., 2001). Peck & Tickell (2002) conclude that resistance movements have exposed neoliberalism as a troubled political project and perceptions of inequities and perversity of outcomes has resulted in resistance often followed by modification of proposed MBI.

3.4.2. Modification of MBI during the policy development process

One of the most widespread obstacles undermining the efficiency goals of MBIs is their modification during implementation often to enhance an instruments political palatability and to secure acceptability in order to create stakeholder 'buy in' (Hahn 2000). This normally includes granting concessions to agents in the form of compromises, which may reduce the potential of an instrument to achieve both cost savings and positive environmental outcomes.

It is important to remember the influence of political factors on the process and the potential for political interference to block intended outcomes of MBI. Hahn (2000) notes that economic efficiency (attributable to the influence of political factors) is inevitably not likely to be a key objective in final policy design. This is because policy ideas affect stakeholder groups differently, who in turn may affect or directly influence the key decision makers and policy outcomes to meet their political objectives. (Hahn, 2000). For example, agricultural interests have successfully rallied against the imposition of transferable water rights due to concerns over losing valuable entitlement to water resources and land values (Hahn, 2000).

A number of institutional factors present significant barriers to successful policy implementation (Hoffman et al., 2002; Wallington and Lawrence, 2008). Stakeholders

may challenge the role of science and the compatibility of economic and environmental goals in order to manipulate proposed MBI policy and achieve their own objectives. Institutions and stakeholders may exert political pressure upon policy makers to modify policy for their own interest. Baily (2007) confirms that both conflicting interests and capture of policy makers by powerful groups may result in modification of policy. According to Wynne (1993) powerful actors have considerable resources and rationalities which impose significant influences on policy formation and implementation processes, many which seek to satisfy their own interests and protect market share under new environmental regulations. The failure of carbon taxes in the European Union provides an example of capture of interests where powerful industry groups lobbied against the integration of the tax (Biermann et al., 2001. Another example is provided by Lenschow, (1999) in exploration of European agricultural policy modification. Lenschow (1999) found farming organisations were given privileged access to the policy making process which led to a number of industry concessions. Therefor this demonstrates that industry, stakeholders and groups have the potential to exert political pressure on policy makers during the development of new MBI. Thus evidence suggests the propensity of stakeholders to mobilise the inherent and perceived injustices, uncertainties and contradictions in underlying neoliberal environmental management as justification for resistance and modification of proposed policy.

Hahn (2000) argues that only by understanding the political ecology of MBI and the policy implementation process, can we improve our understanding of the constraints imposed by complex political structures on the ability of MBI to achieve economic, political and environmental efficiency (Hahn, 2000). For this reason, a review of the underlying institutions, motivations and influences of policy development, may shed light on the various responses to policy and hence, the ultimate success or failure of instruments.

As this section has shown, markets for environmental commodities such as fish and externalities such as emissions are constrained by the processes of resistance to implementation and the modification of MBIs during the policy development process. Examples have demonstrated the propensity of stakeholders to mobilise the inherent and perceived injustices, uncertainties and contradictions underlying neoliberal environmental management as justification for resistance and modification of proposed policy. This demonstrates that resistance and modification of MBI during development and

implementation is analogous with the issues of injustice described in section 3.3. This has demonstrated that stakeholders can exert significant barriers to effective implementation of MBI.

3.5.Conclusions

Despite a greater movement towards the employment of MBI as a solution to environmental issues, disparity emerges between there theoretical intentions of the underlying assumptions of MBI and their outcomes. This has provided an opportunity for a political ecology to review a recent but growing body of empirical literature on the emerging issues of MBIs. Neoliberal advocates have argued that markets can be deployed as the solution rather than cause of environmental problems. Critical evaluation of the underlying theories of MBI reveals several of the basic tenets of market environmentalism do not hold true in all circumstances.

Academic critiques of MBI as solutions to environmental problems range from the theoretical to the practical. A focus upon the political ecology of MBI and the material consequences of the failure to account for the political ecology of resource issues in MBI has meant that MBI often fall short of generating the outcomes predicted by the theoretical arguments of environmental economics and the underlying assumptions of MBI. MBI policy has been observed by many scholars to be driven by a criterion of underlying assumptions which has inevitably neglected other criteria just as crucial to resolve environmental problems. As such it has been uncovered that ecological and political considerations are often overlooked in the underlying neoliberal assumptions of MBI. Researchers have revealed that valuation, rationalist assumptions, property rights and scientific based assumptions as well as spatial and temporal constraints may contradict the goals of environmental protection and have led to barriers to the effectiveness of MBI. Furthermore it has been shown these underlying contradictions can further lead to social justice issues in MBI. Resulting resistance to MBI implementation and modification of policy has been seen to further inhibit the effectiveness of MBI. These findings reveal the importance of reconciling political and economic differences within MBI through more thorough political as well as economic assessment.

This chapter has fundamentally challenged the theoretical disposition of proponents of market based forms of EM, that inevitably MBI provide an answer to

achieving synthesis of society's economic goals and environmental protection. It is only through an understanding of the political ecology of MBI and the policy implementation process can we improve our understanding of the constraints and limitations of MBI policy. It is evident that economic policy can no longer remain disconnected from environmental and social aspects of EM. Inevitably, given the apparent limitations of MBI assumptions, and the factors acting upon their implementation that are often overlooked, it may be the case that MBI cannot be 'properly' designed and implemented as a solution to a number of environmental problems. The contextual representation of a tradable permit MBI in the following chapter will reveal some of the policy contexts and political ecology of MBI implementation in the case study.

Chapter 4 Context and Methodology

4. Context and Methodology

This chapter will outline the context of the research and the methods of data gathering and analysis. It will begin by exploring the agri-environmental issues under New Zealand's planning regime, with particular reference to water quality issues. It is important to introduce local and historical contexts of New Zealand's neoliberal and environmental policy framework in order to justify the use of the methodology for research and data analysis outlined in the second half of this chapter.

Section 4.1 will begin with an exploration of New Zealand's neoliberal policy and environmental planning regime. This necessitates examination of national and local policy contexts. A key emphasis will be the Resource Management Act (1991), agricultural reform and other relevant policy contexts such as the more recent Climate Change Response (Moderated Emissions Trading) Amendment Act 2009, and their inherently neoliberal underlying assumptions. Section 4.2 will explore intensive farming practices and the political power of farmers that has shaped the management of freshwater resources in New Zealand. The political power of farmers combined with an effects based environmental planning regime demonstrates some of the limitations of neoliberal policy and planning regimes. Following this section 4.3 will begin the local contextual introduction to the case study. I will begin to explore the local historical, environmental, cultural and political context of the case study and the implementation of a nitrogen trading scheme. This will identify how a particular configuration of governance, land and land management practices has led to the issue of diffuse nitrogen (N) currently entering Lake Taupo and market instrument implementation. It will become evident that the case study is a highly discursive and contested political issue justifying the methodological approach to research in the second half of the chapter.

Subsequently section 4.4 will identify, outline and justify the methodology and section 4.5 will introduce the specific methods to be used for data collection and analysis. It will become clear here why these methods chosen are particularly relevant and suitable to the case study. In this section qualitative research analysis will be introduced as the methodology used to interpret the case study. This section will next outline the methods of data collection and justify and account for the methods of extracting and analysing data from interviews as an analytical strategy of examining key stakeholder discourses. Section 4.6 will also provide an indication of the sample selection.

4.1.New Zealand's wider neoliberal policy context

4.1.1. Introduction

New Zealand has seen an undeniable shift towards neoliberal policy reforms as a predominant mode of regulation. Neoliberalism is said to have emerged in New Zealand and indeed in the rest of the developed world during the mid to late 1980s. As a means to restore conditions of economic stability New Zealand's fourth Labour Government began to experiment with neoliberal policies through a series of market oriented reforms (Peck, 2004). In order to stimulate the economy the "New Zealand experiment" (Furuseth and Cocklin, 1995; Larner, 1997) soon began to extend into non-economic areas of public policy, beginning with bold and innovative reforms in environmental institutions, much of which was unprecedented at the time (Bührs and Bartlett, 1993). Neoliberal policy reform in New Zealand was centred on aligning economic development with environmental sustainability through legislative restructuring and continues to inform recent thinking on environmental policy change in the realms of resource management, water quality, local government and climate change policy contexts in New Zealand (Furuseth and Cocklin, 1995; Mol and Sonnenfield, 2000).

While the origin of these reforms has been founded upon the possible ability of market forces and public sector bureaucracy to accommodate environmental demands (Memon, 1993: 120), others believe that deregulation and movement to the market may possibly reduce the power to implement strategies to eliminate negative social, economic and environmental effects (Buhrs, 2003). In order to understand the way in which New Zealand's environmental management regime fosters neoliberal solutions to environmental problems, it is necessary to explore the key features of government

environmental restructuring, and in particular that of the Resource Management Act 1991 (RMA) and the use of market based instruments (MBI) in New Zealand.

4.1.2. Resource Management Act – 1991

After re-election in 1987 and following through with an election promise the fourth Labour government launched massive state sector restructuring, which quickly spread to other areas of governance such as environmental planning legislation (Buhrs and Bartlett, 1993; Memon, 1993; Memon, 2002; Anker, 2002). The goal of restructuring was to reinstate efficiency in governance associated with neoliberal policy ideals and typified by decentralisation of government and devolution of power to local authorities. Prior to the reform, New Zealand's environmental planning regime was characterised by multiple resource statutes with overlapping jurisdictions (for further information prior to the RMA see Ericksen et al., 1990). Restructuring of environmental governance began with the passing of the Environment Act of 1986 followed by the Resource Management Act (RMA) in 1991 which intended to create "rational and streamlined procedures for decision-making [in regards to] environmental planning and provide an integrated focus on natural resources (land, air, water, geothermal and mineral)" (RMA, 1991; cited in Gleeson, 1994: 84).

The RMA changed the way in which government and especially regional authorities responded to environmental issues. The RMA was enacted with the express purpose of promoting sustainable management and integrated resource management, uniting economic and social goals under one regulatory umbrella (Anker, 2002). It provided "a way of thinking about how to move beyond the conflict prone relationship that is often assumed to exist between the economy and the environment" (Murphy, 2000: 7). In this way the RMA attempts to tie economic development with sustainability in order to achieve what is termed 'ecoefficiency' which employs neoliberal philosophies within the application of resource management through the RMA (Memon, 2002; Anker, 2002). Section 5 outlines the RMAs effects based management regime as it specifically focuses on the management of adverse effects of resource use upon the environment and society (Memon, 2002). Decisions made under s 5(2) are not based on ordinary balancing of interests but rather on more objective examination of effects of a particular activity in accordance to an ecological point of view or environmental bottom line (Anker, 2003). Under s 5 negative environmental effects should be avoided, remedied or mitigated by

(dis)allowing certain activities (non-consented activities) based on immediate effects and in accordance to bottom lines. This demonstrates the tendency of the RMA to be reactive in nature, with a focus on managing effects after the fact rather than preventing them in the first instance. Hence the RMA is essentially seen as reactive in nature to the management of adverse environmental effects. This type of effects based management emulates the unique neoliberal linear application of scientific understandings and discourses to resource management in scientistic approaches and processes explored in section 2.4 and 3.1 and critiqued in section 3.2.

Effects based management to achieve sustainable management from the RMA approach is expected to offer policymakers the prospect of promoting higher environmental standards without sacrificing living standards (Hajer, 1995; Weale, 1992: cited in Jackson and Dixon, 2007). Although the intention of the RMA is to achieve a greater degree of sustainable management, debate surrounds the actual ability of the RMA to actually achieve this. Widespread criticism of the RMA in planning literature illuminates the point that the act is essentially reactive in nature. Jackson and Dixon (2007) argue that the planning regime has become essentially permissive and applicant led, subject to an environmental baseline. Criticism of effects based management is centred on whether trade-offs between socioeconomic and environmental considerations are appropriately addressed. This is archetypal of neoliberal approaches to resource management which attempt to combine economic development and environmental sustainability (Jackson and Dixon, 2007). It will become apparent that these policy contexts are particularly relevant to the case for water quality management in the Lake Taupo catchment.

4.1.3. Implications of neoliberal restructuring and the RMA for water governance:

The RMA has had a remarkable effect on the management of water and the functions and duties of local government, repealing both the Water and Soil Conservation Act 1967 and the Town and Country Planning Act 1977. The Local Government Act 2002 and the new planning regime for water management under the RMA 1991 are of particular importance to this study and the governance and management of agri-environmental impacts upon freshwater. There have been several attempts to marry the RMA with local planning functions. Importantly restructuring has involved devolution of

power to local authorities and a reorganisation of state sector bureaucracy (Memon, 1993). In line with this devolution regional government boundaries are defined on the basis of water catchments scale under s 30(1)(a) and 59.

The RMA provides a general legal and regulatory framework for integrated water resource management. Management issues arising from the management of non-point source emissions from agriculture come under the definition of permitted or discretionary activity (see: RMA s14 and s15). The RMA prohibits several categories of activity likely to have adverse effects on water, which under the RMAs effects based management approach, predominantly relates to point source emissions. Jay (2004) claims the reactive nature of the RMA tends to overlook the effects of non-point source emissions reaching groundwater as its effects are not immediately or adequately traceable to the source of emission. At the regional level, regional plans are responsible for the management of water catchments. Non-point source emissions are infrequently managed by the regional plan and rarely require discharge permits (Anker, 2003). The theory behind this devolution of authority is that those closest to the areas affected will be more sufficient at managing environmental issues. In contrast to the goals of devolution of authority many scholars debate the actual merits of devolving power to local authorities as it is questionable whether the devolution of decision making actually leads to more efficient resource management (Anker, 2003; Jay, 2007; Memon 2010).

Political factors also play a prominent part in the legitimisation and role of science in neoliberal approaches to resource management. Memon (2010) found recent experience in New Zealand has shown that science is limited in resolving water issues. In Canterbury the role of science has become highly contested under the effects based water planning system. Memon (2010) found the RMA's legal approach led to science impasses, where two sides square off with competing scientific data which supports their respective claims to water allocation and use. This observance, combined with the multiple sources of legitimacy and skepticism in the public sphere regarding science, creates impasses as explored in section 3.4.1 which reiterates the sentiment of section 3.2.3 that more science does not necessarily equate to better science. Additional restraints of MBI as described by King (2005) are monitoring and enforcement issues. As Sharp (2002) indicates, monitoring and enforcement issues are also dependent on the scientific and technical expertise and capacity of regulating authorities, without which will reduce its viability as a functioning market. Thus as Guerin (2004) points out it is important to

recognize and account for the institutional limitations in valuation of MBI for water resource management.

4.1.4. Conclusion

This section has introduced the wider policy context of the case study. It has shown that New Zealand has a strong foundation of neoliberal environmental policy. By introducing the history of environmental policy development in New Zealand, it has been possible to examine the emerging discourses over New Zealand's neoliberal policy reforms. Succinct with the empirical findings of previous chapters, New Zealand's neoliberal reforms are also characterised by underlying assumptions of free market reform which often overlook the political ecology of policy contexts. Political ecology considerations in the next section will reveal how, through a continuation of this trend under the RMA, central and regional governments face difficulties in the management of agri-environmental issues and in particular freshwater.

4.2. Intensive farming in New Zealand, resistance to regulation and the (mis)management of freshwater:

4.2.1. Introduction

The following section will outline the climate of response to a decline in New Zealand's fresh water quality in relation to increasing agricultural activities. It will explore the general failure of the RMA to address agri-environmental impacts, particularly water quality and the management approach to non-point source emissions. It will show how the unrealistic expectations placed upon the effects based management structure of the RMA, the inadequacy of a voluntary approach and the lack of specific water quality standards and scientific tools that are useful to decision-makers in the absence of regulation have led to the current issues (Caruso, 2000). Moreover the cultural context of support for farming in combination with pressures to intensify agricultural production in New Zealand can be directly associated with resistance from farmers to be regulated and a fall in the quality of freshwater. The outcomes of New Zealand's freshwater management regime may suggest that market approaches to management of agri-environmental issues are a more politically salient solution. However, as previous chapters have shown, regulators will likely be faced with the same difficulties as for other forms of neoliberal governance and MBI.

4.2.2. Addressing Non-point source emissions from Agriculture.

The issue of non-point emissions of nutrients from pastoral agriculture is explored in the New Start for Fresh Water cabinet paper (MfE, 2009) (a guideline to a National Policy Statement on freshwater management). The paper found a strong link between some forms of land use intensification, in particular agriculture, water use and water quality decline. Although the cumulative effects of disruption to biogeochemical cycles with impacts upon many of New Zealand's lakes and waterways have been more obscure until recently. Studies in the early 90s found a direct correlation between the intensification of agriculture in particular regions and cumulative environmental impacts upon many of New Zealand's lakes and waterways (Wilcock 1986, Sinner 1992, Smith et al., 1993, NIWA 1994, MfE 1997). It is now well recognised that non-point source agricultural emissions of nitrogen (N) and phosphorus (P) are responsible and despite the agenda of the RMA to enable decision makers to make more effective resource management decisions, debate surrounds the ability of the RMA and regional governments to address water quality issues, in particular agri-environmental water issues (see: Memon, 1993; Caruso, 2000; Larner, 2000; Anker, 2003; Jay, 2007; Memon, et al., 2010).

Policy makers believe decisions regarding freshwater management are more efficiently made and effectively executed as close as possible to the appropriate level of community where interests and benefits lie (Memon and Skelton, 2007; Memon, et al. 2010). Despite this devolution of responsibility, there are a number of important barriers to achieving satisfactory management of non-point source emissions. Over-lapping jurisdictions, vague reference to water quality under the RMA, a culture of support for farmers, political resistance to regulation, the permissive nature of the RMA and scale effects of non-point source emissions all impede the efficient management of agricultural emissions upon freshwater resources in New Zealand (Memon, 1993; Caruso, 2000; Anker, 2003; Memon and Skelton, 2007; Memon, et al. 2010). These issues will be explored and confirmed throughout the following section.

Although there is a mandate for management of freshwater issue under s 6(a) of which requires policy makers to recognise and provide for the preservation of the natural character of "...wetlands, and lakes and rivers and their margins... from inappropriate subdivision, use and development" guidelines for avoiding, remedying or mitigating the

effects of non-point source emissions are absent. Therefore Freshwater quality management, in the absence of sufficient guidelines the formulation of rules to achieve regulation of non-point source discharges has proved difficult. The uniqueness of New Zealand's environment, including climate, hydrology, and ecology, make the development of national guidelines or a national approach to freshwater management difficult (Caruso, 2000). Furthermore although the RMA specifically deals with point source emissions, water quality standards for the management of non-point source pollution appear vague in the RMA and thus regulation of non-point source pollution becomes reliant on traditional resource consent activities or dealt with in regional plans (Anker, 2003). Memon, (1993;2010), Caruso (2000) Anker (2003) conclude that the RMA seems to lack a uniform basis for the setting of water quality objectives and standards. Anker (2003) concludes this may create problems for the control of land use activities such as farming in respect to cumulative scale effects of non-point source emissions.

The RMA struggles with the management of agri-environmental impacts of non-point source emissions to water quality (Cameron and Trenouth, 1999). The issue is that the RMA is outcomes focused, where the outcome of point source emissions to lakes and streams may be obvious, non-point sources are less obvious and not easily measured and effects quantified. This is because of the time it takes for ecological cycles, expressed in section 2.2.3 and 2.2.4, to show signs of degradation. The fact that such non-point source emissions have not been the focus of the RMA is an example of a temporal mismatch between environmental legislation and ecological processes as discussed in section 2.4. Furthermore the RMA is temporally focused for management of current resource issues, this means the cumulative effects of N which are long term, and historically significant are not well managed by the RMA effects based approach (Memon 2000). This has allowed for has allowed non-point source emissions to go unmanaged under the RMA (Memon, 2000). Jay (2007) concludes that one of the greatest perils facing New Zealand pastoral farming is the results of non-point source N leaching leading to nutrient loading in many farming catchments throughout the country.

As Memon et al. (2010) believe regional authorities have been loath to place regulatory controls on freshwater in regards to such things as non-point source emissions. As a result of political resistance and support for production and growth in pastoral industries voluntary approaches and education have been considered more politically

salient (Memon, 1997). Memon et al. (2010) conclude the inability to effectively regulate diffuse non-point source pollution caused by intensive agricultural activities has proven to be the Achilles heel of New Zealand's water planning regime.

4.2.3. The role of farming discourses, support for pastoral farming and resistance to regulation

Blunden et al. (1996) claim that since the neoliberal restructuring in New Zealand in the late 1980s, the promotion of sustainability has been within the terms of the market economy. This, in combination with a traditional climate of support for farmers and pressure for increased production and intensification of agriculture in New Zealand has been compounded by resistance of farmers to be regulated. Cultural, political and financial support has meant there has been a tendency to alleviate restrictions placed upon New Zealand pastoral farming towards management practices, land use change, intensification and increases in productive capacity (Blunden et al., 1996; Jay, 2007; Memon, 2010). The effect of this ethic towards maintaining or enhancing current productive capacity of pastoral farming is twofold. Firstly, intensification of agriculture has led to increased nitrate leaching into groundwater (Clark, 2007; Ferrier, 2004, Jay, 2007). Secondly, it has led farmers to resist being regulated against any cap on their productivity imposed by environmental protection legislation. As discussed in section 3.4.1, resistance to neoliberal environmental management by industry groups is evident in New Zealand. For example resistance is strong amongst farmer lobby groups such as Federated Farmers who have advised farmers in order to maintain economic survival "not to give away their property rights so lightly" (Kelly, 1993; cited in Blunden et al 1996). As such implementing sustainable legislation is made that much more difficult.

Resistance to regulation is correlated to a culture of support for, and the growth of, and the power of pastoral farming industries and institutions (Jay, 2007). Blunden et al. (1996) proclaim that tension exists between the ethos of productive discourses and the goals of environmental protection. Due to this resistance and the support for pastoral farming there has been a tendency to relax restrictions towards management practices, land use change, and increases in productive capacity (Jay, 2007). Councils have tended to shy away from regulation primarily for political reasons, rather relying on voluntary approaches and education (Anker, 2003). The Waikato regional plan advocates such measures as self-regulation, nutrient budgeting and ecological measures such as wetland

planting (Anker, 2003; Jay, 2007). Although these solutions are advocated as effective and politically salient alternatives to regulation, the effectiveness of voluntary self-regulation of non-point source pollution is debatable. New Zealand's dairying clean streams accord signed by Fonterra and several government agencies intended to achieve healthy streams and water bodies in dairying areas. Forest and Bird (2008: 1) claim in some areas the Accord "has not only failed to improve water quality, but has allowed rivers and streams to deteriorate further" stressing the sentiment that the accord has meant that more effective alternatives are ignored in many areas.

As discussed in section 3.4.1 and 3.4.2 New Zealand examples have shown that the productive interests of farmers have captured the interests of regulatory and planning authorities through industry lobbying and submissions (See: Jay, 2007; Memon, 2010). Furthermore strong support for pastoral farming and resistance to be regulated have meant that the planning regime of the RMA remains permissive, applicant led and subject to environmental baselines. Janicke (2008; cited in Memon, et al. 2010) concludes that until greater incentives are put in place to ensure farmers do not become the 'losers' of the ecological modernisation process, conflict and a narrow production and growth based ethic will continue to impede New Zealand's ecological sustainability.

4.2.4. MBIs as an alternative to regulation in agriculture: Emissions trading schemes and Nitrogen Trading Programs

Failure of the RMA to sufficiently address agri-environmental issues, the political propensity to overlook regulation and farmers resistance to be regulated has prompted a growing recognition of the opportunities of employing market based instruments in agriculture. Sharp (2002) demonstrates that MBIs are compatible with the RMA under s5. In fact the RMA has many provisions for, and may actively promote the use of market forces in environmental solutions. Under the current legislation the Ministry for the Environment (MfE) is obliged to give consideration to and investigate ``the use of economic instruments including charges, levies, other fiscal measures, and incentives to achieve the purpose of the Act" [RMA, section 24(h)]. These suggestions emphasise the use of market instruments for the management of water allocation rights and the right to emit non-point source emissions as well as manage greenhouse gas emissions from agriculture.

While a number of scholars agree that market approaches may have some role in finding effective solutions to environmental problems, they have argued that idealistic propositions of neoliberalism and efficiency gains without due social and ecological considerations are unrealistic (Funk, 1992). These issues have been emulated in section 3.2 and 3.3. As Larner (2000) outlines, many environmental issues under neoliberal approaches have led to conflict, dissent and resistance, as explored in section 3.4.1 which have similarly in many ways undermined the legitimacy of the RMA, neoliberal projects and governments. Section 4.2.4.1 and 4.2.4.2 explore two examples of market based instruments in New Zealand.

4.2.4.1. New Zealand Emissions Trading Scheme

The New Zealand Emissions Trading Scheme (NZ ETS) provides a contemporary example of one such contested neoliberal regime and provides examples of resistance from the agricultural sector. The controversial nature of environmental issues and the application of MBI to their solution are reflected in the extensive political debate in New Zealand over the design and approach of climate policy (Buhrs and Christoff, 2006). In order to meet New Zealand's obligations under the Kyoto Protocol, an internationally binding agreement on reducing anthropogenic climate change by reducing greenhouse gas (GHG) emissions, successive New Zealand Governments have developed and revised policy packages in an environment of contested policy measures (MfE, 2007). This has include a carbon tax proposal, dubbed "the fart tax," which was announced in 2002 and cancelled in 2005 due to significant opposition and public demonstrations particularly from the agriculture industry (Buhrs and Christoff, 2006). At the time of the proposed emissions tax, farmers did not accept any responsibility for greenhouse gas emissions and water quality issues (Kerr and Sweet, 2008). Despite public consultation, the proposed NZ ETS remained very controversial and required extensive amendments before it was eventually passed in September 2009, thus emulating the resistance to neoliberal ideology explored in section 3.4.1 and modification of policy in section 3.4.2. The planed integration of the agricultural sector in 2015 continues to receive considerable contestation from the business sector, economists and farmers (New Zealand Herald, 2010).

Resistance and delay to agriculture's integration into the New Zealand ETS (NZ ETS) is congruent with the uncertainties and contradictory outcomes of neoliberal

environmental governance explored in section 3.2. The view that a MBI is the fairest, most efficient and effective measure to address climate change and meet Kyoto obligations is highly contested by many Government officials, businesses and members of the public (Backstrand and Lavbrand, 2006; Muhovic-Dorsner, 2005; Michaelowa, 2004). Gunasekera et al. (2007) claims one of the potential failings of emissions trading is its narrow scope of social, economic and environmental considerations. Subsequently many opponents to agricultures integration into the ETS in New Zealand argue that there is huge potential for injustice and negative environmental outcomes (New Zealand Herald, 2010) .

4.2.4.2. Freshwater Nutrient Trading Programs (NTP)

Market based management of fresh water resources through Nutrient Trading Programs (NTP) involves the marketisation of emissions rights. Nutrient trading programs rely upon the ability of bio-physical sciences, modern technology, environmental management systems and economic incentives to promote the sustainable management of water resources under the RMA (Clark, 2007; Memon, 2010). In 2009 there were 57 NTPs worldwide with two in New Zealand (Selman et al., 2009:1). Paragahawewa (2007: 1) argues there are three common attributes to any NTP. First a cap or target level of emissions is required. Second, permits, which define the aggregate quantity of emissions which are equal to the target or cap, need to be allocated amongst emitters. Third, a mechanism for market exchange of permits must be created. In addition Abdalla et al. (2007) claim there must be heterogeneity in abatement costs. If not, the cost of purchasing emissions would equal the cost of abatement of emissions and trading would be unlikely to occur at a rate that would sufficiently reduce emissions. Hatton et al. (2004) argue NTP offer a more flexible and cost effective alternative to achieving water quality goals than command and control approaches, others argue that NTP like any other MBI are affected by the political ecology of resource issues and as deviation exists between their theoretical roots and practical application (Nguyen, 2006). Social and political considerations such as participant buy in and social justice, as well as biophysical and scale factors and the level of certainty in the science of diffuse nutrients are all important considerations of any NTP (Nguyen et al. 2006; Selman et al. 2009).

Like any MBI, social and political outcomes are important to the success of NTP policy. Selman et al. (2009) Claim that because existing resource users, such as farmers, are often over-represented in democratic processes their buy-in to a NTP is particularly important. Buy-in for farmers is particularly dependent on perception of potential benefit and detriment accruable to a proposed program. Kerr et al. (2007) claim that allocation of emissions units amongst resource users may offer the opportunity for community engagement in the emissions control process and also structure allocations to compensate vulnerable groups and the ability to reduce opposition to NTP to create participant buy in and increase legitimacy. On the other hand, the allocation mechanism, usually set through a political process, provides the potential to create winners and losers in NTP allocations and the ever present potential to result in social injustice and further inequalities and re-distribution of political power between stakeholders, as explored in section 3.3.2 (Castree, 2008a; Selman et al. 2009). Selman et al. (2009) and Nguyen et al. (2006) conclude that participant buy in is dependent on the extent to which resource users are represented by decision makers and that it is an unlikely outcome that the allocation of permits will either result in the social or environmental optimum level because of this.

Biophysical factors also influence the success of NTPs. The success of NTPs is reliant upon the ability for science and capacity of regulators to invest in science to accurately reflect the movement of nutrients. This is particularly the case for non-point source emissions for which emissions proxies rather than direct measurement are often used to model and monitor cause and effect relationships of diffuse nutrients (Selfman, et al. 2009). Spatial and temporal scale and the complexity of hydrological systems in which NTPs are implemented affected the ability of the NTP to manage nutrients. An additional problem identified by Nash and Revesz (2002) is that a NTP may lead to concentrations of emissions or "hot spots" within catchments. Like quota management systems, Nash and Revesz (2002) found that hot spots in NTP occurred due to spatial concentrations of emitters in one area prior to, or as a result of, emissions rights trading. This demonstrates the failure of scientific assumptions underlying neoliberal policy approaches identified in section 3.2.3 and outcomes addressed in section 3.3.5 Woodward et al., (2002) claim the failure of the first NTP in the 1970s can be accredited to perverse incentives of emissions rights trading to cause localised concentrations of emissions.

4.2.5. Conclusion

Theorising the neoliberal approaches to environmental management as a controversial and contradictory phenomenon in previous chapters has allowed an appreciation of the contestations and struggles that have engaged policy debates in New Zealand and in particular the management of non-point source emissions under the RMA. The failure of the RMA to sufficiently address agri-environmental issues, the political propensity to overlook regulation against these effects and the continued support for maintaining farm productivity has led to a complex political and ecological issue. The findings have illuminated not only the role of the state, but also the broader political, ecological and economic forces at play in New Zealand's environmental policy contexts of freshwater and agriculture land management practices. These findings strongly suggest that environmental policies critically depend on the ecological understanding and social construction of environmental problems. Whilst the outcomes of New Zealand's freshwater management regime and environmental governance restructuring may suggest the use of market instruments will be more politically acceptable, previous chapters have shown, NTPs will face the same political and ecological issues as other MBI initiatives

Nearly 20 years since the enactment of the RMA and the popularisation of neoliberal frameworks of environmental management a number of cases present themselves as opportune and relevant for further investigation of the consequences of free market reforms and free market environmentalism upon the management of agricultural environmental issues. In particular the Lake Taupo's N trading scheme provide opportune cases for investigation of the initial planning stages of market based forms of environmental governance.

4.3.Lake Taupo - local and historical context

4.3.1. Introduction:

The area of the case study is the catchment of Lake Taupo which is located in the Central North Island and is New Zealand's largest lake. It is a world renowned tourist destination and trout fishery which is known for its superb water clarity. Water quality has been consistently identified as the most important environmental priority facing the Waikato region (Stewart et al, 2000). In 1999, the identification of non-point source emissions of N as a potential threat to lake water quality by Environment Waikato (EW), the regional council responsible for managing the Lake, prompted the call for a policy response to manage these sources of N. EW identified that non-point source N emissions

were entering the Lake through ground water and subsequently having a detrimental impact on lake water clarity and increasing algal blooms. As a response EW initiated the Lake Taupo Water Quality Project (LTWQP). The initiative represented a landmark attempt to utilise the RMA, legislation and market instruments to address a complex environmental, social-political and economic issue.

The following sections will utilise the political ecology approach to resource issues to introduce the case study. Local context is important for later analysis. This will involve an exploration of historical land development and the identification of N leaching as an environmental issue in the catchment. Later sections will explore the political, social and policy response to the issue. Furthermore it will introduce the NTP intended to manage nitrate leaching from farming within the catchment. Providing an introduction to the study area and specific contexts of this land use issue is important for wider political ecology considerations.

4.3.2. Historical Land Development

Historical land development practices have indeed led to the current resource dilemmas faced by the lake, the regional and local council and local land owners. Historically, the area around Lake Taupo was considered to be un-cultivatable pumice lands (Ward, 1956). After World War One Discharged Soldiers Settlement act of 1915 saw vast tracts of land turned to pasture with the addition of fertilisers, phosphate and mechanisation of sowing practices. Post World War Two (circa 1945) saw agriculture in the catchment enter new phase of expansion involving the large scale conversion of native bush, tussock and scrubland into exotic forests and pastoral lands. Government departments, specifically the Department of Lands and Survey and the Department of Maori Affairs, began improvements on unoccupied crown land including fencing and soil consolidation and grass sowing which made possible rapid settlement and pasturalisation of large areas of previously forest tussock and native grassland within the catchment. At this time excessive amounts (based on comparison between historical and more recent measures) of super phosphate were added to the soil (Yerex, 2009). A majority of this newly converted farmland was handed to returning soldiers from WWII from 1945 to 1955 with further balloting out of government developed farms in the 1970s (Yerex, 2009).

4.3.3. The science: N as the limiting factor:

Water quality has been monitored relatively consistently for the lake and its tributaries since the 1970s, results showing clear signs of gradual deterioration over the past 30 years (Vant, 2008). Historically, Lake Taupo had extremely low levels of N and other nutrients. This has maintained the lakes water quality and limited the growth of nuisance plants and algae (Yerex, 2009). Development and land use change in the Lake Taupo catchment over the past 50 years has increased the amount of N and other nutrients entering the lake (Environment Waikato, 2003). EW (2001) and other commentators (Vant, 2008; Yerex 2009) argue that the main sources of N entering the Lake are from pastoral farming, undeveloped land, rainfall, planted production forest, Tongariro Power Development Scheme and sewage and urban runoff. It is estimated that 93 percent of the manageable load of N entering the lake is from the non-point source emissions of pastoral farming of sheep, deer, cattle and dairy cows contributes the majority of the manageable load of N to the lake (EW, 2003; Vant, 2008; Yerex, 2009).

The most important diffuse wastes are nutrients predominantly N from fertilisers, faecal matter, urine, and sediment washed into waterways by rainfall runoff, or by leaching through the soil into ground water (Barnett and Pauling, 2005). When effluent (in particular urine) is combined with fertilisers it increases the level of nitrates in soil which leads to leaching into surface and groundwater (Cameron and Trenouth, 1999; de Klein et al., 2003). The Lake responds very slowly to the many biophysical processes that control the movement of N from the land to the lake, as ground water travels at much slower speeds than surface water (Cameron and Trenouth, 1999). This means that there is a significant time lag between non-point source N entering the ground water. It is only in recent years that the impact of large scale land conversions since the 1950s have led to observable changes to the lake's water quality through the vigorous increase in lake plant growth (EW, 2003). As a result of the increased levels of N entering the lake and a significant increase in phosphorus associated with N leaching this has in turn increased the number of potentially toxic algal blooms, first reported in the lake in 2001 and again in 2003 resulting in health warnings being issued in Whakaipo Bay and Omori (EW, 2003). EW sees this as significant as modelling studies have shown that the water quality of the lake may be adversely affected in the absence of any controls on land use practices in the catchment (Yerex, 2009). Despite previous efforts to reduce levels of sediment and

runoff entering the lake through extensive stream fencing, tree planting and land retirement under the Taupo Catchment Control Scheme these efforts have not been enough to halt N rich groundwater entering the Lake (EW, 2003).

Uncertainties in science mean it is inherently difficult to establish market instruments for environmental management that are both scientifically accurate and politically salient. Monaghan et al., (2008) claim the ability of science to precisely model and predict the movement of non-point source N in below surface strata has meant that management responses are limited by multiple spatial and temporal scale factors. Due to limits of science to predict the movement of N, the outcomes of non-point source N discharges are inherently unpredictable (See: Longhurst et al. 2000; Monaghan et al., 2008). Furthermore, EW (2003) recognises that temporal scale delay means that policy shifts will not likely take effect for a period of 20 to 30 years, meaning the outcome of changes implemented now will likely remain unknown for this period of time. The next section will now explore the development of Regional Plan Variation 5 (RPV5), the policy variation set to structure a response to the issue of non-point source emissions of N and their effect upon lake water quality.

4.3.4. Regional Plan Variation 5 policy development

Under the RMA (1991) EW has a mandate to protect the lake and its tributaries from adverse effects of N entering the lake. The evidence available suggests that manageable N loads must be reduced by 20 percent in order to maintain lake water quality at its current level (EW, 2003). In terms of farming there are two main ways in which this is achievable; through changes in farm management systems and practices so that less N is leached and changes in rural land use to increase the amount of low N leaching land use, such as forestry, silage and new horticultural crops (EW, 2003). As an alternative to regulation, RPV5 utilises a NTP as a policy tool in an attempt to achieve comprehensive land use change to reduce the level of N emissions within the Lake Taupo catchment. The catchment boundary defines the area under RPV5 (see figure: 2 bellow)

Figure 2 - Map showing RPV5 catchment boundary (Source, Environment Waikato, 2009)

RPV5 has evolved over two distinct phases. This ranges from finding statistically significant indications in the decline of water quality in 1999, informing farmers of the need for non-point source reduction and management in the catchment, formation of EW's strategy (LTWQP) and public consultation on the proposed changes to the Regional Plan and the introduction of a NTP. This phase presents a unique example of the problems of establishing MBI in agriculture, specifically NTPs (discussed in chapter five). The second phase which has just begun involves the implementation of the NTP. This phase thus provides early indications of some of the outcomes of introducing NTP to manage non-point source emissions in agriculture and possible future implications (Discussed in chapter six).

As part of an EW's action plan to clean up Lake Taupo and its tributaries, EW announced an RMA strategy that would involve a variation to the Waikato regional plan (RPV5). This included a cap and trade nutrient trading program to cap non-point sources of nitrogen (N) at the farm level and establish N management and trading program and corresponding consent requirements under RPV5. The plan imposes consent requirement upon land use activities in the catchment that leach N above authorised or permitted discharge levels. The NTP requires farmers farming over a particular level of N output (See appendix II) to apply for a resource consent to farm. They are then assessed using Overseer2 nutrient budgeting model to produce a Nitrogen Discharge Allowance (NDA) (See appendix I). The consent process requires farmers to determine a baseline year of N emissions (NDA) which they cannot exceed (Yerex, 2009). Furthermore, farmers are provided with the option to apply for consent to buy or sell allowable N permits if they emit N above or below the baseline. The intention of tradable discharge allowances is to provide farmers with flexibility under the scheme with the intention of creating economic efficiency in reduction of pollution.

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2 Overseer, a nutrient budgeting model was developed by AgResearch New Zealand LTD. It is the model used by EW staff to determine the Nitrogen Discharge Allowance (NDA) for each individual property based on single best year of nitrogen leached between July 2001 and June 2005 (QUOTE – 2011 EC decisions). It is also used to manage N leaching activities on an on-going basis and to manage the annual average of N leached per farm using a Nitrogen Management Plan (NMP).

RPV5 introduces a NTP which caps N emissions to land under consented activity rules of the RMA. N emitting rights are then allocated based on historical best year production level between the years 2001 and 2005. The N cap functions as a bench mark necessary to achieve the policy goal of a 20 a percent reduction in N entering the lake by 2020 (EW, 2003). Monitoring is required under the scheme to ensure farmers are adhering to a benchmark (EW, 2003). Flexibility is provided in abatement options to landowners in the scheme through the option to trade N as a form of private property right. This allows the transfer of NDA between land holdings. This ensures any increases in N leaching are offset by corresponding and equivalent reductions within the catchment (Environment Waikato, 2010). Environment Waikato believe it is appropriate to provide for some flexibility in land use management where nitrogen leaching over the catchment remains within capped limits (Environment Waikato, 2010).

After much caucusing in the Environment Court, it was decided that Consented activity rules under the RMA were the only option to give 'certainty' (Yerex, 2009). The policy needed all three components being; the cap, a robust regulatory regime to enforce the cap (a Central Government prerequisite for funding), and the public money to assist the precedent setting change (Yerex, 2009). This means that farmers who don't qualify for permitted activity rules (see appendix II) will now have to apply for consent to farm. Furthermore Section 36 of the RMA enables councils to charge applicants for receiving, processing and granting consents; and consent holders for administering, monitoring and supervising consents.

The cap and trade policy also required the support of central government if the strategy was to succeed in reducing N emissions. A non RMA components of RPV5 includes the establishment of a 'fund' to purchase the 20% N reduction required to reach the goals of maintaining lake water quality (Yerex, 2009). Recognition of the importance to the local community of social, cultural, economic and environmental led EW and the Government to the decision that nitrogen reduction should be achieved via financial assistance. It was decided that there needed to be a 20% reduction in the manageable load of N to the lake. Therefore Lake Taupo Protection Trust3, an

3 The Lake Taupo Protection Trust was set up in 2007 to administer the $81.5 million fund to protect Lake Taupo's water quality. The Trust is charged with purchasing land or other such means to reduce to lower N leaching activities or by purchasing NDA directly to reduce the amount of manageable nitrogen leaching

independent trust, was set up to administer the $80million fund. The purpose of LTPT is to purchase N permits from farmers and permanently remove these N emitting allowances from the catchment. LTPT is tasked with reducing enough N allowances to reduce the N output by 20%. The trust does this by either purchasing land and converting it to low N land use, for example forests, or by purchasing a farms NDA directly which is secured through changes to resource consent (Environment Waikato, 2010). The New Zealand Government agreed to establish a fund as firstly government agencies were a major land owner in the area with extensive landholdings in the catchment held by Landcorp and Corrland (a part of the department of corrections). Secondly the implementation costs imposed upon EW exceeded EWs ability to create land use change and reduce N output (New Zealand Government, 2003). The New Zealand Government pledged it would contribute $36.7 million towards the implementation of the strategy (New Zealand Government, 2003), in total $80 Million has been set aside for the project until 2020.

This complex process has involved contribution from a number of key groups and stakeholders across the region, conflict, analysis of various forms of policy and finally the regulatory process utilising the RMA and the environment court. As discussed in earlier chapters, the uncertainties in science behind the NTP in Taupo have provided stakeholders evidence to contest the practicality of the application of science and question the potential effectiveness of the Regional Plan Change. There is also large temporal risk posed by changes in the structure of political and social contexts over time (Yerex, 2009). It has been suggested that over this period of time farms may change and there may be unforeseen political changes in the organisation of the structure of local or national governments which may impede upon the effectiveness of RPV5. Due to this time lag even where management of non-point source emissions of N is put in place now lake quality will still worsen in the immediate to medium term.

The farming community seriously questioned the scientific basis for action and the need for a regulatory approach (McKenzie, 2004; Yerex, 2004). Shortly after the release of the strategy and statement that EW was in 'consultation development' in 2000

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into the lake by 20 per cent. The Trust reports to the Government (Ministry for the Environment), Ngati Tuwharetoa (local Iwi), the Taupo District Council, and EW (LTPT, 2011).

delays began in the progress of the LTWQP as some stakeholders disputed the science and the issue of N entering the lake. Modelling of the catchment and hydrogeology reports of groundwater movement commenced in 2001 in response to disputes over the science (Yerex, 2009). Realisation by farmers that any policy changes implemented now would likely take a long period of time (around 20-50 years) to take affect and would pose short to medium term costs with little environmental response to land management practice has forced many farmers to challenge the validity of the policy response (Yerex, 2009).

Farmers also have shared their concerns in regards to potential negative social and economic outcomes of the policy implementation. The proposal to enforce N restrictions makes some pastoral farming systems uneconomic and has the potential to reduce farm income which has caused upset amongst farmers. Furthermore Yerex (2009) claims that RPV5 has a very real potential to create injustice through loss of income and lifestyle. It has been estimated that farm losses can be in the form of loss in capital value of a property and also loss of future income to be upwards of $160 million (Thomas et al, 2002). Furthermore some rural land cannot be sold in the catchment; such land includes Maori land properties like those owned by Tuwharetoa Economic Authorities who are the largest land holders in the catchment (EW, 2009). The Te Ture Whenua Maori Land Act (1993) creates significant barriers to selling Maori land. As such these demand special consideration in the catchment (Yerex, 2009).

Any potential policy implementation which may restrict farmers and threatens their income is likely to face strong opposition. As such early proposals to manage non-point sources of N in the catchment have met strong farmer resistance which has subsequently resulted in delays and modification of policy during the consultation and environment court phases of policy implementation (Yerex, 2009). Whilst the RMA gives EW the mandate to manage the Taupo catchment for appropriate land use by way of plan changes to the Regional Plan it has also provided numerous actors the provision to challenge and appeal against plan changes in the environment court (McKenzie, 2004). Modification of proposed plan changes through the environment court resonate with the findings of the theoretical literature that through the capture of interests by stakeholders in the development of policy often results in modification and provisions to proposed policy. However such opportunity to oppose and modify policy through the consultation and environment court process was deemed necessary by EW and stakeholders in order to

achieve political saliency. The consultation process and involvement of the environment court during the consultation phase of RPV5 has meant that discourses have become important in the shaping of subsequent policy and provide opportunity for analysis.

4.3.5. Conclusion

Sections 4.1 to 4.3 have discussed how a historical drive towards pasturalisation and pastoral agriculture land management practices have led to the current N management issue faced by the Lake Taupo Catchment. Analysis has reveals a number of contextual aspects mirror the theoretical literature in that outcomes of environmental solutions depends on the unique combination of institutional, political and ecological factors acting upon it. A review of theoretical and contextual literature strongly suggests this particular governance issue is part of wider political and ecological contexts within which political contests over environmental governance are played out. This claim is clearly evident in the development that has shaped RPV5. The preliminary stages in development of RPV5 align with the theoretical literature suggesting environmental governance is an inherently political process.

The contextual literature review reiterates suggestions that stakeholder political influence over policy development may lead to modification of policy in order to achieve political saliency at the cost of potential environmental outcomes or goals. LTWQP reflects unpredictable and multiple political influences as the project and its outcomes have been shaped by a variety of actors and political strategies, tactics and discourses. Furthermore ecological, temporal and spatial scale factors are observed to both influence the effects of N and play an important role in the outcomes of policy responses. The review of literature reveals environmental policy changes based solely on changes to legislation or imposition of regulation are unlikely to be successful. Furthermore these findings resonates criticisms of the ecological modernisation agenda of New Zealand's resource management institutions, frameworks and their outcomes. This section concludes the theoretical review of literature.

4.4.Methodology

4.4.1. Introduction:

In this thesis I examine discourses from interviews with key stakeholders from the Lake Taupo catchment who are affected by or involved in the creation of RPV5. This section introduces the concept of qualitative data analysis as the analytical strategy of examining and interpreting discourse. In the methods section it will describe the research applications of narrative analysis as a form of discourse analysis and its appropriateness for stakeholder research. An examination of stakeholder perspectives in the Lake Taupo N Trading scheme will provide insight into the tensions of market based instruments and how they operate in an agricultural setting. Analysis will emphasize stakeholder perception of the potential effectiveness and appropriateness of the instrument and to elucidate stakeholder confidence in these instruments to achieve their intended outcomes. Furthermore, the likelihood of market instruments in agricultural to achieve a fair, efficient and effective solutions to environmental problems will be explored.

4.4.2. Approach to research:

A review of literature has shown that market mechanisms encompass potential for scientific, social, economic and ecological uncertainty and pose the threat of potential social injustice. Stakeholder recognition of the potential and existence of these issues in the Taupo catchment has led to an atmosphere of livid debate and contestation of RPV5 and the associated N trading scheme. Accordingly stakeholder recognition provides important insight into the issues faced in agricultural MBI and the potential appropriateness and effectiveness of MBI in managing agricultural emissions. In light of these arguments, and the discursive nature of the issue, qualitative discourse analysis is deemed the most appropriate methodology to address the underlying political, social and environmental issues of RPV5 and MBI in agriculture.

The primary aim of this research is to construct a representation of individual experiences, beliefs and responses toward the implementation of an MBI for the management of a complex agri-environmental issue. Qualitative researchers draw on a range of theoretical tools in order to convey individual meanings in an analytical manner to represent a research participant's story (Paulson,2001). As individuals experience the implementation of agricultural MBI differently this research will allow these viewpoints

to be heard where otherwise they may be silenced or excluded. In order to provide an accurate representation of the case study it is pragmatic to ensure solid theoretical tools are employed to explore the issue. This is emulated by Titscher et al. (2000: 13) who claim "Theories define the framework for methods, methods determine conditions for concrete research operations." Mackenzie (1995) and Paulson (2001) both argue for a greater degree of the use of rich, holistic and open ended ethnographic practices in the examination of resource issues in order to uncover additional contributing factors to resource issues.

As most people use words to make sense of situations (Maykut and Morehouse, 1994), qualitative research provides a methodology which enables researchers to find patterns in words used by individuals to explain in a rich and interpretive way how individuals come to view and understand resource issues (Maykut and Morehouse, 1994). Qualitative researchers value subjective interpretation of meanings of words and stories of individuals as the way they construct reality and understand issues. Deconstructing the meanings of words enables researches to interpret these experiences and meanings and understand and interpret an individual's particular view of reality. As such Jootun et al. (2009: 32) argues that qualitative research is capable of delivering socially relevant insight as qualitative researchers attempt to "tell it how it is." Qualitative research in this way allows for deeper understanding of the complexity of research participant experiences and the discursive way in which knowledge is created, contested and becomes situated within and affects particular resource issues.

4.4.3. Situating the researcher: positionality and the role of reflexivity

Reflexivity of the researcher refers to the degree to which the researcher controls and exerts influence over the research findings either intentionally or unintentionally. Reflexivity plays a vital role in qualitative research as it enhances the quality of research through the understanding of the role the researchers positionality affect all stages of the research process. This includes maintaining a reflexive approach during interviews and data processing and a need to remedy the researcher's subjectivity upon interpretation of participant's behavior and collected data (Jootun et al., 2009). Reflexivity throughout the research process ensures reflection of the researcher on their own values, preconceptions, behaviors or presence and those of the research subjects which can exert influence upon the interpretation of responses (Parahoo, 2006; cited in Jootun et al., 2009).

My own position as a researcher and non-farmer, although having grown up on a small farm, is fitting of an 'outsider' status to the rural, farmer participants in the research. This aspect raises concerns over representation as my project aims to give voice to farmer perspectives yet is mediated through myself, someone with a minimal farming background. This requires effort by the researcher to understand participant perspectives and be sensitive to differences. To some measure, this issue will be addressed by: taking a relative and holistic approach in using discourse analysis; using participants own words where possible; by being explicit throughout the thesis about my own position as a researcher. In order to maintain reflexivity this required me to explain my own positionality to the research participants before interviews. During the initial introductions of the interviews I ensured participants that I would stay open minded and not harbor preconceived judgment.

4.4.4. Ethical considerations

As this study involved a highly polarized and contested issue in a relatively small community a number of ethical issues needed to be raised and addressed which included gaining ethics approval from The University of Auckland Human Participants Ethics Committee. This research followed a number of necessary ethical safeguards such as the five core principals of ethical conduct as outlined by Tolich and Davidson (1999). Firstly the researcher must not cause harm to or deceive research participants in any way. Participation must be voluntary with expressed consent given for participation. Participants must be informed of the intent of research and interviewed from an informed perspective. Anonymity and confidentiality must be maintained at all times. Finally, it must be insured that the researcher does not cause any harm to the research participants

It is the responsibility of the researcher to ensure participants are provided with information in order for them to participate from an informed position (Maykut and Morehouse, 1994). This study was designed to be considerate of participant's ethical concerns firstly by ensuring participants provided informed consent and by adhering to the necessary ethical concerns and safeguards outlined by Tolich and Davidson (1999). As such, this required providing all participants a participant information sheet (PIS) outlining the details of the study including all ethical considerations (See appendix: III). The purpose of this PIS was to provide the participants with a description of the research,

and what was required of them should they wish to participate in research. Participants were also provided with a consent form which was signed and returned to the researcher (See appendix: III). Managerial consent forms also ensured that employees had permission from their employers/managers to participate in research. The PIS and consent form ensured those participants were informed of their rights pertaining to the study as well as my obligations to these rights.

The procedural initiative of gaining ethical consent was conducted through the application of human ethics approval at the University of Auckland as this study involves field interviews with human research participants ethical clearance was required. A low risk application form was completed and signed off by both the HOD of the School of Environment and the Human Ethics Committee. The nature of this research posed a number of ethical issues. An overarching ethical consideration was the need to ensure consistency between participant views expressed in interviews and what was reported in research findings. To ensure participant views are appropriately presented within the thesis, direct quotations from participants have been used in research findings. Furthermore this study took a holistic political ecology approach to the analysis of data collected from interviews thus ensuring holistic representation from all participants. One concern raised by the ethics committee before final approval was granted was maintaining the anonymity of research participants. This was due to the fact that participants were from a small community and the possibility of participants being identified through their responses to research questions was a concern. Final approval was granted ensuring amendments were made to the application which ensured all measures were to be taken to prevent this from occurring and that participants were informed of the possibility of being identified by their responses.

Privacy of research participants is another important ethical consideration. Some participants might not want their opinions to be made known to others. Privacy and anonymity will be maintained as far as is possible by not using names and only using a generic job title where permission is given. Where anonymity cannot be guaranteed this will be expressed to participants who then have the opportunity to decline participation. Another concern was the potential misrepresentation of participant responses. In this case direct quotations will be used to ensure views are expressed correctly.

Most importantly, the downstream effects of research, subsequent to publication or use, will be taken into consideration. In order to moderate negative downstream effects of research three key principals of stakeholder research will be followed. Firstly, direct quotations will be used in research findings to ensure fair representations of participant's views are upheld. Secondly, all care will be taken to ensure participant's anonymity. Lastly, the researcher endeavors to provide a holistic interpretation of responses.

4.5.Methods

The following section will introduce stakeholder interviews as the primary qualitative research method for data collection. Narrative discourse analysis will be introduced as the methodology used to interpret stakeholder interviews the case study. This section will next outline the methods of data collection and justify and account for the methods of extracting and analysing data from interviews as an analytical strategy of examining key stakeholder discourses. It will become clear here why these methods chosen are particularly relevant and suitable to the case study.

4.5.1. Interview Strategy –

The strategy behind a qualitative research methodology required thinking about how to construct several interviews with a diverse group of individuals about a highly contested and politicized issue that has significant impact on their lifestyles and jobs. Interviews as a method of collecting qualitative data as interviews often reveal the discursive issues under the surface of a particular issue where other approaches fail to uncover such issues (Smith, 2001). Interviews constitute what Kvale (1996: 5) refers to as a "...postmodern constructive understanding that involves a conversational approach to social research". The methodological appeal of the open ended interview lies in its ability to reveal diverse experiences, and to give voice to a range of different actors and interests (Smith, 2001). Through the interview process more detail may be revealed during face-to-face interviews than can be elicited by more impersonal forms of data collection. This is because the method demonstrates the researcher's genuine interest in participants' own viewpoints. Finally, interviews bring to light issues previously unanticipated by the researcher (Hoggart et al., 2002; Valentine, 2005). The project researcher, through qualitative research methodologies, becomes the instrument through which the story of the research participants is told (Maykut and Morehouse, 1994). Maykut and Morehouse

(1994) claim the purpose of qualitative research through the interview method can reveal important information about a topic beyond written text.

It was for these reasons and my lack of experience in participant interviews that I believed the structure of interviews to be an important consideration. However, research on interview methodology revealed that when participants have broad and in depth knowledge of the issue being studied it is likely beneficial to take a more relaxed and open ended approach (Tolich and Davidson, 1999). Structured interviews were subsequently rejected because of the diversity of participants, the multiple roles they play and their varied experience and expertise. Furthermore the diversity of experience of the policy issue of each of the interviewees within the catchment varied greatly. For this reason I settled on the primary research method of semi-structured key stakeholder interviews with a checklist of issues to be covered.

The qualitative research methodology is in line with Mackenzie (1995) and Paulson (2001) demand for more open ended ethnographic research, which is considered an appropriate methodology for a political ecology approach and this particular research. This is because interviews provide an opportunity to gather qualitative data that is rich in context and meaning. The open ended nature of the research questions also served to encourage and engage interviewees to participate in everyday conversation about the topic in a more fluid and evolving way which provided rich qualitative data for analysis (Soderberg, 2006).

4.5.2. Interviews

The interviewing of participants began on 5th October 2010, the majority and remainder of interviews took place over the period 28th October until 12th of November 2010. This time was chosen as it coincided with the end of Lake Taupo Catchments lambing season and the majority of farmers were available for interviews.

Preparing for interviews was an important aspect required in order to ensure the richness of contextual information was gathered. In order to ensure the most appropriate questions were asked it was necessary to prepare for interviews by completing background research on each participant involving a number of methods. If the interview subject was part of a company, group or other such organisation then an investigation was completed of the organisations website, publications and other such available material.

Where some interview subjects were not members of organisations information was gathered by asking a few general questions when first making contact with each participant regarding their involvement in the scheme. This phase of preliminary research was important as it ensured the most appropriate questions were asked of each interviewee during interviews.

The aim of the interviews was to investigate issues raised in the preliminary literature review and contextual review of the case study. As such the idea was to engage interviewees in a conversation about the market instrument employed under RPV5 and encourage the interviewee to provide information and discuss issues related to the research topic. As discussed structured interviews were rejected because of the diversity of roles and the breadth of knowledge relevant and held by each interviewee. The interviews began with an introduction, the interviewees were asked to describe their current involvement in the catchment/scheme. This was then followed by a number of contextual questions based upon their primary response, divulging more about the participants' role in the catchment. Following this a number of open ended questions pertaining to the research questions of this thesis were asked. At the end of each interview, subjects were asked if they had anything else they may like to add or change. This interview strategy proved useful as it provided rich data for analysis.

Interviewees were all aware that all interviews were recorded and later transcribed by myself. No interviewees approached me to request transcripts although a number approached me later to clarify a few issues they said they would have to consult with others and get back to me on, subsequently these were added to transcript data and analysed. Candidly a number of interviewees stated that they were happy to be identified as they had strong views on the subject that may be related back to them although all efforts described above to maintain anonymity of interviewees remain strong in the research output.

4.5.3. Discourse analysis: analysing data from interviews

Political ecology provides the theoretical framework for this research. One line of political ecology research attempts to examine the different narratives or story lines from different points of view at the local level where different stake holders act and interact when dealing with environmental issues. Beyond a preliminary analysis of historical,

political, economic, ecological and social factors at multiple scales, political ecologists utilise various forms of discourse analysis as a qualitative approach to research methodology to reveal the evidence beyond the text. Discourse analysis is also widely used in human geography (see: Lees, 2004; Wiles et al., 2005).

Discourse is an institutionalised way of speaking, it describes a specific series of representations and practices through which meanings are produced (Lees, 2004). Discourses determine what entities are constructed, what relationships are considered natural, and who has agency within the discourse (Wiles et al., 2005). In addition discourses affect everything in our society while remaining nearly unobservable (Waitt, 2005). Emphasising the desires, imaginaries, ideologies and metaphors which both reflect and shape relations of power and understanding, discourse analysis methods are concerned with investigating how discourses in language and written texts are used to shape and influence behaviour (Lees, 2004; Wiles et al., 2005). In this way discourse analysis can be used to develop an understanding of how resource issues and the ways in which they are dealt with are products of discursive struggles (Oels, 2005). Foucault (1972; cited in Waitt, 2005) conceptualises discourse within a theoretical framework that produces knowledge through language (meanings) which influences what we do (practice). Discourse analysis allows for a richer examination of particular social, political, and cultural contexts (Carvalho, 2007) embedded in policy debate. In the environmental arena, discourse analysis has been used to characterise pervading and received wisdoms (Leach and Mearns, 1996; cited in Adger et al., 2002) and the evolution of environmental crises and their social construction (Roe, 1999; cited in Adger et al., 2002). Furthermore, distributive issues in environmental policy making become the focus of the environmental justice discourse.

Discourse analysis as a primary method of data analysis is a suitable method of qualitative analysis. RPV5 reflects unpredictable and multiple political influences as the project and its outcomes have been shaped by a variety of actors and political strategies, tactics and discourses. The way people tell their story of the consultation process and how they have been affected and what they think are the pertinent issues associated with RPV5 has meant that discourses have become important in both viewing the outcomes of and shaping subsequent policy. Therefore utilising stakeholder discourse to explore the emerging stages of the RPV5 and the potential effectiveness of the trading instrument will

reveal important issues that arise during the implementation of MBI in the agricultural sector.

The domains of enquiry upon which interview questions and policy submissions will be analysed include; stakeholders perception of the efficiency and fairness of RPV5 and the NTP; perceptions of justice; infringement upon private property rights and environmental implications of emissions trading as the primary mitigation mechanism. Analysis also aims to determine what processes and means are used and attempts made to shape and influence the RPV5 and explain the role and influence of stakeholders within the policy process. The outcome discourse analysis will be the classification and categorisation of linguistic descriptions and geographical knowledge surrounding agricultural emissions mitigation policy.

4.5.3.1. Narrative analysis

Various methods of discourse analysis are utilised to analyse data from interviews and other sources of data from stakeholders. One method political ecologists have found particularly useful in analysis of stakeholder discourses is a subfield of discourse analysis, narrative analysis. Discourse analysis will specifically focus on stakeholder narratives, the description of the series of events and experiences of resource issues. Narratives form part of everyday language as oral or written accounts of events. Narrative analysis provides researchers with a useful tool to examine the storylines within the discourse of stakeholders. It allows researchers to make more available the unstated, implicit understandings that underlie stories that people tell (Feldman, et al., 2004). It forms an interpretive method which researchers may use to ask questions such as to why the story was told the way it was by exploring the forms, structure and content (Feldman, 2004). This provides additional opportunity to observe reoccurring themes in narratives between stakeholders. As such Weick (1995) claims that narratives as integrated and sequenced accounts of events can provide information for analysis and as a means of understanding the political ecology of resource issues (Paulson et al., 2003; Alversson and Skoldberg, 2000; Klein and Myers, 1999.

There are a number of methodologies applied in narrative research. Narrative research generally explores how the narrator tells a particular story and what is included or excluded (Franzosi, 1998). Some narrative researchers will look at form, structure and

content focussing on the "semantic grammar" showing that the structure of narratives and their content reveal key insights (Feldman, 2004). Some researchers examine narratives as a whole, considering narratives to be defined as a sequence of events, and actor's personal experiences of events which tie together various parts of a narrative into a meaningful picture. Whilst others break it down into component parts concerned with subjective and differing interpretations of participants' narratives, they tend to reveal how different identified groups amongst stakeholders both interpret and tell different narratives or stories of the same event (see: Allport 1962; Lieblich et al. 1998; cited in Feldman, 2004). This is important as farmers and policy makers are expected to share very different narratives, and thus these divergences shall form an important part of analysis. Whether taking a holistic or categorical approach, the researcher employs a particular methodology for narrative interpretation (Feldman, 2004). Differences between the perceived realities of environmental changes and the actual or potential outcomes of policy changes will reveal the politically saliency of lake Taupo's RPV5. This will enable the researcher to draw conclusions on the perceived effectiveness and appropriateness of the instrument for managing agricultural emissions beyond what has already been revealed. This study takes on the hybrid of both forms of narrative analysis, both looking for differences and convergences between different groups and also focusing on the narrative as a whole to interpret the issue surrounding the employment of a market instrument in RPV5 and the lake Taupo catchment.

4.5.3.2. Limitations of narrative data analysis:

As research questions and objectives will somewhat dictate which discourses within each narrative should be analysed it is important to recognise the limitations of such an approach. Sharp and Richardson, 2001) outline the potential for a bias towards certain aspects of the case study through selecting elements which are considered important in analysis, thus excluding other potentially important lines of enquiry. Soderberg (2006) outlines the importance of realising the data is not as an objective reality but rather a series of social constructs drawn from interview transcripts and thus stories are not facts and selective use of narratives by interviewees can be a problem. This is because narratives are influenced strongly by the narrator's audience, narrators may wish to convey a particular message to the interviewer. Furthermore interviewees may want to use the researcher to mediate their interpretations and experience of an issue.

Therefore Soderberg (2006) claims it is important to recognise this and consider these qualities of the interaction between the interviewee and researcher. These observations are important considerations for the researcher to reflect upon when identifying pertinent story themes and assessing links between stories in relation to highly polarised and contested environmental management issues.

4.5.4. Narrative analysis analytical strategy:

By revealing the processes of interpretation the researcher conveys to the reader the assumptions behind their research methodology (Feldman et al., 2004). However the analytic process is not as simple as it seems, as Lofland and Lofland 1995 suggest, because of the open ended and creative nature of the analytic process, a description of the process composing it does not necessarily capture what has actually occurred in the proceedings of interpreting narrative data. The following will explain the analytical strategy of data categorisation in order to locate themes and meaning from narrative analysis of stakeholder discourse.

A preliminary data analysis was completed as the first step towards analysing data. During this preliminary analysis key themes were identified**.** The process of locating themes and meanings was conducted immediately following each interview. This began with identifying the dominant themes, comparing them between what may have been the themes of questions and responses, and shaping understanding of the issue as each interview was completed. This revealed a number of key convergences and divergences with the themes from chapters two and three. The following key steps to analysing data were adopted from Taylor-Powell and Renner (2003), guide to qualitative data analysis and modified to suit the purpose of this analysis.

It is important to ensure the quality of data gathered and the methodology employed to analyse data. Firstly good qualitative analysis requires understanding the data (Taylor-Powell and Renner, 2003). This meant that after transcribing interviews I read, and re-read the text whilst writing down any key themes that emerged. As recommended by Taylor-Powell and Renner (2003), considering the quality and relevance of the data was important during this process, as sometimes data collected may not be relevant or collected in a biased way.

Secondly there was a need to focus the analysis, requiring a review of the purpose of the evaluation of data and what purpose the data served. Critical review of the data and cross comparison to the theoretical discussions of chapters two through four helped to highlight key convergences, bias and particular perspectives as discussed by Sharp and Richardson (2001). Furthermore in order to dictate which discourses were to be analysed required relating analysis back to the key focus questions of this thesis addressed in chapter one. As Taylor-Powell and Renner, (2003) suggest these key focus questions did change as I began to work with the data and located key themes, some which were unexpected as was to be expected.

The third step required categorising the information gathered, identifying key themes or patterns and organising them into coherent categories as described by (Taylor-Powell and Renner, 2003). This meant looking for key themes, providing a more in-depth analysis than the preliminary analysis completed after each interview. This was a fairly labour intensive task and required gathering all relevant text from transcripts and categorising it under the different themes. Whilst completing this task a number of subcategories become apparent and data was subsequently labelled under these headings and forms the crux of chapter six. This was completed in order to later explore more unique findings to the case study in addition to the connections and relationships between theoretical and empirical data. This form of locating differences and divergences between respondents was chosen over categorising and focusing the study into groups such as farmers and policy makers because of the degree of similarities and differences within and between groups.

A number of emergent themes appeared that were unexpected and only became apparent after reading through the text and working with the data. As Taylor-Powell and Renner, (2003: 7) claim, this allows categories to "emerge" from the data as a result of working with the data. As qualitative data analysis is an iterative process this required me to adjust the definition of some categories. In this process I continued to build categories until no new themes or subcategories were identified. Whilst it was my intention to create exclusive categories, in reality there were a number of cross cutting nuances which had to be cross indexed accordingly. Reading and re-reading the text ensured this was done correctly. This process revealed a number of the key themes which were easily related back to the theoretical literature review.

The story of the individuals interviewed provides the raw data for analysis that is presented in chapter five and six in relation to the theoretical considerations and context introduced in previous chapters. Due to the analytical approach to research chapters five and six are organised in such a way that they present both the results and a discussion of results rather than splitting chapters into results and discussion separately as this would be ineffective. Major themes of research associated with the theoretical discussions in chapters two, three and four are covered in chapter five. Chapter six explores the less expected themes that emerged from data analysis but were still important findings from analysis nonetheless.

In summary, narrative analysis is particularly relevant to this case study as the events which have occurred in the lake Taupo catchment have happened over some time period and are highly discursive. The stories of stakeholders provide raw data for analysis and reveal the similarities and differences between the theoretical literature and the case study.

4.6. Sample selection

A sample of interview subjects was selected from key stakeholders and personnel involved in and affected by RPV5. The policy development process in Taupo surrounding RPV5 involves a relatively small community and is dominated by a small number of individuals. Key individuals were identified from local government, stakeholder organisations, stakeholders, and other farming groups. Initially a list of key contacts was provided by a stakeholder organization followed by a search of published and unpublished documents, working papers and memoranda. Those identified were either key to the governance decisions or were potentially significantly affected by RPV5 which makes their response to the development of RPV5 particularly interesting.

A list was compiled of a possible 29 interviewees. Initial contacted was made via phone and/or email. Of the 29 people contacted two cited they had no time for an interview and five did not reply to numerous emails and phone messages. While 17 agreed to participate, 14 participants were selected for the study as a result of timing and availability and accessibility for interviews. See table 1 for information on the makeup of research participants.

Table 4-1: Summary of research participants

Organisation/Industry	Position
Farmer lobby group	Taupo Farmer Representative
Local Government	RPV5 Farmer support
Environment Waikato	Senior Policy Analyst
Farmer Support Group	Secretary
Farmer – Sheep, beef, deer	Large Station owner/manager
Farmer – Sheep, beef, deer	Large Station owner/manager
Farmer – Sheep, beef also Farmer support group	Farmer
Local Government	Farm advisor
Farmer – sheep and beef also Environmental trust	Farmer and also member of trust
Farmer – Sheep and Beef also Environmental trust – researcher	Farmer and also member of the trust, researcher
Fertilizer company	Farm nutrients advisor
Ex farmer Environmental trust	Member of trust
Ex Farmer	Ex farmer sold farm and out of catchment
Farmer – Dairy also Farmer support group	Chair
lifestyle block owner	Small farm owner

To act as a check between interviewees selected and those whom may have been inadvertently overlooked by these processes of selection, interviewees were asked to identify anyone whom they believed played a key role in the development of the policy, those who have been affected by the policy and those whom have a significant view on the policy developed. This process check revealed that interviewees consistently identified the same people whom I had included in the sample, this served to confirm the initial selection of interview subjects.

4.7. Conclusions

This section accounts for how the research was conducted. Sections 4.5 through 4.7 have thoroughly considered the theoretical underpinnings and methodological approaches to a political ecology informed, narrative discourse analysis. It has explained the overall qualitative approach from data collection to analysis. It has expressed the

concerns of situating the researcher and the effects of positionality, exploring the interview strategy to be employed, and addressed the pertinent ethical concerns to be considered. Importantly it has expressed the researchers own understanding of their role as a researcher, which involves the values, positionality, and preconceptions of the researcher and those of the participants and how this effects all stages of the research process. It has explained the process of data management and analysis that was used to interpret participant's stories. The process of organizing data allowed the researcher to categorize the key themes in relation to key themes identified in the theoretical literature review as a basis for narrative analysis. Chapters five and six will now present the results and discussion of this analysis.

Chapter 5 RESULTS AND ANALYSIS:

Policy Development

5. Policy development: Problems establishing nitrogen trading and associated contradictions of neoliberal environmental governance

While market based instruments have been regarded as politically acceptable and plausible alternatives to regulation in New Zealand agriculture, the capacity of this approach to achieve fair and equitable, as well as economically efficient and environmentally effective management options, is highly contested. Drawing upon narrative analysis of stakeholder interviews simultaneously with political ecology (PE) literature and the theoretical literature on neoliberal environmental governance, provides important insight into the potential effectiveness of MBI in agriculture.

The aim of this study was to explore the similarities between RPV5 and the critique of other neoliberal environmental governance mechanisms. As such research utilizing a set of social, economic and environmental considerations of political ecology, this thesis focuses on a number of specific research questions. (1) Do the neoliberal theories attached to MBI accurately reflect and manage the nature-society relationship? 2) Does the 'neoliberalisation' of nature through MBI deliver what underlying neoliberal environmental governance assumptions promise – more efficient and cost effective environmental governance? 3) Test the hypothesis that manipulation, resistance and delay to implement RPV5 are congruent with uncertainties, contradictory outcomes and justice implications of neoliberal environmental governance and MBI? 4) Explore the three core PE claims of MBI, that they inadvertently have the potential to perpetuate negative socio-economic inequalities, face challenges in modelling and managing complex ecological phenomena, and may inadvertently create unintended consequences and perverse incentives to environmental protection. Research questions reflect the goal of this thesis to provide a preliminary exploration of a NTP from a political ecology perspective and to

contribute knowledge to PE in order to better understand the logical contradictions and material outcomes of neoliberal environmental management.

Previous chapters have provided theoretical and empirical evidence on the potential limitations of neoliberal environmental governance, especially in the absence of consideration of prominent political, economic, social and scale factors. Previous chapters have also explored the inherent complexities of resource issues and the problems of underlying economic and knowledge assumptions of MBI when faced with this complexity. The literature review provided examples of logical contradictions and material failures of the underlying assumptions of neoliberal environmental management and MBI in practice. As suggested the resulting disputes over science and injustice, as well as modification of MBIs and resistance to their implementation, questions the validity of MBI as effective and appropriate instruments for environmental management. It has been revealed that similarities exist between the outcomes of New Zealand's neoliberal environmental governance regime and earlier critiques of neoliberal and free market governance reforms.

Chapter five and six will now utilise political ecology and narrative discourse analytical perspectives outlined in chapters two and four, to examine the common themes that emerged from narratives of stakeholder interviews in relation to key themes established in previous chapters. Political ecology exploration of stakeholder narratives should reveal the multiple complex facets of resource issues and provide important insights into the justice issues faced and the potential effectiveness of MBI policy in agriculture. Findings of previous chapters justify this approach to research as there is a need to understand these discourses as they often inform and circumscribe the design, implementation and effectiveness of policy, and provide important insights into the potential shortfalls of MBI in agriculture. Analysis of stakeholder interviews will provide evidence and insight into the challenges of implementing RPV5. Analysis in chapters five and six will reveal interesting results such as the historical and institutional factors that play an important role in RPV5, justice issues and resistance and modification of policy, pervasive explanations for land use change in the catchment and perverse incentives for environmental protection. Exploration of these issues is important if MBIs are to be more commonly implemented as a policy alternative to regulation in agriculture.

The process of analysis has revealed important links between the political failures of neoliberal environmental governance in section 2.3., underlying contradictions of MBI in section 2.4 and 3.2. and barriers to effectiveness and implementation issues of MBI in agriculture. These themes from analysis have revealed similarities and differences between how interviewees perceived the employment of an MBI to manage non-point source emissions of N in the Lake Taupo catchment. The issues addressed by political ecology throughout chapters two, three and four provide a useful framework for exploring these differentiating stakeholder narratives and exploring the research questions. The key themes which have emerged are closely linked to the MBI and political ecology literature.

The chapters will be divided into the two distinct phases of RPV5, the policy consultation phase and the policy implementation phase (with some cross referencing) which also relate well to the inputs and outcomes of neoliberal environmental governance initiatives. Chapter five will look at problems for establishing and implementing N trading. Chapter six will explore the preliminary outcomes for N trading and the possible future implications for MBI in agriculture. Both chapters will employ a political ecology approach which emphasizes the Importance of the complex assemblage of social, economic and political/institutional factors that have historically led to a resource issue.

The purpose of chapter five is to explore the problems associated with establishing nitrogen trading in Taupo. In order to do this it will explore stakeholder narratives of interviewees regarding the initial establishment phase of RPV5 and the underlying logic of MBI. Analysis will reveal the concurrent themes between the literature and the case study in order to answer the research questions. Each section will begin by reiterating a major theme from field work then will juxtapose that theme against a trend from fieldwork. The juxtaposition can be threefold, first it may confirm the trend from fieldwork and the literature, it could counteract or negate it, or there could be a partial agreement where contextual factors did not fit exactly how academic literature has suggested. The themes covered in chapter five include wider spatial and temporal scales, historical and institutional factors, the political, social and economic factors, and dubious science and knowledge based assumptions. It is important to note that wider spatial and temporal scales will be addressed throughout the subsections of chapter five and six rather than in a single sub section as scalar issues have been seen to relate to each theme concurrently.

5.1. Historical and institutional factors:

Political ecology emphasizes the consideration of wider temporal scale and historical institutional factors in their contribution to resource issues. As explored in chapter two by Blaikie (1987) and in chapter three by Mansfield (2006), the exploration of wider temporal scale factors led to the rejection of explanations for resource degradation. For example, that existing problems are caused by traditional open access property regimes and the absence of property rights over limited or degradable resources. Political ecology has revealed wider contextual, political and social pressures acting upon local resource managers to extract surpluses. For example, institutionalised colonial approaches to land cultivation, as found in section 2.2.1, and institutionalised practices, such as Maximum Sustainable Yield (MSY) found in section 3.2, has culminated in resource base and environmental degradation.

Similar to the findings in chapter two, preliminary research in chapter four section 4.3.2 has revealed the significance of historical and institutional factors in contributing to the current resource issues affecting the lake. As such, the theoretical and contextual literature provides clear evidence to support a call for political ecology investigation into the historical and institutional factors that have shaped the current resource issue in the Lake Taupo catchment.

Political ecologists invite us to explore the influence of multi-scalar factors in the examination of wider political economy and ecology of resource issues. Similar to the findings of Bebbington (1999), this study has found the ecological demands of an external capitalist economy to have provided wider spatial political pressures on farmers to maintain and increase production. Analysis also reveals wider temporal effects of expansion and intensification of farms over temporal scale. As such, this study confirms the PE finding that what happens in local places is impacted by social and environmental variables, at different spatial, temporal, ecological and political scales.

Stakeholder narrative analysis reveals the significance of historical factors. Baring a striking resemblance to Blaikie (1987), further examination through narrative analysis of wider contextual, political and social pressures acting upon local resource users in the Taupo catchment, has revealed that these factors have contributed significantly to the current resource dilemma. Furthermore, these factors have largely been overlooked by

individuals and government institutions in solutions to the problem of diffuse nitrogen in the Lake Taupo catchment

5.1.1. Narrative evidence of the influence of historical and institutional factors contributing to the nitrogen issue

In 2000 when farmers were first notified in a series of meetings by EW staff that they were "responsible for polluting the lake" and a decline in lake water quality was their fault, the farming community "were outraged that the finger was pointed so squarely at them" (Yerex, 2009: 14). This enraged farmers as they believed they were not the only ones responsible for polluting the lake. Similar to the findings of section 4.3.2 the mention of historical factors contributing to the current resource issue is present in a number of interview transcripts. Narrative analysis reveals agreement between a majority of stakeholders, including farmers, EW and other organisations, that the current diffuse N issues facing the Lake were in part instigated by significant amounts of pastoral development and the encouragement of farming in and around the Lake Taupo catchment. One stakeholder reveals that this was undertaken by "government agencies such as Lands and Survey" (Interviewee, 2010) (now Landcorp - the government department that was then in charge of developing non-productive land into pastoral agriculture) and "Corrlands" (Interviewee, 2010) (management section of the Department of Corrections land holdings). The first instances of land development in the catchment occurred in the "early 1900s" (Interviewee, 2010). Land use intensified during the late 1950s, through institutional encouragement of intensification, such as subsidies for fertilizer to take up farming in the catchment. This included "low interest and repayment threshold loans" from the "rural bank" to purchase and cultivate previously non pastoralised land. One stakeholder reveals that during the 1960s "[the Government] saw that land was our primary industry, so the government spent a lot of money with Lands and Survey developing land" (Interviewee, 2010). The interviewee describes the process as turning Taupo's native tussock "…into good quality grass, white clover pastures for intensive sheep and beef, and that happened nation-wide" (Interviewee, 2010), whilst another interviewee describes this process as "breaking in land basically" (Interviewee, 2010). In terms of the Western bays (Taupo's most agriculturally developed area), another stakeholder claims "all but one farm" (Interviewee, 2010) was developed by Land and Survey.

This trend of institutionalised government support and encouragement for farming in the district during the 1970s and 80s also took the form of "ballot farming" and "subsidies for stock…(as) supplementary minimum prices (SMPs)" (Interviewee, 2010). This represented institutional encouragement of intensification and unprecedented growth, as described by Blunden et al. (1996) and Jay (2007) for pastoral farming. One farmer claims that "you are actually farming under systems that have been largely government funded and research has promoted all the systems that we use" (Interviewee, 2010). This quote exhibits the institutionalization of encouragement for farming effectively allowed farmers to "expand production" beyond what they would be normally economically capable of. Both farmers and regulators agree that historical encouragement of farming and support from government has led to the intensification of agriculture, which is associated with the high levels of N currently entering the lake in conjunction with "urban development" and "other" sources of N.

Analysis reveals that wider scale political factors have largely been overlooked when considering policy solutions to the current resource issues. Stakeholders reveal that this historic institutional encouragement of farming has inevitably led to increases in historical N emissions and associated environmental degradation is now being paid for by the Taupo catchments current farmers. Farmers also claim the government escaped full responsibility for their contribution to nutrient runoff because Landcorp, a significant landholder in the region, sold all of its Taupo catchment farms during the consultation phase of RPV5. Landcorp owned the largest single tract of land in the catchment that could have possibly been converted from high N leaching pastoral farming to a land use activity with lower N leaching to achieve the 20% reduction necessary (Yerex, 2009). As a key landowner in the district, Landcorp land was seen as being a crucial part of any solution by all parties. Thus a number of stakeholders recognise the selling of Landcorp land as a "great injustice" and that "the government should be more responsible" (Interviewee, 2010).

Realising its contribution to the issue, the New Zealand Government and EW pledged an 80 million dollar fund to purchase N discharge allowances from farmers, and effectively retire these allowances, "removing" the N from the catchment under the cap and trade scheme of RPV5. Some farmers claim that the fund is not satisfactory and does not cover for the loss of significant "initial capital investment" to set up farms and other

inequities caused by RPV5 (social justice and equity issues will be discussed in further detail in section 5.3 and 6.3.1).

As described in chapter four, farmer opposition to regulation and avoidance by regulatory authorities of imposing command and control forms of regulation upon farming, has resulted in a complicated resource management situation. As such, one stakeholder argues that the overall impact of diffuse N and the policy problem leads policy makers to market instruments "essentially that leads you towards a cap and trade. From a less cost to the community, I think it has huge benefits" (Interviewee, 2010). One stakeholder argues that imposition of a 20% reduction cap across farms would not have been politically or economically feasible "a minus 20% and not a cap which would have been totally unacceptable economically and sustainably for farmers of the catchment that would have ruined everybody" (Interviewee, 2010).

Furthermore, evidence suggests that stakeholders believe a lack of institutional and regulatory controls may also be responsible for the levels of N entering the lake, as was revealed in chapter four. A clear lack of regulation or water quality standards in New Zealand and the problems of regulating non-point source pollution under the RMA have meant the current dilemma faced by the catchment has gone unchecked for some time (Yerex, 1999). One stakeholder agrees, confirming the current issue with New Zealand freshwater resources associated with diffuse pollution from agriculture is "well overdue for needed compliance" (Interviewee, 2010).

The evidence in Taupo suggests that political ecology literature is correct in its call that wider scale institutional and historical factors play a significant role in contributing to resource conflicts. Analysis reveals historical and institutional land development and management factors, ingrained in wider policy contexts, have contributed to the growth and intensification of pastoral agriculture, contributing to the current resource issues in the Taupo catchment. The significance of this finding extends back to the theoretical claims of Mansfield (2006) that policy analysis literature has overlooked the influence of historical and institutional factors upon MBI. As Mansfield (2006) brought to attention, the role of historical and institutional factors on current resource issues is often ignored in consideration of solutions to diffuse resources. This is also the case in the Taupo catchment suggesting it is important to consider the potential effects of historical and institutional factors upon current resource issues. Whilst

participant narratives reveal these factors may have been overlooked, analysis and theoretical literature suggest that policy makers need to pay more attention to the role historical and institutional factors play in factors influencing resource issues. The following sections show how inconsistencies in science and the recognition of justice issues, as a result of overlooking these factors, may result in inappropriate targeting of policy responses to such resource issues.

5.2.Disputes over science and underlying assumptions.

PE has shown insight into the limits of theory, knowledge and scientific claims about nature and the role of market instruments. In particular, PE questions the role and validity of science and knowledge based discourses and the linear application of science used to justify MBI (Castree, 2001). A key feature of PE and non-equilibrium ecology is to draw attention to how nature's role in human environment interactions and spatial and temporal scale factors may undermine the assumptions of science regarding nature (Castree, 2001). This thesis has explored the ability of spatial and temporal scale and ecological variability and its ability to undermine forms of EM that define spatial and temporal scales of nature through science and modelling in section 3.2.3 and 3.2.4. This section will demonstrate the claim of Sprott et al. (2005) that management practices and scientific models face inherent difficulty when attempting to manage naturally occurring biogeochemical cycles which exhibit unpredictability in nature. As discussed, this has become most evident over wider temporal and spatial scales. Furthermore, Sarewitz (2004) suggests that resource managers believe resolving scientific debates will resolve political debates. These attributes are typical of a linear approach to science application and resource issues, where science is used to justify market approaches and scientific models for MBI (Sutton, 1999; Oreskes, 2004). Given the unpredictability of naturally occurring biological cycles and diffuse nutrients, discussed in chapter two, and the unpredictability of nature and the political nature of resource issues discussed in chapters two and three, burgeoning academic critique has questioned the validity of scientific and knowledge based assumptions of MBI.

Oreskes (2004) and Castree (2008a) argue that the linear model of science is an inaccurate characterisation of the environment, as policy does not simply emerge from scientific understandings, and simultaneously ignores the politicization of science and the agency of nature through processes of scientisation and the neoliberalisation of nature.

As such, a PE approach to researching scientific and knowledge based assumptions questions the validity and application of economic and scientific assumptions surrounding RPV5 and the cap and trade instrument. Looking beyond the assumptions of neoliberal environmental governance and MBI, PE reveals the uncertainties in science models, which form the basis for market instruments in environmental management.

5.2.1. Narratives of dubious science and debates of knowledge based assumptions.

Stakeholder recognition of the issues surrounding science and other knowledge based assumptions has proven consistent with literature. Participant narratives reveal the linear approach to the deployment of scientific knowledge. Analysis reveals very little critique of underlying economic assumptions within stakeholder narratives. Disparate from the literature, critique of underlying economic assumptions did not feature dominantly in narratives. Rather narratives reveal the potentially logical contradictions of both science and the NTP instrument.

Narrative analysis reveals critique of scientific assumptions and models, which question the use and validity of science. Stakeholders from all groups recognize the potential shortfalls of science in predicting the movement and effect of diffuse nutrients and the outcomes of which may undermine the purpose of RPV5. This is evident in a number of narratives, which suggest that the application of the nutrient budgeting model at the centre of RPV5 to manage N discharge allowances is too complex to understand and thus, many may ignore important ecological and farm management practices. Furthermore, stakeholders question the achievability of land use change due to shortfalls of underlying scientific and economic assumptions. Clear narratives develop as farmers believe that RPV5 may fail to deliver the economic efficiency gains and incentives promised under a market based approach.

As was found in the Canterbury water allocation trading scheme, more science does not necessarily mean more accurate science. Competing scientific views have led to a ‘bogging down’ of the consultation and environment court processes. In the case of Taupo, more science (see: Vant, 2008) has justified the use of a NTP, in response to a management dilemma, and has not subsequently led to a competing science. Farmers argue they could not dispute the science, as they lacked the funding and expertise to disprove EW science. Stakeholder narratives reveal a linear application of science

particularly in respect of RPV5 around the use of science to validate political debates and justify the use of a market instrument. A few farmers mentioned that it felt like the science had an agenda in order to support the application of a NTP, thus providing possible evidence of the linear application of science to support the use of an MBI as suggested by the following quote; "it's almost as though that the scientists or Environment Waikato have got an agenda" and they are "looking at the science as a way to support that" (Interviewee, 2010).

Analysis found a strong correlation between political factors and the legitimation of science. One issue immediately identified in narratives was recognition of the assumptions surrounding the correct solution to the problem of diffuse nutrients and the inability to regulate farmers. One stakeholder claims that "the policy problem of diffuse nutrients essentially leads you towards cap and trade mechanisms with less cost to the community" (Interviewee, 2010). This is a knowledge based assumption in popular discourse within the catchment, whilst others contest it, claiming that "compensation" and "best practice" methods would prove more effective. Regardless of the action taken, one stakeholder concludes about the debates around the science that, although it is debatable "it is undeniable that farming is having an effect upon the lake" (Interviewee, 2010). Another reiterates the sentiment of authors, such as Jay (2007) and Memon (2003; 2010), that regulatory controls to curb agricultures negative environmental impacts are upon the environment are "long overdue" (Interviewee, 2010).

It is debatable whether NTPs are tried and tested methods of managing freshwater nutrients in agriculture (Selman et al., 1999). Vital to the success of a NTP is the ability of science and the capacity of regulators to invest in science that accurately reflects the movement of nutrients from non-point sources through using emissions proxies and modelling. Monitoring and enforcement are dependent on the scientific and technical expertise and capacity of regulatory authorities. Stakeholder discourses have revealed that farmers have mixed feelings on the science model. Some do not buy in to the science model, one farmer claims: "I do not believe they needed 20% quite frankly…the water in our creek is perfectly good and there's nothing wrong with it", "it's far too complicated". Some farmers even highly contest it, as they believe discrepancies in science and the function of the market instrument may lead to adverse environmental effects as highly suggested by the findings of section 3.2. The following narrative indicates some of the

underlying economic assumptions and a lack of scientific considerations may in fact lead to adverse environmental outcomes:

> I think they made a big mistake in the science, they don't consider the sponge effect - if you've got so many animals over a bigger area there must be less nutrients, entering the lake because of the sponge effect, but another way to look at it is it actually encourage peoples to sort of push smaller nutrients onto a smaller area and intensify a piece of nice land, and basically walk away from the more extensive stuff that was probably not doing a hell of a lot of damage anyway so in effect people are walking away very ordinary land and putting more intensity on the flatter land and so if anything more nutrients heading into the lake (Interviewee, 2010).

(The potential for adverse consequences of in more intensive land use and N hotspots under RPV5 will be discussed in detail in section 6.3.3 and 6.3.4)

Whist some disagree with the science others tend to share the sentiment that the current science is the best they have got. One fertilizer company representative stated that "there is a big spectrum of farmers out there too, some farmers will be really negative towards the model and some farmers have really embraced it". Regardless of their position, stakeholder narratives clearly indicated recognition of the shortfalls of these necessary capacities within EW and the RPV5 scheme, due to what a majority of stakeholders have agreed is "dubious science".

As suggested by the literature the science is heavily criticised and contested and these discrepancies had the potential to seriously delay the consultation and policy development processes. Respondents often claimed that science is dubious in terms of what is actually happening versus that modelled by the overseer: "what is actually happening versus the indicators that are used for modelling" (Interviewee, 2010). A senior policy analyst states "what is really hard [about the science] is to distinguish whose property is losing how much N, direct measurement would have been an administrative nightmare" (Interviewee, 2010). The uncertainty in science between modelling and what was actually occurring below the surface one interviewee claims "the science always gave farmers something to contest" (Interviewee, 2010). Farmers have argued that there are a

number of shortfalls in the science one farmer claims "[science] doesn't include N from other sources such as gorse…[and] focuses too much on farming's contribution to N emissions in the catchment" (Interviewee, 2010). Some conclude that the misleading view on the contributions of N leaching and the inability to accurately monitor and measure diffuse N, seriously questions the cap on N. The cap itself is also questioned by a number of stakeholders who claim the "20% was just a figure that was decided upon…and the more it was talked about the more it became right" (Interviewee, 2010). Another stated that the "20% was decided upon before we even finished the benchmarking process and knew the [modelled] tonnage of N hitting the lake" (Interviewee, 2010). A number of participants have contested the science on the basis that it may lead to a "miss-targeting" and "miss-management" of N. One respondent from a regulatory authority claims that the uncertainty in science means that "as science develops, that may very well be that they introduce a new set of regulations to further reduce the amount of N" (Interviewee, 2010).

When asked about the effect of science upon the overall success of the scheme, one regulator stated he was "undecided" about the scheme as an appropriate and effective means to control and manage non-point source emissions due to the inherent uncertainties in scientific models as the following section of transcript will show:

Researcher: Do you believe the scheme is potentially an appropriate an effective means to control and manage non-point source agricultural emissions?
Interviewee: Undecided on that, yeah.
Researcher: Just because of the science behind it.
Interviewee: Yeah.

In contrast, another regulator claims that the science is proficient and thus acceptable, as observed in the following transcript;

> There has been exceptionally good science and people need to be reasonably sure of the mechanisms that deal with diffuse pollution. The model has to be right otherwise it doesn't work because then the result doesn't match what your trying to do…Your actions from implementing that model don't match the result downstream (Interviewee, 2010)

These narratives echo one particular aspect of scientific modelling that was recurrent throughout most stakeholder narratives; that accuracy is needed for the validity of the use of the overseer nutrient budgeting model used for modelling the on-going N output of farms. Firstly, a number of farmers have argued that Overseer was "designed for nutrient budgeting and not for legislative purposes", and science that attempted to accurately reflect "on farm practices" was "marginal at best." One farmer claimed that Overseer was "full of warts" while another claimed it was "seriously flawed" in its attempt to reflect on farm practices. One version released was found to be totally incorrect by an experienced farm advisor:

> I blew it apart in 12 hours and they'd pulled it next day off the website, and the next version didn't come back for another nine months, because it was just full of crap and didn't reflect on farm practice (Interviewee, 2010).

The sentiment of farmers is shown in the following statement from one farmer who describes the margin of error in overseer and the possible negative implications of its margin of error;

> Overseer still has a margin of error – of up to 20 percent, now 20 percent is what we are trying to save and we are spending 80 million dollars on so you could argue that the 80 million [of government funding] is put at risk by the margin of error on overseer, you could argue that you are sending some farms broke and it would be terrible that they would go broke because of the margin of error in overseer but those are the leaps of faith we have had to take, so in the end if you could show me better software I would use it but the problem is there is nothing better out there (Interviewee, 2010).

Additionally, a number of farmers share the sentiment that the modelling does not take into consideration other important N contributions to the lake. Stakeholders believe there is a lack of science in the models of N contributions to the lake. This includes little understanding of non-point source N from "urban development", "forestry" and "gorse". One farmer claims:

> I would say generally as a rule a lot of farmers will be fairly suspicious of the science, they don't think it is robust enough…I don't think there has been enough

> science done on…. tourism and just general population use, extra boats and all that I haven't heard any work done on boats (Interviewee, 2010).

Whilst many farmers agree Overseer has its flaws, a number maintain that the overseer nutrient model is the "best they have got" and thus a useful nutrient budgeting tool. One nitrogen fertilizer company representative, who works closely with both EW and farmers disagrees that most farmers strongly contest the science. When asked "Do farmers generally believe in the science behind the nutrient budgeting model?" their response was;

> Yes. I think so. The model has had pretty extensive research, there has been a fair bit of research behind overseer and it's the best research we've got. It's not 100% well it's a model, if we put it into real life practices then it's not going to be the same but there has been that much research into overseer and that research has to be pretty robust to get into overseer. In my opinion it's pretty robust, the science behind it is good. Whether the average farmer thinks it's good I don't know, they've certainly got reservations about the model but there is a big spectrum of farmers out there too, some farmers will be really negative towards the model and some farmers have really embraced it. So there is always going to be that.

As can be seen there are a number of concerns over the "robustness" of the science, stakeholders themselves critical of the science that supports and validates RPV5. This raises a further issue apparent from analysis, in that many stakeholders believe that direct measurement is more precise than modelling and thus necessary. Many farmers contest the science on this basis, claiming that unless N leaching rates are directly measured then there will be an "inherent level of uncertainty" in the scheme. Others strongly argue against direct measurement, as it is "infeasible," "costly" and "time consuming". A regulator believes the modelling is the best science, "modelling is the best science we've got…modelling what is happening below the root zone [via overseer] is the only viable way to figure out what is going on, on each farm" (Interviewee, 2010), whilst others agreed that direct measurement is both implausible as it would be "costly" and "administratively burdened."

PE provides evidence that more science is not necessarily better science, although initial contestation of the science in early 2000 led to the commissioning of further scientific evidence to explore farming's contribution to N leaching (see: Vant, 2008).

Although the use of science may lead to impasses, as seen in section 4.1.3 in example of the Canterbury water allocation trading scheme in section, science was not found 'to bog' down the regulatory process in Taupo, as it was not challenged in the Environment Court stage of consultation of RPV5. Farmers have claimed that although they recognize a number of important discrepancies in science, they were unable to fund their own science to dispute research funded by EW. One farmer stated that "TLC struggled to make enough noise" to dispute the science. Science was not seen as a factor holding up the progression of RPV5 during the initial stages of the implementation. The case study fits the description of the linear application of science in that it has been used to the implementation of RPV5 legislation has followed the linear application of science to managing resource issues.

Discourse analysis interrogates the relationship between power and scientific knowledge, and implicitly recognises the existence of multiple, culturally constructed ideas of the environment and environmental problems. The case study has proved consistent with political ecology literature, which critiques the linear application of science to both justify and manage the use of MBI to manage complex environmental issues. Stakeholder narratives reveal shortfalls in their ability to accurately reflect, monitor and measure the effects of diffuse N emissions from pastoral agriculture. Further consistent with the literature is stakeholder recognition of the inherent discrepancies in scientific modelling and the margin of error inherent in these models. This questions the ability of RPV5 to achieve its intended goals.

The linear application of science to both justify and determine objectives of RPV5 is of concern. The belief that "more science is better science" and "getting the science right" is prominent in stakeholder narratives and inadvertently justifies the use of scientific models in order to achieve accurate representation of ecological issues and their solutions. Critics have argued that this does not justify the use of MBI, nor does it necessarily lead to achieving more effective environmental management under MBI. As indicated by literature and somewhat in the case study, the linear approach to scientific understanding and environmental management now has the potential to become problematic because of the inherent politicization of science. The literature argues that the application of science should be more of an organic and changing process, considering the influence of ecological and political factors and the ability of science to accurately measure monitor and manage diffuse emissions.

Although it may be undeniable that farming is having some effect upon the lake, the validity of science is questioned by both farmers and local government officials. This questions the extent to which the science should be used to determine the policy response to the issue of diffuse nutrients. The results are inconclusive as to whether the use of science is an adversarial and political suasion tool, although the use of science in Taupo has been limited by farmers and farmer group's ability to contest EW science.

In recognition of the local ecological context and perceptions of the inherent unpredictability of nature on spatial and temporal scales, the nature of non-point source emissions of N has shown that there are large margins of error which may impede the achievements of the goals of RPV5. This is despite the best efforts of EW to 'get the science right' and the use of modelling software such as Overseer. As a policy advisor concludes, they are not sure whether the scheme will be successful for the management of non-point source emissions, due to the uncertainties in science. Consequently, the wider application of Overseer throughout the country as a regulatory tool to implement NTPs is now a major concern. As will be discussed in the following section, it is the perception of the logical contradictions in underlying economic assumptions of MBI and the perception of inadequate scientific understanding of diffuse emissions that add to the complex milieu of political factors, that make introducing MBI into communities of resource users much more difficult.

5.3.Problems establishing political saliency

As indicated by the theoretical literature in chapters two and three, neoliberal projects and their explicit prescription in MBI often face political resistance to their establishment and implementation. This is often due to impasses in science, stakeholder recognition of logical contradictions in policy and the potential for injustice (Robertson, 2004). Exploration of stakeholder narratives in sections 5.1 and 5.2 began to reveal these contentions. Section 5.3 will now continue this analysis and begin to explore the problems of establishing MBI, due to perceptions of these contentions, in addition to perceptions of injustice, resistance to policy implementation and manipulation of policy by stakeholders.

Like any MBI, social and political outcomes are important to the success of an NTP. A number of issues contribute to the political success or failure of MBI. These include logical contradictions in economic incentives, historical and institutional factors,

contentions in science and potential failing of social justice. Selman et al. (2009) claim that because existing resource users, particularly farmers, are often over represented in democratic processes, their buy-in to a NTP is particularly important. Buy-in for farmers is particularly dependent on perception of potential benefit. A number of authors have commented that stakeholder recognition of these factors presents a number of issues when establishing MBI.

One of the most widespread obstacles undermining the efficiency goals of MBIs, is their modification during implementation, often to enhance an instrument's political palatability and to secure acceptability in order to create stakeholder 'buy in' (Hahn 2000). A number of authors have commented that resistance and opposition may encourage the granting of concessions to agents in order to achieve political saliency (Jarvie and Solomon, 1998; Hahn, 2000; Bolduc, 2004; Michaelowa, 2004; Muhovic-Dorsner, 2005; Backstrand and Lavbrand, 2006). In the Taupo case, stakeholder narratives reveal that the consultation and environment court process of RPV5's implementation reflect literature, which shows that perceptions of negative policy outcomes have resulted in the modification of policy, in particular the N allocation mechanism, in order to achieve political acceptability. Modification of policy is not without consequence. Modification of policy by stakeholders may result in the redistribution of power and income amongst farmers.

Political ecologists such as Bryant and Bailey (1997), Turner (2004), Castree (2008b) and Neumann (2009), invite us to explore questions about wealth distribution, social patterns of accumulation, interclass relations, the role of the state, patterns of land ownership, and control over access to natural resources. In doing so, PE may reveal the non-homogenous political, social and economic differences and the costs and benefits associated with MBI, which may reinforce or reduce existing social and economic inequalities and the altered power relationships that result (Bryant and Bailey, 1997). Political ecology insight into stakeholder narratives reveals similarities with the findings of Kerr et al. (2007) that the allocation of emissions units amongst resource users, set through a political process, offers the opportunity to structure allocations to compensate vulnerable groups, thereby reducing opposition to NTPs. On the other hand, literature regarding allocation mechanisms has also shown the potential to further perpetuate political power struggles (Bryant and Bailer, 1997). This section will focus on the issues caused by the rules of the Plan Variation, the allocation mechanism, stakeholder

representation in the various phases of the consultation process and subsequently, it will explore resistance and modification of policy and subsequent outcomes.

5.3.1. Perceptions of potential injustice and modification of policy:

As Bolduc (2009) discussed, stakeholder perception of logical contradictions and potential injustice of proposed MBIs may inevitably lead to contestation of policy and divert, delay or encourage manipulation of policy outcomes. Narrative analysis that reveals discourses of potential injustice have shaped farmers initial response to the notification of proposed changes to the Regional Plan in 2001. Initially, EW informed farmers that it wished to tackle the policy issue by implementing a 20% reduction of nitrogen output across all farms. Farmers argued that this simply would not work, as it was both economically and politically infeasible and it would have put many farms out of business, especially because farmers could not just reduce stocking rates and remain profitable.

As shown below one respondent argued that it simply would not have worked:

> Researcher: And that 20% reduction that was proposed originally that would not have worked in your eyes?
>
> Interviewee: Coming from farmers, to ask farmers to reduce 20%, it would have put the majority of farms out of business.

This was the argument that farmers used to secure farmers the flexibility of a NTP after the first round of consultation. EW decided upon the use of a NTP to manage the levels of nitrogen entering the lake. The N allocation mechanism, based on historical N output levels between 2001 and 2005 would inevitably cause some injustice. Consistent with Young and McCay (1995) and Kerr et al.'s (2001) findings, the allocation mechanism was seen as a tool that both created injustice and prevent injustice and that injustice was inevitable no matter what allocation mechanism was used. This sentiment is reflected in the following narrative of a senior policy analyst stated:

> No matter what you choose, no matter what starting allocation you choose, whether you go for any kind of averaging, whether you auction, whether you go with historical emissions, or grand-parenting, or those interchangeably. There's always people that win and lose, so yes there were implications of choosing that but I think in the long run it was as fair as anything could be and the losers are

> historically those in the catchment, people who hadn't developed their farm to the extent that maybe their neighbours had, people who were still in forestry, people that were still in shrub land (Interviewee, 2010).

As such seven key injustices (with the exception of historical injustices) associated with the outcomes of the allocation mechanism were identified from stakeholder discourses:

Table 5-1: Key injustices associated with the outcomes of the allocation mechanism

Type of injustice:	Description:
Historical injustice	Many farmers believe that central government should take more responsibility because they were the ones who developed the farms. Also believed the sale of Landcorp properties was avoiding the responsibility
Farmer life style injustice	Farmers now have admin burden, stress from consultation phase and the loss of "redeemable" value of assets that were to be used for retirement.
Lifestyle farm injustice	Those with less than 20Ha farms, stakeholders believe this group was not fairly consulted, and received a low NDA, restricting ability of these farms to create income
NDA injustice	Farms that were not farming to their capacity between 2001-2005 received low NDAs. The people believe they were punished for effectively being "environmentally friendly".
Maori land injustice	Under the Maori Land Act 1993, Maori land cannot be sold, therefore not allowing Maori land owners the same opportunities to get out of the catchment unlike other farmers
Age injustice	Injustice to those winding down farms preparing for retirement as they received an NDA lower than the productive capacity of those farms
Forester injustice	Low N leaching land use only given a standard/lower number of units per Ha, effectively restricting land use change and development of forested land in the catchment

Given the perception of these potential injustices, an ever present discourse in all stakeholder narratives was the essential nature of the consultation process. Evidence also suggests that public consultation was deemed necessary in the case of RPV5 due to the sensitivities of the issue, particularly because it influenced people's livelihoods (Yerex, 2009). A representative from a farmer lobby group recalls that farmers wanted to participate in the consultation process as "the farmers in the catchment area were trying to get viable, flexible, farming in addition to looking after the lake" (Interviewee, 2010). The consensus was amongst advisors, regulators and farmers that stakeholder participation in the consultation process was vital, as it provided those that will be adversely affected by the potential injustices of RPV5 with an opportunity to voice such concerns.

Two consistent narratives became apparent: The need for a successful consultation process and to ensure participant buy in, as discussed by Hahn (2000). Firstly, it required funding, education and input from the regional council as shown in the following quote "I think the rate of change is dependent on the willingness of councils to put money and time towards getting cooperation with farmers to create participant buy-in". The second was that it was necessary to work closely with farmers, firstly to "form good working relationships"(Interviewee, 2010) and secondly to "explore, practical on farm solutions because of the complexity of farm systems"(Interviewee, 2010), another stating "practical on farm solutions were needed." A policy analyst expressed that "it was important to know what kind of farmers we were dealing with, what kind of system they had, what were their problems, because I don't think you can design policy unless you know that." A regulator states that key relationships were important during this process;

> I would credit a lot of the success with the very fact that TLC formed themselves. They could have fought the policy but decided not to, there were some very smart people who said this isn't going to work and they approached the council (Interviewee, 2010)

These responses to RPV5 are consistent with Daniels (1996) and Jarvie and Solomon's (1998) claim, that in order to avoid increased risk of political opposition, there is a need for unitary public consultation to be included where possible. Given the perception of these potential injustices, an ever present discourse in all stakeholder

narratives was the essential nature of the consultation process. Interestingly and important finding was the perceptions of necessity for full public consultation and the need for council funding, consultation, and to form good working relationships and be willing to make compromises in order to achieve participant buy-in and reduce resistance.

Essentially, farmers argued they needed flexibility to remain economically viable and thus wanted to be a part of the consultation process to find a policy solution. One farmer said about the involvement in the consultation process:

> So because we started the consultation process, because there was some initial trust and understanding Environment Waikato did manage to politically achieve what nobody else has managed to do which was to set up a joint fund to initiate land use change which meant… that the farmers were capped rather than reduced (Interviewee, 2010).

Discourse reveals "TLC was successful in securing some objectives of farmer groups" (Interviewee, 2010), arguing a case against EW in the environment court. One farmer states the consultation process achieved concessions for farmers "the consultation process achieved concessions for farmers"(Interviewee, 2010), another stated that concessions were necessary to get farmers on board "to get the farmers on board there were quite a few concessions made" (Interviewee, 2010). TLC argued that the historical allocation of N emitting rights should be based on the best year between 2001 and 2005, rather than an average over these years. Farmers argued: "averaging didn't reflect the best productive capacity of our farms" (Interviewee, 2010) also farmers have stated "these were drought years" (Interviewee, 2010). The allocation mechanism has been said to be based purely on a political decision: "the choice of initial allocation, which isn't an economic decision, it's totally a political decision about what seems fair" (Interviewee, 2010). Farmers argued that consultation and concessions were absolutely necessary in order to create participant buy in. Farmers have mentioned that a number of things created participant buy in and left farmers "happier" with RPV5. This included the decision to use a NTP to allow flexibility, the addition of the equity fund from government and EW of $80 million over 20 years in order to reduce nitrogen by 20% by buying nitrogen emitting rights (credits) from farmers.

As suggested by Jarvie and Solomon (1998) Hahn (2000) and Bolduc, (2004), the public consultation process also provided opportunity for political power to influence the shape and direction of market based policy. Stakeholder narratives reveal that participation in the consultation process matches this description in the literature; that participation/representation usually leads to modification of MBI policy which may have negative political and environmental outcomes.

While some aspects of the consultation process were seen as productive, a number of narratives reveal the consultation process had inconsistent outcomes. Consistent with the findings of Jarvie and Solomon (1998), research revealed that stakeholder groups had a tendency to disrupt the policy creation and implementation process, bogging down the regulatory process with lawsuits, submissions and counterproductive media releases. Consistent with Memon's (2010) claims of the adversarial nature of the RMA, the following narratives exemplify that the court mediated processes of RPV5 as required by the RMA has created conflict. These narratives reveal that open consultation did halt progress of RPV5, making the environment court a "costly and time consuming process," which "held the process up…" (Interviewee, 2010). Another farmer claimed that not only was the environment court costly, it also presented the potential to undermine the environmental objectives of RPV5; "In the end an environment court solution is really the result of deep pockets and the best lawyer, it may not always be the best outcome for the environment." (Interviewee, 2010). This indicates the risk of court assisted mediation.

A senior policy analyst commented that details in the wording held up the consultation process for a further two years and were unnecessary, as seen in the following transcript:

> Interviewee: "federated farmers and Ecological Defence Society both had issues with a particular method. Things dragged on for, almost two years.
> Researcher: And it was specifically to do with wording?
> Interviewee: To do with wording of one method, took 18 months to resolve. So, we just couldn't get them to agree. So that's the thing about court assisted mediation, everyone turns up…." (Interviewee, 2010)

This highlights the issue with court mediation raised by Memon (2011) and witnessed in the Canterbury example, that the RMA's legal process requiring the use of the environment court which can potential lead to confrontation. Narratives reveal RPV5 also became adversarial in nature led to legal impasses and further delaying the implementation of policy.

The Environment Court (EC) process would prove costly and time consuming but was seen as absolutely necessary as concessions for farmers achieved buy in to some degree. A general sentiment between managers in farmer groups and local authorities agree that compromises were necessary in order to secure acceptability.

> Researcher: "Do you believe that these compromises were essential to gain acceptability of the farmers, for equity and acceptability?"
>
> Interviewee: "They were useful, quite important for those farmers and I believe probably we wouldn't be where we are today if those compromises hadn't been made" (Interviewee, 2010).

While opinions are divided on the outcomes of the consultation process, a number of respondents expressed that it was necessary and a lot of positive working relationships emerged between EW and farmers. One farmer responded that the consultation was a success: "[the consultation process] has been very good I think really – let our voices known and heard, well not even just in the Council in the media and you know in general" (Interviewee, 2010) Another farmer stated that the consultation process achieved concessions that were necessary to proceed with policy implementation: "in retrospect I can't really criticize what was done because concessions had to be made otherwise it would never of happened" (Interviewee, 2010). Those that reported being involved in the consultation process at a consistent level commented that working relationships between EW and TLC kept the process moving along. EW credits a lot of the success of consultation process to the heavy involvement of TLC. One senior policy advisor claimed that "if it wasn't for the active involvement of a few members from TLC, we wouldn't be where we are today" (interviewee, 2010).

Narratives indicate the consultation created a level of participant buy in essentially reducing opposition to the RPV5. One respondent claims value shifts were achieved as a result of the outcomes of the consultation process:

> However, that's all been resolved through this value shift, and the value shift has come around because the environment court said they could have best year for their benchmarking, so a lot of these farmers and farm properties had significant best year's (Interviewee, 2010).

Value shifts were achieved through granting farmers the right to benchmark their properties through a historical allocation of nitrogen, based on the best year of production between 2001 and 2005, rather than averaging nitrogen outputs between these years. This would inevitably increase the level of output of nitrogen per farm.

As argued by Hahn (2000), the downside to granting concessions to achieve political acceptability is the possibility to reduce the potential of an instrument to achieve positive environmental outcomes. In particular, the involvement of stakeholders in the consultation process resulted in modification to the proposed allocation mechanism of N credits. Under the EC's advice, EW decided that their fairest allocation would be based on the best year of output. This inevitably increased the original proposed amount of nitrogen each farm is allowed to leach; some insignificantly some significantly. Similarly, narrative analysis reveals that stakeholders generally believe the modification of the allocation mechanism via concessions made during the consultation process, was potentially at the cost of environmental outcomes, as suggested by Nguyen et al. (2006) and Selman et al. (2009). The following discourse shows recognition of the potential environmental compromise of choosing best year over averaging.

One farmer and researcher who was involved in the consultation process claimed;

> I don't think the issue of environmental impact came into the debate over best year, because at that point we were, the legislation and the players were trying to establish the final method of establishing an NDA (Interviewee, 2010).

Although the cap itself was never questioned at the EC stage, various details of the cap were challenged at the environment court stage;

> It's quite outstanding given that even at the environment court stage no one challenged the cap…to contest the cap itself would be a futile exercise, pick your battles, and the battles were around the implementation and the administration, people always use to say "the devil will be in the detail" so let's deal with the detail – and we didn't ever challenge the cap, so you could argue that this whole process was around the implementation and the fact the cap was never challenged meant the environmental goals were never challenged… (Interviewee, 2010).

Surprisingly a majority of research participants interviewed recognise the potential environmental compromise yet never questioned the potential effectiveness of the cap at the EC stage. As the examples of MSY in sections 3.2.2, 3.2.3 and 3.2.4 have shown, diffuse resources are particularly hard to manage. The underestimation of the environmental impacts of MBI due to inconsistencies between environmental modelling and ecological variability have led to further degradation of resources as shown by examples. On the contrary to what the literature and the majority of stakeholders would suggest, one policy advisor has argued that choosing best year over averaging did not make much of a difference in total N input to the lake;

> If it was single best year and they deemed that the difference was only one kilogram per ha then they felt that was not a significant amount and on that basis were willing to accept single best year (Interviewee, 2010).

Whilst a majority of interviewees confirmed the potential of concessions to farmers to have been an environmental compromise, others have stated that "there is very little change overall [between best year and averaging] and is based on total load of N and thus there's no actual increase in N" (Interviewee, 2010).

A further issue of changing to best year from averaging is raised by one farmer who claims that by choosing best year over averaging, it would cost EW more to get more nitrogen out of the catchment: "EW may regret having the single best year because it's costing them in terms of the amount of nitrogen they have to remove" (Interviewee, 2010) A fertilizer company representative claimed;

> If they had kept it at the average there would have been so many kilograms of N entering the lake, now with that change in the policy there is more kilograms of N

> entering the lake as NDA. So potentially it's going to be harder for the group responsible for taking 20% of nitrogen out of the lake (Interviewee, 2010).

Another farmer involved in one of the trusts claimed that EW may have made a mistake in choosing best year as shown in the following statement;

> If they had known what they know now personally they would have never of backed it and why would they? Why would they want to give farmers more NDA when they are trying to put a cap on what is going into the Lake. (Interviewee, 2010)

A further issue created by this concession, which is apparent in narratives, is the potential injustice amongst farmers as an outcome of the allocation mechanism. A PE perspective has revealed the non-homogenous political, social and economic differences and the costs and benefits associated with environmental change and property rights over resource, in this case N. This has both reinforced and reduced existing social and economic inequalities, and the altered power relationships that result, as described by Bryant and Bailey (1997). Stakeholder narratives reveal the tendency of the allocation mechanism to result in a redistribution of 'productive capacity' of farms, which stakeholders claim are associated with both economic and political benefits/power and the potential for injustice also. One farmer claimed "all it is doing is making the incredibly wealthy more wealthy at the cost of everyday people really" (interviewee, 2010)

In recognition of the potential injustice posed by the allocation mechanism, TLC fought for other equity instruments to address some of the other equity issues posed by the scheme:

> Taupo Lake Care as a group always fought for nitrogen allocation not to be the instrument alone, that allocating nitrogen was not going to solve the equity issues that arose…it was going to prove hugely inequitable for them. [it was] the only option that was put on the table by the political and Environment Waikato people. We fought to have all sorts of things bought in…But unfortunately… those weren't taken up, it was purely an allocation of nitrogen on a grand-parented basis with the fund [80 million from EW and central Government] to take out the 20% [of nitrogen needed] to save the lake (Interviewee, 2010).

One respondent from the regulatory authority confirmed that no other compensatory measures were taken other than the allocation of N:

> Researcher: Were there any other compromises, as in grandfathered credits, to compensate for equity issues?
>
> Interviewee: At this stage, no, there are no farms that have been given more right…although there may very well be a need in the future (Interviewee, 2010).

As a consequence of choosing an allocation mechanism based purely on historical emissions, those with historically higher N output will receive a higher NDA. This is revealed by a policy analyst who states that "different land uses have different N values and as part of that have restricted opportunities for growth or operation" (Interviewee, 2010). This has the potential to create new injustices between stakeholders where there was no injustice previously. All farmers agree to some degree that the NTP seems to reward farmers with a high Nitrogen discharge allowance (NDA) for having a high N output, whilst those who may have in fact considered themselves environmentally friendly and leaching less N, are in some ways punished with a low NDA and the inability to expand their farms beyond their current low production level. As described by Corburn (2001) and Selman et al. (2009), allocation and distributive mechanisms have the potential to result in social injustice and further inequalities and re-distribution of political power between stakeholders. Likewise, narratives have revealed that the allocation has further extenuated inequalities between farmers. Some farmers who were reportedly winding down to retirement between the years of 2001 and 2005, were reducing their output over this period due to the uncertainties that the scheme would bring. Others, knowing what the legislation was going to bring, were beefing up production.

> Farmers who knew what was going on first did very well in terms of setting their own farms up with very high NDA's and other farmers who didn't understand the system and didn't want to understand the system got very very low NDA's…there is a huge discrepancy I suppose, sometimes obviously, you play the system. So a high NDA puts money in the bank, and other people sort of put their head in the sand and almost went into simple mode and wound their farms down detrimentally (Interviewee, 2010).

A fertiliser representative gives another example in the following statement, which also shows the potential injustice from using best year from 2001-2005:

> Some farms may of done a lot of development between the end of the benchmarking period and when variation 5 has come into force so they have invested a lot of capital but they can't farm to the potential to that investment because they are capped below, they can't stock the farm as high as they need to pay for that capital investment (Interviewee, 2010).

This has inevitably meant that because of the circumstances, some farmers were given an NDA much lower or higher than they would usually produce. A number of stakeholders have suggested that this is a form of injustice, as it further perpetuates disparities in the production potential of farms within the region as shown in the following narrative.

> It has been more equitable for them [Dairy farmers, with high NDAs] where-as there certainly people who some might have winding down and who have been seriously disadvantaged economically. People who just may have been getting near that stage of life, they want to take things easier and wind things down a bit and ended up with a very low NDA. Or even just out of choice have not really wanted to push the job and their farms have been seriously devalued (Interviewee, 2010).

A fertilizer representative confirms these claims stating that during the early phases of the scheme the uncertainty of what N manage was going to entail meant that no one could sell their farms and impacted farmer lifestyles:

> During the period of time that all this uncertainty was there they didn't have that option of retiring, a lot of guys wanted to sell up and retire but no one wanted to buy their farm, no one knew what the value of the farm was so they were impacted on lifestyle quite markedly (Interviewee, 2010)

A number of farmers claim that there is a correlation between NDA and property values in the catchment; "properties can be valued by the NDA and they have. We bought a bit of land the other day that, where we paid basically for the NDA and the land was free. So yeah that shows the injustice it has caused" (Interviewee, 2010).

These narratives maintain that NDAs can determine the income potential of farms. They also indicate that NDAs can detrimentally affect property value. One farm which had been purchased by the trust and thus the nitrogen taken out of the catchment; "because they have taken the nitrogen out of this land, so it almost has no value, because if you can't do anything with the land it is like owning a desert"

Some claim the biggest losers are those who did not develop land to potential, those with forestry, Maori trusts who cannot sell land and lifestyle farmers. One respondent said about one farmer:

> One farmer suffered ill health for quite a period of years and the farm ran down in its in carrying capacity and ran right down, now they finished up with a very small nitrogen allowance and they have been quite seriously disadvantaged but in these sorts of schemes there is winners and there is always the odd loser.

Discourses regarding these injustices were present in another respondent's narrative:

> Researcher: You believe that there is potential for injustice as well where people that obviously had a low benchmark over that four year period believe they are missing out especially those in forestry.
>
> Interviewee: Yes well a lot of them because they got no recognition of that [in terms of ability to increase nitrogen levels on forestry land] (Interviewee, 2010).

One respondent claims the cap itself was an injustice; "it is a New Zealand tradition to expand your farm, now you can't" (Interviewee, 2010). Largely due to the imposition of the cap, those who's narratives indicate they were "hard done by" are moving out of the catchment. One of many farmers explains in regards to the imposition of RPV5: "we have decided to sell which is one of the reasons for it" (Interviewee, 2010).

Whilst some have moved out a number of the following quote reveals some farmers have moved into the catchment; "you have people moving into the catchment seeing the benefit of the market to me says the market is working really well"

(Interviewee, 2010) a large land holder/farmer also claimed "we moved into the catchments seeing the benefits [of property value]" (Interviewee, 2010).

Another injustice that was prominent within the literature was the perceptions of an age injustice:

> Had we been younger we would have probably tried to carry on because you have more time for the thing to work through and it's obviously the way to some extent that is going to happen in a lot of areas (Interviewee, 2010).

Farmers also claimed that RPV5 caused significant loss to the redeemable value of their farm and therefore what they were relying upon as their retirement fund, claiming "it is a loss of redeemable value…for us it is our retirement" (Interviewee, 2010). Another farmer stated:

> Farmers in New Zealand historically have regarded the increasing value of their land holdings as a superannuation fund. Suddenly their superannuation fund was under serious threat and their ability to retire was thrown into quite serious jeopardy (Interviewee, 2010).

Another group, lifestyle farmers with farms less than 20 Ha, expressed that they have been excluded from the consultation process and are subject to great injustices. A number of participants argued that the consultation process was unfair on life-style farmers. One life style farmer claimed; "we have had one letter from Environment Waikato in the whole 10 years that we have been here about what is happening and how it will affect us directly and that was about two months ago [September 2010]" (Interviewee, 2010). This respondent thought they were excluded from participating but as one regulatory respondent stated "all participants were given equal opportunity to participate, to come to meetings…" (Interviewee, 2010). Although there was an attempt to get all farmers involved, there were still some that would not participate productively in the consultation process. A couple of farmers felt disillusioned by the consultation process. In particular, one lifestyle farmer claims "we did have an opportunity, we did try and stand up for ourselves at the beginning but we were too small to take into account and now I really do think they need to stop and listen" (Interviewee, 2010). This claim is reiterated by a large farmer who claims:

> I think that the people who have been forgotten the most are the lifestyles the people who rely on the work around the catchment to what's going on and the loss of equity they have seen in their own properties and also jobs that they rely on in terms of casual work on the farms (Interviewee, 2010).

This further reiterates the potential injustice to lifestyle farmer claims. Whilst one policy advisor claims "EW recognizes that life-stylers don't fully understand the consequences of RPV5 idea was to prioritise those with over 20Ha's first" (Interviewee, 2010).

> Essentially lifestyle blocks have been assumed, because of their size and the economic value, the fact that it's not their business… we have got a new group of people there, that we have started to communicate with that don't exactly know what it means for them and this learning process that we've gone through to building and developing relationships with larger land owners is just starting with those other properties now… it's just that the people over 20 hectares we a priority because of their land size and they were the likely ones that were nitrogen reductions could be achieved on in large quantities (Interviewee, 2010).

Others believed that their concerns were not listened to, although they got the flexibility of nitrogen trading as an outcome of the consultation process:

> Over the whole time I often felt we had been asked for our opinions and thoughts but really there has always been a direction set from the start and I don't think much of what we have said has an affect (Interviewee, 2010).

Furthermore, farmers felt that their political strength did not enable them to participate equally in consultation with EW. A lack of funding meant they were not strong enough to resist RPV5 and EW implementation of a NTP. One farmer points out that a Regional Plan change as ambitious as EW's RPV5 would be a lot harder to implement elsewhere:

> I felt we were probably smaller in numbers as a farming group to have any clout as opposed to for example the Hauraki Plains or somewhere like there. It would be a lot harder to take on those guys than farmers around Taupo.

The preceding analysis shows the propensity of RPV5 to produce outcomes perceived as negative for particular groups and there are clear instances where new injustices have been created where they were previously non-existent. As discussed by Walker and Bulkeley (2006), a growing body of literature critiques MBIs because of their potential to create new injustices. This further perpetuates power relations and struggles, and imposes additional costs on stakeholders through administration and entrenching, rather than changing values. The consultation process was seen as necessary to overcome some of these potential injustices, and the compromise of best year to farmers was intended to provide some equity. It remains unchanged that the use of marketed redistribution of N leaching rights to farmers results in some new, and further perpetuated injustices.

This section has explored the factors which have generated perceptions of injustice, the stakeholder involvement in the consultation process and resistance and modification of MBI policy. It has expressed the problems of establishing stakeholder buy in to create a level of political saliency acceptable to most stakeholders and the importance of resistance and modification of policy. The case of RPV5 is consistent with the literature in that stakeholder buy-in is mutually dependent on participation in the consultation process and perceived outcomes. Furthermore, analysis also confirms claims by Solomon and Jarvie (1998) and Hahn (2000), that participant buy in may require provisions to policy that come at the cost of political and environmental effectiveness. In agreement with Selman et al. (2009) and Nguyen et al. (2006), it is concluded that participant buy in is dependent on the extent to which resource users are represented by decision makers, and as an outcome, the allocation of permits under RPV5 has not resulted in the social or environmental optimum level because of this.

The preliminary lessons from initial opposition to the plan reveal that neoliberal ideologies do indeed insight opposition to the implementation of MBI specifically due to stakeholder perception of a number of inherent flaws and discrepancies. Analysis of RPV5 discourses reveals that historical and institutional factors contributing to the current

resource issue, discrepancies in science and the potential for adverse social justice issues have subsequently led to resistance and modification of policy as suggested by political ecologists. Thus analysis reveals that greater emphasis must be placed on the underlying assumptions of MBI. Furthermore it has been revealed that greater social consensus is necessary in the early stages of policy development if policy makers are to encourage broader and more acceptable policy approaches to avert a slow or costly policy implementation process. In addition, regardless of the differences in stakeholder narratives, the inclusion of stakeholders in the policy process has shown their potential to shape the direction of policy formation.

In the case of Taupo, the modification of proposed plan changes through the environment court exemplifies findings of the theoretical literature that the capture of interests by stakeholders in the development of policy, often results in modification and provisions to proposed policy. However, such opportunity to oppose and modify policy through the consultation and environment court process was deemed necessary by EW and stakeholders in order to achieve political saliency. The implications of these findings are that environmental policies will continue to be contested, unless they are developed in recognition of the values and concerns of those in opposition. There is a clear need to get farmers involved in 'on-the-farm' practical solutions.

Stakeholders also support the view that modification of the original regional plan has come at a cost to environmental outcomes by allowing more N to enter the lake. This suggests that allowing provisions may be inevitable to create politically salient policy, which may come at the cost of environmental effectiveness, a difficult compromise for policy makers. Furthermore, it has been shown that in the absence of any other equity mechanism in the allocation of permits, there may be a number of potential injustices, which is likely to disadvantage some stakeholders.

An important consideration of any concession to policy is the potential costs and benefits of that concession. Analysis has revealed that in order to achieve political saliency, it has cost RVP5 in terms of potential environmental effectiveness. Stakeholders recognise that the allocation mechanism inevitably creates winners and losers, and therefore it can further perpetuate injustices.

5.4. Conclusion:

A PE perspective has politicised the issues surrounding establishment of RPV5 and the NTP in the Lake Taupo catchment. It has been revealed that nature and environmental issues in the Taupo catchment cannot be understood in isolation from the political and economic contexts within which they are actively produced, contested and reconstructed through discourse (Bryant and Bailey, 1997; Escobar, 1999; Castree, 2001). The results of narrative analysis have revealed that the issues which arise from attempts to establish a NTP in the Lake Taupo catchment, mirrors a number of the logical contradictions of the neoliberal theories for environmental management, commonly underlying MBI. Firstly, the political ecology thesis that ecological problems are at their core inherently social and political problems, has been established in the preceding sections. This is emulated in the fact that historical and institutional factors have considerably contributed to this resource issue. One such example shown was historical and institutional factors and the role they play in shaping the current resource issue. Narratives have revealed that a tendency to overlook the contribution of these factors towards current resource dilemmas tends to focus the solution on current resource users to environmental problems that are largely due to historical expansion of resource use and intensification of farming.

Secondly, discrepancies in science have proved fundamental in rallying opposition to the implementation of RPV5. Narrative analysis reveals that the unpredictability in nature, as described in section 2.2.4 and the inability to accurately model diffuse N emissions has the potential to undermine the basic tenants of scientific and knowledge based assumptions underlying the NTP. These issues and the potential for social injustice as an outcome of the scheme, have led to strong resistance and granting of concessions in the form of modification of the proposed allocation mechanism through the environment court process. It has been revealed that concessions are believed to be at the cost of environmental of potential environmental effectiveness and adverse social justice outcomes.

The wider political ecology of the case study was examined in order to analyse the local scale in its wider scalar context. Analysis revealed spatial and temporal geographies of scale have often been overlooked by policy makers but play a significant role in historical and institutional factors, the science behind RPV5, and also in the issues faced to secure political saliency.

The preliminary stages in development of RPV5 align with the theoretical literature, suggesting that environmental governance is an inherently political process. As observed by the literature and narrative analysis, disparity exists between neoliberal ideology and its outcomes. This has incited political resistance and activism towards neoliberal projects. As such, Wainwright et al. 2000 (cited in Henderson and Norris, 2008) claim political activism has indicted neoliberalism as a political, economic and environmental debacle. Correspondingly, analysis reveals a correlation between perceptions of potential injustice, initial resistance to MBI and demands to be involved in the consultation process, as expressed by Budds (2004). Narrative analysis has revealed the allocation mechanism has been altered to preference farmers, and has also resulted in political and ecological compromises to the efficiency of policy. The modification of policy may further perpetuate environmental and socio-political issues, as suggested by Castree (2008a) and Selman et al. (2009).

Confirming the three assertions of Bryant and Baily (2007) firstly it has been observed that political, social and economic differences and the costs and benefits associated with neoliberal restructuring, are distributed unequally. Secondly, PE interpretation has recognized that this unequal distribution has tended to reinforce or reduce existing social and economic inequalities. Third, the unequal distribution of costs and benefits and the reinforcing or reducing of pre-existing inequalities holds political implications in terms of the altered power relationships that result within the catchment. As such the allocation mechanism has been highly contested and caused delay to the implementation of RVP5, as suggested in the literature (Bryant and Baily, 2007).

As indicated in the theoretical literature, disparity exists between the ideology of neoliberal projects and the outcomes of MBI, evidence from RPV5 supports these claims in this chapter. These findings indicate that it is important to consider the prominent factors hitherto explored, otherwise there is potential for multiple shortfalls of NTPs. The next chapter will further expand upon these points, and will begin to focus on the induction difficulties associated with the scheme; the complex political, economic and ecological outcomes, and subsequently a number of perverse and unintended consequences of RPV5.

Chapter 6 RESULTS AND DISCUSSION:

Policy Implementation

6. Policy implementation: the material success and failures of MBI:

6.1. Introduction

An important trend emerges from political ecology's (PE) critical insight into neoliberalisation of nature. PE reveals that whilst market based instruments (MBI) attempt to use neoliberal economic theory to manage the nature-society relationship disparity emerges between this ideology and the observed outcomes of neoliberal projects. So far the case study has provided theoretical and empirical evidence to support claims by political ecologists that there are a number of shortfalls of neoliberal environmental governance. Analysis has so far revealed that historical and institutional factors have significantly contributed to the current resource issue. Discrepancies in science have proved fundamental in rallying opposition to policy implementation, furthermore narratives indicate that the scientific model has underlying flaws which demonstrate the inability of MBI to manage the nature-society relationship. Social injustice issues have resulted in resistance and modification of policy to the possible detriment of environmental effectiveness.

Chapter six continues the exploration of stakeholder narratives, focusing on the preliminary outcomes of RPV5 and initial difficulties towards securing policy goals[4].

4 It is important to note that at the time of completion of stakeholder interviews (12 November 2010) RPV5 was still a proposed variation. However, initial stages of RPV5s implementation were underway, involving benchmarking of properties to produce NDAs and NMPs, and the sale and purchase of nitrogen by a number of parties. A joint memorandum and final set of provisions was filed with the Environment Court in December 2010. The Court confirmed the final provisions of the Variation on 17 June 2011, a report went to council for its 29 June 2011 meeting seeking they resolve to make the Variation operative. Council will then provide, via public notice, at least 5 working day's notice of the date the Variation will become operative.

There are a number of consistent themes between those narratives and the literature. Section 6.2 explores the difficulties of policy implementation. It will begin with an analysis and discussion of narratives surrounding the implementation difficulties and institutional capacity dilemmas under RPV5. Analysis will reveal the underlying contradictions of neoliberal environmental management. It will become evident that a number of unexpected outcomes contradict the claims of neoliberal advocates that MBI provide cost effective solutions to diffuse emissions. Section 6.3 will then introduce the complex and often unintended political, ecological and economic outcomes of RPV5. Outcomes of RPV5 will demonstrate the potential for perverse incentives for environmental protection. Following analysis and discussion of these key themes, section 6.4 will discuss the concurrent theme of uncertainty and the implications for the Lake Taupo catchment and stakeholders. Finally, analysis will reveal the important lessons from RPV5 for the future of agricultural nutrient trading programs (NTP) in New Zealand. In exploring these aspects chapter six will reveal unique outcomes of RPV5 and provide evidence to confirm or disprove research questions and the claims of political ecologists.

6.2. Difficulties in policy implementation:

The literature indicates several design elements of MBI are important attributes that are vital to the success or failure of MBI policy, as discussed in section 3.2. As such the success or failure of MBI has been seen to depend upon the outcome of these design elements. This section will explore the similarities of this literature with RPV5. Section 6.2.1 will reveal key reflections upon initial implementation difficulties associated with the scheme. Pertinent issues have become apparent in the implementation of RPV5 include, added costs, administrative burdens and complexities. It will become apparent that themes in narratives share a number of similarities with the theoretical literature. Narratives will demonstrate evidence which supports a number of the critiques of neoliberal environmental management and contradict underlying assumptions of MBI. Section 6.2.2 will reveal stakeholder observation of institutional capacity limitations in regards to implementing RPV5. Narratives will reveal that price transparency,

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Farmers in the Lake Taupo have six months from the operative date of RPV5 to apply for resource consents. (Source: Environment Waikato, 2010)

information dissemination and market function are often limited by the institutional capacity of groups. It will become apparent that limitations in institutional capacities to effectively implement RPV5 may impede market function and inevitably policy success. Analysis will provide evidence to suggest the ability of MBI to achieve their intended goals is dependent upon often limited institutional capacity to implement MBI effectively. Analysis will reveal shortfalls in institutional capacity of RPV5 which are unique to the scheme. The difference between RPV5 and other MBI will provide some interesting points to be discussed in the conclusion - chapter seven.

6.2.1. Narrative reflections regarding implementation difficulties

In contrast to the claims of market advocates that neoliberalism and MBI offer a number of potential benefits through efficiency gains in the administration and costs of policy implementation, researchers have found that MBI have the potential to impose barriers to the market, perpetuate structural inequalities and shift administrative cost of resource management to resource users, as discussed in section 3.3. As noted by Bailey (2007) and Henderson and Norris (2008), this is often in direct contrast to the economic development and flexibility promised by market approaches. Furthermore these impositions have been found to create new environmental and social injustices. Studies such as Harvard Research Institute (1999) found that many agricultural MBI instruments in China have potential to create injustice by shifting the weight of administrative burdens from Government to resource users. The shift in administrative burdens associated with MBI has the potential to entrench rather than change existing socio-economic conditions and environmental practices (Bolduc, 2007). According to Henderson and Norris (2008), in order to reconcile economic and environmental objectives of MBIs, substantial compromises must be made to ensure better instrument selection, design and implementation. This is important as it is increasingly recognized that achieving positive environmental benefits at the farm level requires the support of land owners, facilitated by initial government assistance and non-restricting policy (Bailey, 2007). Therefore, it is essential that policy makers understand the complexity, economic and administrative burdens imposed upon resource users (Henderson and Norris, 2008).

Preliminary analysis in chapter five revealed that key market design elements such as the ease of transactions, information dissemination, monitoring and measurement and compliance and enforcement were all seen as important attributes to the initial outcomes

of RPV5. As discussed in chapter three, several design elements of tradable permit schemes are all integral elements which together make up the framework of permit based MBI and determine their effective implementation. These are: transaction costs, incentive strength, monitoring and measurement and compliance and enforcement. Bolduc (2004) revealed there are a number of reasons why tradable permit schemes may fail to achieve intended cost savings in practice (Bolduc, 2004). This is because the existence and function of markets for environmental externalities and commodities are in part determined by these design elements. A number of authors echo the same point that all classes of MBI require adequate compliance, enforcement and monitoring in order to achieve environmental and economic outcomes (Stavins 2003; Bolduc, 2004; Mansfield, 2006; De Cara and Jayet, 2008; Henderson and Norris, 2008). Some instruments may require further regulation such as a regulatory back stop (such as consented activity rules under the RMA in the case of RPV5) to ensure the function of instruments and compliance. Whilst these aspects are essential to ensure the function of MBI, political ecologists have shown MBI have the propensity to shift the administrative burden, complexities and costs of compliance upon resource users (Bolduc, 2004; Mansfield, 2006; De Cara and Jayet, 2008; Henderson and Norris, 2008).

In the previous chapter it was established that the consultation process proved costly and time consuming, it was argued however that this was necessary in order to work out the 'devil in the detail' to implement politically salient solutions (Yerex, 2009). Analysis reveals since the implementation and benchmarking of farms began, new 'implementation difficulties' such as 'administrative burdens', 'added costs' and 'complexities' associated with RPV5 have emerged continuing the recurrent theme that policy implementation continues to remain costly and time consuming. Some themes that have emerged exhibit similarities with the literature whilst other themes specific to the Lake Taupo Catchment have emerged. As there was expansive response to questions of these implementation difficulties, 'administrative burdens', 'added costs' and 'complexities' associated with the implementation of RPV5 are summarized in the tables below. These categorized narratives will be followed by discussion in sections that follow.

6.2.1.1. Added costs of RPV5

As discussed in the theoretical literature there are a number of additional costs of implementing MBI imposed upon resource users and regulators. Revealing similarities with literature, analysis uncovered a number of added costs accompanying RPV5, such as resource consents and monitoring farms to ensure compliance under RMA s36. Interview subjects have identified the following added costs of RPV5: added administrative cost of resource consents and associated monitoring, additional costs of farm advisors and experts, additional costs to EW and opportunity costs and loss of income for farmers.

Analysis has revealed four categories of added costs related to RPV5. Firstly farmers and regulators have described new administrative costs associated with monitoring and enforcement under the NTP. Farmers have described how they now bear the costs of RPV5's implementation: "[farmers] have to bear the cost of [RPV5]" (Interviewee, 2010). Farmers are generally concerned RPV5 may become administratively "costly" as consents are now required to farm under non-permitted activity rules under the RMA. A number of farmers "totally disagree" with having to pay for a resource consent to farm where there previously was none, as one farmer states they consider this an injustice:

> This is an injustice…when people apply for a resource consent they are actually doing it to get some benefit, they see a cash return…[whereas] we are getting a resource consent to keep what we have already got so it just a cost there is no return (Interviewee, 2010).

These findings demonstrate the conclusions of Huber et al., (1998), Harvard Research Institute (1999), Bailey (2007) and Henderson and Norris, (2008) that the costs of implementing market instruments may be more costly for resource users. Furthermore as discussed in section 3.3.2, MBI have the potential to transfer some of the costs of environmental management back upon resource users which may inadvertently be counteractive to local development, as expressed in section 3.3.3 and in the following discourse. Farmers voice the concern that the cost of monitoring is "loaded back" (Interviewee, 2010) on the farmer to some degree as they will be charged for audits depending on the farm system in operation (See Appendix II). The costs of environmental management, namely monitoring costs, resource consents and associated auditing are now

part of farm operations under RPV5. The socio-political outcomes of transferring these costs are not often a consideration of market analysis as discussed in section 3.3.

Farmers and regulators also point out that the cost of monitoring and enforcement will be more costly to those who have "brought or sold nitrogen" and "dairy farmers" in the catchment as they will be "audited more than once a year" (Interviewee, 2010). This demonstrates the claims of in section 3.3.2 although the costs of environmental administration are now unequally spread throughout the catchment. Furthermore, farmers claim that RPV5 creates inequalities between groups, institutions, with the greatest inequalities created between those inside and outside the catchment as expressed in the following quotes: "these extra costs are unfair cause no one else has to pay them [to farm]" (Interviewee, 2010), whilst another farmer claims "farmers in Taupo have suffered compared to someone outside the catchment" (Interviewee, 2010) citing potential injustices between those inside and outside the catchment as a result of RPV5. One farmer claims that there is real potential for increasing costs over time, an outcome of RPV5 which farmers will not easily be able to absorb into their costs of production as expressed in the following narrative:

> The problem is…most resource consents that people apply for they are actually doing it to get some benefit, development benefit , they can see a cash return. We are getting a resource consent to keep what we have already got so it just a cost there is no return on it, it is just adding to your costs and there is a real danger too that that is impacting on peoples net incomes so the actual total cost relative to your net income is going forward. So it has got to be real elastic and cost effective, there is a real danger of blow out, it is an open ended check book. And that will make or break it (Interviewee, 2010).

A unique finding specific to the case study is the economic structure of small farms and their ability to absorb the costs imposed by MBI. as the following quote demonstrates farmers may not be able to absorb these new costs: "farmers abilities to absorb these new costs are compounded by the fact we now [cannot] farm to our properties potential…which is a real cause for concern" (Interviewee, 2010). This is a problem as farmers cannot simply increase product prices to compensate for increased costs of production as one farmer describes "[Farmers are] price takers not price makers" (Interviewee, 2010).

Unique to the case study analysis reveals the additional cost of "farm experts" as an additional cost of RPV5. This is similar to Memon's (2010) findings that environment court assisted mediation also presented a number of costs such as experts and lawyers. Farmers and regulators describe that "farm specialists" are now required to ensure farmers are farming to the optimum level under the cap. A regulator admits that "farmers living under a cap, they have to get farm advice…that's a cost for them." A number of farmers, especially those from larger farms claim there has been a "huge administrative cost" (Interviewee, 2010) because of the "cost of hiring farm consultants" (Interviewee, 2010) and other "legal experts" and "lawyers." One farmer claims "[the costs of specialists] may become very costly". One farmer raises the issue that EW may also face the costs of increased necessity for "specialists" and "consultants" under RPV5 as there is a need for "regulators" and "policy analysts" with "on farm experience" necessary to "administer," "monitor farms" and "enforce" RPV5

In addition farmers also report there is an opportunity cost of RPV5. One life-style farmer claims "our farm income will automatically be halved by only being allowed half the number of stock" (Interviewee, 2010). Although economic costs of RPV5 were an obvious consideration of EW, the actual analysis of these costs seems to have been overlooked, as suggested by one farmer, no substantial economic analysis of the outcomes of RPV5 upon farmers was conducted by EW. One farmer claims independent research (see: Thomas et al, 2002) indicates "that the cost to farms will bankrupt a number of farm businesses…none of that modelling was ever done by environment Waikato" (Interviewee, 2010) but is required under section 32 of the RMA – eco-efficiency testing. These opportunity costs are considered an injustice by some farmers and subsequently will lead to people cheating the systems as the following farmer narrative suggests:

> I think that has created a system which is very expensive and costly to management and when you create systems like that people will be looking for loopholes, I mean it is inevitable and they will try and beat the system (Interviewee, 2010).

As can be seen RPV5 has contributed both to the costs of farmers as seen in the narratives. Furthermore, confirming the claims of Young and McCay (1995) some resource users perceive these added costs as an injustice, whilst a number also believe it is

fundamentally wrong to transfer the costs of resource consents to farmers as there is no benefit to them. A contention becomes apparent under RPV5 and RMA s 36(1)(b)(c) which dictates that farmers have to pay for the cost of consent and monitoring. Not only do farmers face these new costs for farming, they also have had their productive capacity capped, therefore farmers cannot simply absorb these extra costs, increase production or increase product prices as farmers are price takers not price makers.

Just as Young and McCay (1995) found MBI to result in a disproportionate spread of the financial burden amongst resource users in section 3.3.4, stakeholder narratives reveal RPV5 has failed to spread the costs and burdens evenly throughout the catchment as intended as the impacts of RPV5 have been observed to adversely affect some types of farm systems more than others as suggested by Smith and Scherr (2003). Similarly the impositions of costs have created inequalities between farmers inside the catchment and those outside who are not under N restrictions. RPV5 exhibits the disproportionate effects of MBI as life-style farmers more adversely affected under RPV5. Similar to the findings of Young and McCay (1995) found, barriers to the market now exist for farmers to operate where there were previously none, this is persistent theme under RPV5 also associated with perceptions of inequality and injustice. On the contrary to what market advocates such as Stavins (2003) have claimed, MBIs do not avoid compliance costs and negative effects generally associated with meeting regulatory policy for pollution control efforts. Not only are some of the costs associated with administration passed on to resource users, economic opportunity costs are seen to heavily impact farmers and can result in injustices. As suggested by political ecologists, overlooking the socio-economic costs of market instruments may underestimate the true costs of MBI policy, as is seen in the outcomes of RPV5. The outcomes of RPV5 therefore indicate the importance of socio-economic analysis of costs to farmers. Associated with added costs are new administrative burdens coupled with the implementation of RPV5. Narratives reflecting these additional costs will be analysed in the next section.

6.2.1.2. Administrative burdens

As indicated by several scholars [Huber et al. (1998), Harvard Research Institute (1999) Bailey, (2007) Henderson and Norris, (2008)], MBI have been associated with a number of additional administrative burdens. In addition to shifting the cost of environmental management to resource users, researchers have also demonstrated that

MBI have the potential to shift administrative burdens to resource users which may actually become more costly and time consuming than alternative regulatory approaches. The following narratives and discussion will explore this issue in the implementation of RPV5.

Farmers and regulators narratives reveal the level of added administrative burden associated with having to prepare an NMP and NDA under RPV5. One farmer claims having to prepare NDAs and NMPs was an imposition "going to be an imposition on the farmers but also on council workers". Confirming this claim a number of farmers and regulators comment that figuring out an NDA and then preparing a NMP is a "time consuming" and "intensive" task which depended upon the "abilities of the farmers" "computer skills" and the "availability of information" as one farmer claims "some people have not been keeping complete records and will struggle with their NDA" (Interviewee, 2010) whilst another farmer confirms, stating "certainly just to get the NDA was a bit of paper shuffling" (Interviewee, 2010). A regulator has similar claims regarding the information required to prepare NDAs: "the biggest issue was the amount of knowledge that was there, or available, in a manner that they could understand and actually utilise on their farms" (Interviewee, 2010). In order to find out a farms NDA requires consolidating stock and farm records from 2001 – 2005. Sometimes farmers do not have complete records, and some have none at all, in which case a "standard NDA" is given, one farmer claims this "standard NDA" is similar to a low forestry NDA and does not allow for "[economically] sustainable farming" (Interviewee, 2010).

These findings are comparable with the findings of Huber et al. (1998) in section 3.3.4 that many countries are finding the administrative burdens associated with MBI implementation are in fact more administratively burdened and costly than command and control (CAC) alternatives. This may be because of the additional administration efforts required to cope with the design and institutional changes arising from MBI implementation as suggested by Huber et al. (1998). In the case of RPV5 these administrative burdens are seen as preparing an NMP and an NDA, using Overseer and managing farms under the N cap.

In contrast, three interviewees claim the administrative burdens were "not burdens". One farmer/researcher claims that this information should be collected by farmers in order to make farming more efficient

> Yes there are burdens but i don't see them as burdens [the information gathering required for NDAs and NMPs]…are administrative requirements generally its information about my farm…I should be collecting anyway…once I'm forced to collect it I will use it to make my business more efficient (Interviewee, 2010).

One regulatory advisor confirms this claim stating all the information required for inputs into NDAs and NMPs is information farmers should have anyway claiming "[the information] is basically just information that they'll have on farm anyway…The only thing being that if they're changing their practices that they'll need to let us know, just so that we can keep on top of it and manage it (Interviewee, 2010). As discussed in the literature, administrative burdens have the potential to perpetuate the workload of resource users and also become costly - in particular the potential to create injustice by shifting the weight of administrative burdens from government to resource users as suggested by the Harvard Research Institute (1999) in section 3.3.4. Stakeholder narratives confirm these claims as a number of farmers believe that administrative burdens have been transferred from regulators to farmers. Although reporting and measurement are burdens found to be co-existent in other cases, there a number of burdens unique to RPV5. These burdens also include the significant level of up skilling required to work with the nutrient budgeting model Overseer, and associated NMP and NDAs.

A unique finding of research was in order for farmers to manage their farms under a N cap required an inherent level of up-skilling as shown by the following quote: "[farmers] needed to up-skill in order to remain profitable" (Interviewee, 2010). A number of farmers mention that they wish to remain independent and run their farm business "without expensive consultants" this inevitably requires farmers to up-skill in areas such as "record keeping," "Overseer" and "accounting" in order to manage farms to their potential under the cap and in an "entrepreneurial" manner. The inherent level of up-skilling required by famers has the potential to become problematic as indicated by one farmer who claims up-skilling is not possible for some farmers "There is a large percentage of the population, that hasn't had the education, or don't have the skills to understand the system" (Interviewee, 2010). They also point out that this causes some injustices "as soon as your start dealing with a large group of people and some of them just don't get it then you are going to cause injustice" they claim that "this is where this system really falls down" (Interviewee, 2010). Analysis also uncovered that monitoring

and reporting on farming activities are an important aspect of the scheme which may impose new burdens on farmers and is associated with a level of up-skilling necessitated by a market instrument which depends so heavily on a scientific model.

Monitoring and reporting under RPV5 requires record keeping, and communicating changes in farm operations with EW. As one farmer comments "[RPV5 requires] keeping records to suit nitrogen management…keeping on top of the monitoring" (Interviewee, 2010). This will essentially require farmers to organize records appropriately as described in the following quote: "[farmers] have to be aware what parts of their expenditure need to be kept in a separate pile like fertilizer usage, cropping, stock sales and purchases" (Interviewee, 2010). This is because they may be audited by EW. Keeping such information is new to some farmers whereas others have been practicing it for some time. One representative from a farmer organization claims "[the monitoring] is a new level of complexity and invasion which farmers have never had to deal with before" (Interviewee, 2010).

Reiterating the claims of section 6.2.1.1, farmers also claim that in addition to the unequal cost spread of monitoring between different types of farm system, the administrative burden is likewise unequally spread. Farmers and regulators confirm that those who "have traded nitrogen" and "dairy farmers" will be more closely monitored and thus monitoring will likely be more "onerous" and "costly" for these stakeholders. This again confirms the findings of section 3.3.2 in the case of RPV5, that the costs of MBI implementation may not be equally spread amongst resource users.

In addition farmers confirm monitoring and enforcement is an administrative burden for EW as the following narratives indicate. One farmer claims that there are still significant issues to do with monitoring:

> "There's still significant practical issues around monitoring and setting things up, the problem will not be in the trading but rather the monitoring, and that could potentially become costly" (Interviewee, 2010)

One farmer also expresses that there are issues for those inside and outside the catchment "it will be hard to monitor those with land inside and outside the catchment and therefore there is the potential to cheat" (Interviewee, 2010). This claim is reiterated by another farmer who states "as there are no clear rules for [monitoring and

enforcement] yet…this may provide the potential to falsify information" (Interviewee, 2010). Due to the current absence of a monitoring regime expressed under the rules of RPV5, one farmer raises the issue that there will likely be those who will look for "loopholes" whilst another states that "administrative burdens will likely lead to cheating the system" (Interviewee, 2010).

A unique finding of analysis was that farmers and regulators share the sentiment that compliance will be closely associated with the ease of monitoring and reporting. One solution from EW to reduce the complexities and burdens around managing, monitoring and reporting on of farm NMP is to adjust stocking rates in the NMP in small amounts with-out the need to notify small changes. A regulator states that in order to remove the complexity and administrative burden of reporting to EW, they have attempted to ensure farms have a "buffer" on their benchmark so that they do not have to report any changes to stocking rates below this benchmark:

> "One of the early concerns from the clients [farmers], was that how often do we have to report to you, what constitutes a significant change - you have to ring us within 10 days of having a significant change, so we just got rid of that, said oh well we'll just stack it up , you can just do what you like, so we've made that process really simple for them, and they've appreciated that" (Interviewee, 2010).

This use of a "N buffer" is a significant finding and will be discussed in section 6.3.3. Because of this buffer and the efforts of EW, there should be no issue in achieving 100% compliance under the scheme, one regulator claims:

"there is no reason why [RPV5] cannot gain 100% compliance…a key part of that process has to be, is dialogue, and knowing what's going on, having that respect between the two parties" (Interviewee, 2010).

Henderson and Norris (2008) conclude that it is essential that policy makers understand the economic and administrative burdens MBIs place upon resource users. MBI which have overlooked the complexities of administering the instrument have shown a tendency to be costly in administration and have the potential to entrench and actively encourage unsustainable environmental values rather than change them (Ackerman and Gallagher, 2000). Stakeholder narratives do suggest that EW may have overlooked some of the administrative burdens, although there is no indication that RPV5

may entrench and actively encourage unsustainable environmental values some farmers have suggested it may. In fact in recognition of the administrative burdens inherent in RPV5 regulators have developed methods to ease the burden of reporting through the implementation RPV5 such as buffers and only requiring farmers to report when major changes are made on farm.

A number of farmers have clearly expressed the burden of having to prepare NMPs and NDAs whilst others have claimed that this information should be collected by farmers and as such do not see it as burdens. Analysis has also revealed that unique to RPV5 is the level of up-skilling required for farmers to farm in the catchment under the scheme and that the level of compliance may be associated with the burdens of reporting. Analysis also indicates there are a number of important considerations for EW in terms of the eventual development and definition of a monitoring program[5]. Farmers have expressed concerns that some farmers may look to find loop holes in the monitoring system and effectively cheat the system unless rules for monitoring and reporting are clear. It is for this reason that a regulator from EW states that dialogue between farmers and EW is important. The disproportionate sharing of monitoring burdens under RPV5 is shown by higher monitoring costs imposed upon dairy farmers and those who have traded nitrogen. Associated with monitoring and other administrative burdens are inherent complexities under RPV5. These complexities will be discussed in the following section.

6.2.1.3. Complexities

In addition to added costs and administrative burdens, MBI are associated with a number of additional complexities. Narratives have revealed there a number of complexities are inherent in RPV5. Firstly farmers and managers have identified that there are complexities associated with NMPS and NDAs. A number of farmers claim to have struggled to understand aspects of the system, one farmer representative claims "people really struggle to understand what was going on, the whole system is complex" (Interviewee, 2010) whilst another farmer states, "the biggest complexity was understanding what the whole process was about" (Interviewee, 2010). The scheme may

5 At the time of interviews (November 2010) rules for monitoring had not yet been released.

be particularly complex where farmers have multiple landholdings, as one farmer suggests:

> "it is particularly complex in our case...you need a practical person [a practical manager at EW] to understand the complexities and make it more simple to manage…and amalgamate into a farming system" (Interviewee, 2010).

Stakeholder narratives reveal a number of associated complexities with RPV5. As discussed RPV5 has a number of pertinent administrative burdens which requires, information gathering and consolidation and entering it into a scientific model, which some resource users and managers have reported is inherently complex and difficult to manage, whilst others simply do not have access to necessary records. Farmers have expressed their concern over whether aspects of RPV5 are achievable without the need for educating farmers and in absence of access to some records. Therefore access to information has become an issue. In regards to the nutrient management program Overseer, farmers claim it is hard to understand the science that has gone into the models and that it "doesn't make practical sense". A regulator claims "even if you were quite good with Overseer… you would still just about have to pay a professional to help you." (Interviewee, 2010). Furthermore one regulator claims that EW may not realise the true complexities associated with RPV5 yet, as indicated in the following statement:

> I don't believe they [EW] understand the complexities around monitoring...I don't believe EW – get the big picture and understand the complexities, yet…the problem will be monitoring and making sure that people are staying under their cap" (Interviewee, 2010).

This reiterates the findings of section 3.2.3 where Spangenberg and Settele, (2010) found uncertainties in MBI science and complexities present a significant barrier to achieving public acceptance of market based policy. In addition, as Schlamadinger et al. (2007) found; complexities associated in particular with MBI models involving land-use and land use change has meant the inclusion of agriculture and forestry in the Kyoto protocol has been a contested and controversial issue (Schlamadinger et al., 2007). Similar complexities in the model of RPV5 have also resulted in contestation and inherently complex. Whereas one regulator claims that managing farms under the nitrogen cap imposed by a properties NDA has been made simple "we've made that

process really simple for them, and they've appreciated that" (Interviewee, 2010). This involves allowing farmers "buffers" on a farm's NMP.

A unique finding of this research is that these complexities necessitate a proactive approach by regulators to educate resource users. A number of farmers and regulators express in that education and communication around aspects of RPV5 are seen to be integral in dealing with the inherent complexities of RPV5. One advisor claims; "[communication around RPV5] has to be one on one, it has to be education, it has to be getting people to grasp the concept…I'd like to think that through education and one on one contact we can get this opposition to RPV5 shifted" (Interviewee, 2010). Farmers responses mirrored regulator responses, one farmer states "education's the key, education and communication" (Interviewee, 2010). Whilst another claims "For anyone who's in the catchment it means a hell of a lot for their businesses, so education is really key to continuing growth and management of their operations" (Interviewee, 2010).

Consistent with the literature these new administrative activities associated with RPV5 such as producing and managing a farm under a NMP, the science behind RPV5, and new complexities in terms of monitoring for EW are in-deed complex issues for both farmers and regulators and limited by capacity. However, there is little evidence to suggest that regulators have overlooked this complexity as suggested by Ackerman and Gallager (2000) in other cases. In fact, as suggest by Henderson and Norris (2008), EW appear to have taken the similar view that it is essential that policy makers understand the complexities of new management systems, as shown by EW's emphasis on education to deal with the complexities of RPV5s administration. Furthermore no evidence was found to suggest that inherent complexities may have the potential to entrench and actively encourage unsustainable environmental values rather than change them as suggested by Ackerman and Gallagher (2000) as farmers interviewed have not expressed any such indication. The next section follows on from narratives which report the underlying burdens in the scheme with initial indications of institutional capacity dilemmas which may indicate some of the institutional shortfalls of the scheme question its ability to achieve policy goals.

6.2.2. Capacity Dilemmas: Price transparency, information dissemination and market function

Capacity dilemmas have become apparent through narrative analysis. Capacity dilemmas or institutional constraints refer to problems within regulatory institutions to effectively implement policy. Both farmer and regulator narratives indicate a number of capacity dilemmas. Capacity dilemmas have been identified in an inherent inability to provide transparent price mechanisms and information dissemination necessary for MBI markets to function effectively and secure policy goals of RPV5. Furthermore monitoring and enforcement for example are dependent upon the technical expertise and capacity of regulatory authorities.

As discussed in the theoretical literature, market instruments and regulators have encountered difficulties in converting environmental externalities into a dollar value. Price transparency and information dissemination is considered an important condition for cost effective trading to be established (Stavins, 2003; Bolduc, 2004). Recalling Stavins (2003) example, information dissemination in the Hunter River salinity trading scheme was found to be integral to the function of the trading program. As the literature indicates information dissemination such as the price of permits, the ability to identify trade partners, and the ability to negotiate an exchange, have been shown to be possible constraints on the effective function of MBIs (Bolduc, 2004). As will be shown, narratives reveal complex institutional factors have made it challenging to establish a price on N that is transparent to all parties at any given time. This has been associated with institutional limitations in information dissemination under RPV5.

One farmer claims that because a number of transactions are undertaken behind closed doors this has attributed to "a lack of price transparency in the price of N" (Interviewee, 2010) whilst another farmer claims that "the transparency or lack of it comes from the trust [LTPT]…Environment Waikato have set up the trust to do dirty work and then they are not answerable either" (Interviewee, 2010). Farmers have expressed their concern over a lack of information on the price of N permits because "the price of N is vital to my farm operation, and if we don't know what it's worth, how the hell are we supposed to operate under [RPV5]" (Interviewee, 2010) whilst another claims that LTPT have offered "different prices" to "big business" and "small farmers" (Interviewee, 2010). Farmers express it is import of these aspects as farmers have indicated that they have little idea of what the price of N is, nor are they able to sell N permits. One farmer stated: "we are never given a straight answer when asking what the price of N is. One day its $300 per ton the next its $200, it seems to be different for the

big farmers too which I think is unjustified" (Interviewee, 2010). Secondly the farmers have said that Lake Taupo Protection Trust (LTPT) would not purchase any less than "three consolidated tons of N" (Interviewee, 2010) at any one time, meaning that for many family farms selling three tons is not an option. "They said they are only going to buy three tonne of nitrogen which is basically all of my nitrogen, so unless you were a big player you were never actually in a position to work with the Lake Taupo Protection Trust. So there was a huge injustice there right from the start, they should have bought any N amount, whether it be a 100 kilos or 7 tonnes" (Interviewee, 2010). These findings reflects the analysis of Abdalla et al. (2007) in section 4.2.4.2 who claim that unless there is heterogeneity in abatement costs emissions trading would likely lead to a malfunction of the instrument and thus abatement of emissions are unlikely to occur.

As a result of these institutional aspects of the N permit market, some farmers may be marginalized in their ability to actively participate, creating further inequalities between small farmers and large scale farmers. These findings demonstrate what Guerin (2003) and Walker and Bulkeley, (2006) found: that MBI may inadvertently marginalize smaller stakeholders. Furthermore, analysis reflects Hadjilambrinos (1999) findings, that market price is not simply determined by supply and demand under MBI but rather other market and political influences.

Narratives also reveal a lack of activity in the market. The lack of buying activity is confirmed by one regulator who claims:

> The Protection Trust is the biggest buyer. There's a farmer, [name omitted], who is also one of the few private buyers, so you could say there are very few trades occurring that aren't involving those two parties (Interviewee, 2010).

Regulators agree that there is a lack of competition in the permit market; one states that "there is definitely a lack of competition in permit market." Although a farmer claims that there are only two buyers in the market "well there's only two actual buyers in the market for N, there's a dairy farmer [name omitted] and the trust" (Interviewee, 2010). Whilst Bolduc (2004) agrees that a completely fluid permit market may not be necessary, there is clear evidence the market lacks what Bolduc (2004) believes is necessary for a functioning permit market, namely competition, transparency and price dissemination. One regulator claims that in the case of RPV5 these aspects are not important to the function of the market stating "I'm advised by the economists that that

doesn't matter, as long as the nitrogen is being taken out of the catchment by the trust" (Interviewee, 2010). This statement is contrary to the literature as scholars have argued the importance of completion in the permit market, transparency in price and information dissemination for a fluid and functioning permit market (Stavins, 2003; Bolduc, 2004).

Capacity dilemmas arise where the implementation and scientific modelling may fail to achieve intended resource protection as indicated by the maximum sustainable yield (MSY) model in quota management. In RPV5 narratives have revealed that science does not match the institutional implementation of the scheme due to possible misinterpretation of the spatial distribution of N. According to one farmer "LTPT went out and bought a total of six farms and they paid very good money for them…but those farms all had relatively low nitrogen discharge allowance" (Interviewee, 2010). According to a number of farmers LTPT has made bad purchasing decisions which do not match policy goals. A number of farmers claim that in regards to the farms the trust has purchased "more productive land should have been purchased" as the following narrative clearly shows:

> The science does not match the implementation…they should have been buying land that had high NDAs, intensive land, they should have been buying diary land…but they actually bought the poorest land around, the poorest four farms that were doing the least damage, so they actually misunderstood what they were meant to be doing…they did let those four farmers escape which is good, they got the social part right with those people, but they missed the point environmentally (Interviewee, 2010).

As addressed by Cash et al. (2004) temporal mismatches can occur in MBI where implementation and institutional capacity may impact the effectiveness of an MBI over time. Yerex (2009) claimed there is risk to RPV5 overtime by changes in the structure of political and social contexts over time. It has been suggested that over this period of time farms may change and there may be unforeseen political changes in the organisation of the structure of local or national governments which may impede upon the effectiveness of RPV5. Narrative analysis reveals two such examples have subsequently occurred in RPV5. Firstly policy cycles have presented problems in RPV5 implementation. Regulators have noted that this creates problems such as "loss of knowledge and

capacity" (Interviewee, 2010) and these changes are also said to have shaped the change of direction of policy over time. The following quote supports this claim: "there has been changes to a number of key players which has also changed outcomes…we have lost capacity and knowledge" (Interviewee, 2010), whilst a regulator states "changes in key players have been costly in terms of the advancement of RPV5" (Interviewee, 2010).

According to farmers a further example of where science does not match implementation is a potential funding dilemma which is also associated with a temporal mismatch. One farmer believes the 80million dollar fund "was a great achievement for the catchment, reducing [N] by 20% through purchasing" (Interviewee, 2010), but they raise an equally valid point: "what if in ten, twenty years' time EW decide they need to take out more…we are going to need more funding and it may not be available" (Interviewee, 2010). Another farmer raises a further issue, that the effectiveness of the fund will reduced over the 20 years it is meant to last as farm values and the value of N will likely go up, stating "the effectiveness of the fund reduces over time" (Interviewee, 2010).

Stavins (2003) makes a valid point that transaction costs have inhibited market activity in some MBI. Although stakeholder narratives have not revealed any indication of transaction costs under RPV5, one regulator stated "there are no transaction costs to prevent active participation in the market" (Interviewee, 2010).

6.2.3. Conclusion

This section analysed the design elements and institutional capacities of RPV5 that make up the framework of tradable permit MBI and determine their effective implementation. Whilst these aspects are essential to ensure the function of MBI, analysis has explored a number of difficulties in implementation.

Stakeholders report RPV5 has clearly contributed both to the costs and workload of farmers and at least some of the administrative costs. In addition RPV5 has failed to spread the costs and burdens evenly throughout the catchment as intended. Subsequently implementation has been more costly for some types of farm systems than others. This may have been avoided through economic analysis of the outcomes of RPV5 upon farmers as narratives and the literature suggests. This may suggest that EW has overlooked some of the less obvious administrative burdens inherent in trading schemes

in general, although regulators have developed methods to ease some of these burdens. Resource users have reported that RPV5 is inherently complex although there is little evidence to suggest that regulators have overlooked this complexity. Contrary to the literature there is no indication that RPV5 may entrench and actively encourage unsustainable environmental values. Analysis concludes that eventual development and definition of a monitoring program is important to avert loop holes in the monitoring system thus rules for monitoring need to be clear.

Whilst RPV5 exhibits a number of similarities with the literature, other themes more specific to the Lake Taupo Catchment have emerged. Narrative analysis reveals of particular unique significance is the up skilling required to work with the nutrient budgeting model Overseer. Another feature of RPV5 distinctly absent from the literature is the importance of the additional cost of experts and advisors. These examples show that dialogue between farmers and EW is important.

Political ecologists have brought to our attention the importance of institutional capacities in their ability to manage and ensure equitable distribution of resources under MBIs. The case study has demonstrated the limitations of Institutional capacity in terms of implementation of RPV5. Information dissemination and price transparency, and decisions made towards securing policy goals of RPV5 all appear to be important restraints upon RPV5 implementation. Of particular concern are issues of price transparency and information dissemination in the price of N and marginalization of smaller land holders. These findings confirm what Guerin (2003) and Walker and Bulkeley, (2006) agree are important implementation difficulties. Analysis also reflects Hadjilambrinos (1999) findings, that market price is not simply determined by supply and demand under MBI but rather other market and political influences. Narratives also reveal that science does not match the institutional implementation of the scheme due to fund management decision making and the limited capacity of the fund over time funding is limited in accomplishing the goals of RPV5capacity over time. These findings have some obvious and other less obvious implications which remain important to the success and achievement of the policy goals of RPV5. These findings suggest that these particular areas need further consideration in future academic research.

Some of the functional aspects of the market have the propensity to further perpetuate the inequalities between small scale and large scale farmers within the

catchment. As the following section will show, some of the initial political and ecological outcomes of the scheme support political ecology critiques of neoliberal environmental governance and MBI.

6.3. Unintended political and ecological outcomes of nitrogen trading:

As chapter three has highlighted MBI impose possible socio-economic impacts on local communities. It is argued that only by understanding the political ecology of the policy implementation process of MBIs, can the constraints imposed by complex political and institutional structures be understood (Hahn, 2000). Critics of assigning private property rights as the solution to TOC have pointed out that many MBIs that impose new forms of property rights over resources overlook the inherent socio-political and complex environmental implications of this process.

As reflected in the literature, observation of the Taupo scheme suggests that MBI do not necessarily generate the outcomes predicted by their underlying assumptions. Many authors have argued that MBI provide contradictory outcomes as a result of matching the environment with economic principals as rational decision theory may actually work to provide incentives which are contradictory to environmental and social goals of policy. Neoliberal EM maintains that private interests are better suited to control the allocation of resources on the basis of competition and individual responsibility for the wellbeing of nature and society (Larner, 2005). As such, proponents of market environmentalism assert that environmental goods will be more efficiently allocated if treated as economic goods through establishing private property rights over natural resources, employing markets as allocation mechanisms, and incorporating environmental externalities through pricing. As described by McCarthy and Prudham (2003) and Castree, (2008a) this is part of a process of the neoliberalisation of nature. This theory assumes property owners will make rational economic decisions based upon property rights to control negative externalities. However, political ecologists have revealed this is not always the case as other market and non-market forces contribute to resource user decisions to produce perverse incentives and unintended outcomes. As such, the distribution of property rights and the value of certain environmental externalities and goods have also been found to create complex systems of perverse incentives to environmental protection, demonstrated in a number of mechanisms and much to the disarray of MBI proponents.

Stakeholder narrative analysis reveals a strong correlation between theoretical and case study literature suggestions that neoliberal environmental governance and MBI may provide perverse and incentives and also unintended consequences contradictory to the goals of resource protection. Congruent with critical PE literature such as Mansfield (2006) which suggests this is particularly the case for diffuse nutrients, RPV5 stakeholders recognise the limits and potential for adverse and unintentional consequences of the market principals behind RPV5. As the following section will show, evidence from stakeholder narratives reveals the inherent uncertainties and logical contradictions of market instruments employed in environmental management. Likewise narrative analysis has revealed the initial outcomes of RPV5 exhibit some similarities to this literature as will be analysed and discussed in the following sections. It is important to note here that analysis cannot provide any conclusive evidence of ecological effects of hotspots as a consequence of the policy as RPV5 is only in its infancy.

In section 6.3.1, analysis will explore the initial socio-political outcomes of RPV5. It will explore the propensity of RPV5 and the assignment of property rights over N within the catchment to result in perpetuation of structural inequalities suggested by political ecology literature. This is contrary to the claims that MBI provide a fair alternative to regulation. In section 6.3.2 unexpected market forces and their propensity to affect the intended outcomes of MBI will be explored. It will be revealed that in the case of RPV5, the addition of market signals from the New Zealand Emissions Trading Scheme (NZ ETS) provides complex incentives in addition to price signals from the NTP. Following this in section 6.3.3 narratives will reveal that a lowering of property prices and flexibility to purchase N under RPV5 has likely led to an increase in dairy farms in the catchment observed since 2001, an unintended consequence of a number of factors. In section 6.3.4 stakeholder narratives will also reveal that an increase in the number of dairy farms and flexibility under RPV5 has resulted in concentrations of N, and the uncertainty of environmental effects of N concentrations upon the lake. It will also be shown that increased flexibility has inevitably led to unintended outcomes of N trading.

6.3.1. Socio-economic outcomes

Theoretical literature suggests that the failure of some neoliberal projects is due to the failure and incapacity of MBI to address political issues and social needs. Evidence from this literature suggests this has led to justice implications and perceptions of

injustice. As such neoliberal policy can further encourage the disproportionate power relations between resource users, whilst MBI leave some seriously disadvantaged and others who may benefit. Guerin (2003) found that Inter-Changeable Quota and QMS around the world have the potential to marginalise smaller stakeholders. Particularly relevant to RPV5 which sets in place legislation in order to achieve Land Use Change (LUC), there has been an impact of emissions trading on land-use practices, decisions, and rights. Due in part to the inherent complexities of land-use initiatives, the inclusion of agriculture and forestry in the Kyoto protocol has been a contested and controversial issue (Schlamadinger et al., 2007). Emissions trading is seen to perpetuate the inequitable distribution of wealth among the nations of the world (Schlamadinger et al., 2007). Accordingly, MBI pose the danger of perpetuating structural inequity as shown with the potential of carbon forestry plantations to perpetuate structural inequity (Hadjilambrinos, 1999). Smith and Scherr, (2003) found forestry plantations in many parts of the world have ignored local land rights, providing inadequate compensation or causing involuntary resettlement of communities. Accordingly, Smith and Scherr (2003) contend that as a result of emissions trading, existing disparities in income and political power could be exacerbated. These points highlight the importance of assessing the possible socio-economic impacts on local communities.

Contrary to claims that MBI provide fair alternatives to regulation as discussed in section 3.1, a recap of literature indicates that social injustice may take many forms under MBI as discovered in section 3.3. Injustices as a result of MBI include: barriers to entry into the market, the redistribution of administrative costs and burdens upon resource users, outcomes counteractive to the economic development of communities, perpetuation of the inequitable distribution of wealth among individuals and groups, further marginalisation and exasperation of structural inequalities and localized concentrations of emissions. Stakeholder narratives regarding RPV5 mirror these findings in the literature to some degree, in particular through a number of inequitable economic outcomes.

After the initial consultation process a number of additional injustice issues became apparent. The implementation associated with RPV5 in Taupo, like other empirical examples of MBI, has proven to cause serious concerns for injustice. First and foremost narratives reveal RPV5 has resulted in a number of economic disadvantages upon the farming community. Some stakeholders claim this is an outcome of RPV5 that was partially overlooked because EW's never conducted an economic impacts

assessment. An independently commissioned report discussed in section 4.3.4 by Thomas et al. (2002) estimated that farm losses associated with RPV5 and the N cap within the catchment may exceed $160 million. According to a farmer/researcher this was the only assessment of the social and economic impacts of RPV5 as none were ever undertaken by EW.

> [Economic analysis] is imperative otherwise you just don't have an honest discussion about what this all means for everyone and its required by law under section 32 of the RMA but in this case didn't happen – TLC did it but we were considered to have vested interest – I genuinely believe if we did it early on we may not have had to go to the environment court.....
>
> He [the assessor] said our assumptions were correct, the model we used were correct and our calculations were correct – the legislation would cost farmers 180 million in the Taupo catchment – the assessor said that we presented the worst case scenario and I was comfortable with that but he said farmers have always been an inventive lot and will get around this some-how, which was laughable in one sense but to me was quite disturbing…we had presented an economic argument that you couldn't really refute (Interviewee, 2010).

As argued in chapter five, the joint fund between Government and EW was set up to compensate farmers for reduction in NDAs or purchasing their land in place of regulating a 20% reduction across board and the potential negative socio-economic implications of that approach. One regulator claims that by essentially compensating farmers, the public fund to purchase N prevents the negative socio-economic impacts of simply regulating reductions in N "So to deal with the social issues there is the reduction [in nitrogen being purchased by LTPT], rather than [N] just being regulated down, essentially it is a buy-back of N by public funding" (Interviewee, 2010). Although the fund has prevented potentially more restrictive economic conditions for farmers in the catchment, it appears that injustice remains prevalent as suggested by the following narrative.

> I think there have been some really adverse effects on the wider community, the social impacts were never considered and I think that was a huge injustice, that was completely wrong, and I start to see now the effect it is having on the smaller

> farmers and the life stylers I don't think they ever thought about that (Interviewee, 2010).

A representative from a farmer group claims RPV5 "presents long term inequitable outcomes for farmers in the catchment" (Interviewee, 2010), and another farmer claims "as farming goes, farmers need the ability to bounce back after a low productive year, I am no longer able to do that." Another representative for a farmer group claimed that "farmers feel hard done by [by RPV5]" (Interviewee, 2010).

The outcomes of RPV5 confirm a number of the injustices perceived at the policy development stage. The results of the imposition of RPV5 are beginning to become evident in the catchment, farmers have said RPV5 and the imposition of a nitrogen cap has affected their lifestyle: "there's been a few marriage bust ups and the sort" (Interviewee, 2010), while another farmer claims that "entire roads are for sale…there has been a loss of property value" (Interviewee, 2010) whilst many farmers now claim that property values are now based on NDA level and this is also recognized by EW. These narratives uncover the unintended consequences of MBI and their potential to result in negative socio-economic outcomes as discussed in section 3.2 and 3.3. As such narratives have provided evidence which confirms the suggestions of Low and Gleeson, (1998); Stavins, (2003); McCarthy and Prudham, (2004); Halsnaes and Olfhoff, (2005); Muhovic-Dorsner, (2005); Walker and Bulkeley, (2006) and Halsnaes and Shukla, (2008) in section 3.3 that MBI may inadvertently result in environmental injustice.

Other farmers claim there has been a loss of community. One farmer claims "we know of six people who have already moved out of the catchment who otherwise would not have" (Interviewee, 2010) whilst another claims "the loss of community as a result was never considered as a part of this process, they never tried to add value to the community" (Interviewee, 2010). Farmers claim there have been a number of social changes as a result of the policy "there have been some very real social changes to the community, very negative impacts, people have moved out of the catchment, life stylers have lost jobs and moved out" (Interviewee, 2010). This is reiterated by another farmer who claims that life-style farmers, who are vitally important for farm contractor jobs, are moving out of the rural areas and changing jobs because it is no longer economically rational for them to stay in country:

> [life style farmers] are losing jobs and moving to town, I know of five or six people, who have basically run, because they could see the opportunity, they saw no future for themselves lifestyle blocks they are prisoners, no one wants to live forty minutes away from the local township, when they are very scared that a lot of the area will end up in trees around them, or a lot of the farmers are scaling back and their job will disappear (Interviewee, 2010).

Other farmers agree that the most significant socio-economic effects have been upon life-style farmers: "life stylers are especially effected, have to change jobs, wind down businesses and many have decided to sell and move out of catchment as there's no capacity and opportunity to farm and find work within the catchment" (Interviewee, 2010). One life style farmer claims that "[RPV5's] a total hindrance and no opportunity for us…raising cattle beasts provided income to pay rates, we no longer have this income…a lot of people see no future in the catchment for their business" (Interviewee, 2010). Whilst another farmer claims "[RPV5] has put a damper on the whole catchment" (Interviewee, 2010). Furthermore potential ecological outcomes of RPV5 will see an increase in tree planting on farms bought by LTPT in an attempt to convert land to a lower N leaching land use, the potential for this to happen may also cause injustice as one farmer states "[name omitted] down [name omitted] road is going to be surrounded in pine trees, no one wants to live in the middle of a forest…" (Interviewee, 2010). Whilst that farmer referred to says it's a loss of neighbours and community that farmers rely on:

> I don't want to be in pine, I'm losing lots of neighbours and all that...it is certainly not ideal and lots of neighbours means a lot of social contact…you are often borrowing something or giving them a hand with something or whatever you know so you lose those and yea so that impact was huge (Interviewee, 2010).

Farmers often concluded that this differentiates Taupo from other catchment as the following quote demonstrates: "we are exposed to these costs whereas those outside are not" (Interviewee, 2010) another farmer/researcher claims this is not so adverse as other catchments will face similar schemes soon "at least we now know what effect [RPV5] will have on us farmers, those outside of the catchment have got it coming to them soon enough" (Interviewee, 2010). Whilst another farmer realizes RPV5 may create inequalities between New Zealand and our international trade partners if they don't face similar environmental restrictions claiming " [New Zealand faces negative economic

effects internationally to economies not placed under similar restrictions" (Interviewee, 2010) as New Zealand is vulnerable to agricultural trade competition internationally as pastoral agriculture is a trade exposed industry.

As suggested by Low and Gleeson (1998) and demonstrated by the perceived outcomes of RPV5, MBI may worsen the inequitable redistribution of wealth and power within and between communities, institutions and catchments. Narratives reveal that RPV5 further creates inequalities and perpetuated differences between farmers inside and outside the catchment, one representative from a farmer lobby group claims "we didn't think that it was fair that the course of variation 5 that the farmers were going to get less than a farm outside the catchment" (Interviewee, 2010). Furthermore Narratives reveal through the allocation of NDA (discussed in section 5.4.1) the differences in NDA allocated to each farm has further divided the community on an equitable basis one farmer claims "the NDA allocation have really created a divided community, between the haves and the have-nots" (Interviewee, 2010). These narrative illustrates the contention that MBI, although are said to be fairer than regulatory alternatives, still may fail to address important social needs and perpetuate inequalities between stakeholders, groups and catchments in this case. It will be shown in the next section that ecological outcomes are similarly complex with a number are unforeseen outcomes.

6.3.2. Land Use Change, participant buy-in and the addition of the New Zealand Emissions Trading Scheme:

As discussed in chapter four, comprehensive land use change (LUC) is one of the key policy goals of RPV5. Regulators claim that there has been some achievement of LUC under RPV5. Regulators claim there has been a shift in the mind set of farmers from originally opposing RPV5 plan changes to a number of farmers embracing it for its benefits. Regulators also claim the public fund to buy N is integral to achieving LUC, whilst a number of stakeholder narratives reveal a lucrative explanation for the LUC observed in the catchment. Interestingly, a number of those advisors and researchers claim that LUC has only been made possible due to the addition of the NZ ETS and possible revenues of carbon credits from converting farmland to forestry. A farmer supports this claim stating:

> Unless you had a fund here to take out 20% I think there would be a huge battle. So the fund was absolutely instrumental to achieving land use change…in terms

> of land use change has been the opportunity to match the carbon and the nitrogen for a combined deal…Nitrogen on its own is difficult (Interviewee, 2010).

This sentiment that land use change and participant buy in has been achieved, due to the addition of the ETS is confirmed in the following comment,

> participant buy in indicates that – although [PRV5] is still not law [at the time of the interview –November 2010] we got 90% [of farms] benchmarked so yes this indicates that farmers are buying into the scheme and wanting to get things done, it has created values shifts in this sense, given that there's a lot of land going into forestry and low nitrogen leaching practices already occurring. Yes i do believe it will happen – but whether there are changes in values i think the people that are engaging in those changes are doing so primarily because they see the economic benefit in doing it – whether they change their values i couldn't say that.....
>
> sheep and beef farming has a$250 a hectare return, [and converting land to forestry under the] ETS is two or three times that. So that's not again the result of RPV5 it's a market signal from something else occurring so you'd be very brave to say that RPV5 has bought about the [LUC] that is now occurring (Interviewee, 2010).

This narrative indicates that the addition of the ETS makes forestry economically viable. As another farmer/researcher states "[the ETS] strengthens the possibility of LUC mainly because of the addition of income from carbon and the option to swap from farming to carbon forestry" (Interviewee, 2010) whilst another farmer claims that LUC would be hard without the ETS as it has strengthened behavioural change "without [the ETS] [LUC] would be hard…the ETS strengthens behavioural change" (Interviewee, 2010). When asked if the converting pastoral land to forestry under the ETS was something they would have considered if the cap on nitrogen had not been placed one farmer answered:

> No I would not have considered it had you not been able to sell nitrogen because I basically couldn't afford to take out 75 hectares to plant trees and stay viable so the ability to sell that amount of nitrogen has allowed me to do that (Interviewee, 2010).

Another farmer/researcher confirms the ETS is vital to achieve LUC:

> If it wasn't for the ETS i don't think the Trust would have got its 20%. We would have struggled just on the basis of payments for nitrogen, the fact you could get a capital payment for the nitrogen you are no longer emitting and use that money to plant carbon forests and then get an on-going income from carbon has completely won the day, if the ETS had not been there and the ETS was never part of this process or discourse or debate it just came along and made it happen (Interviewee, 2010).

The addition of the ETS with its potential income from carbon forestry and the ability to sell nitrogen when converting to lower N leaching activities has given farmers some incentive for LUC in the catchment. Although one large farmer who is actively involved in carbon forestry claims that although they are able to realise LUC under RPV5 and the ETS, it was a task that small land holders may not be able to do themselves because it required expensive technical expertise and capital investment that a lot of smaller land holders did not have access to:

> We took up an opportunity to take some land out of farming and put in the trees, we sold some nitrogen to do it, that is one aspect, but that is very complicated and involved lawyers, lots of cost, to get things done…we planted forest under the ETS and there was help and assistance given to do that but there was still a lot of work that went in and I think for a small farmer the costs and the work that we went through, it wouldn't have happened. I am pleased it has happened because it has got the desired effect, but very hard to get there (Interviewee, 2010).

Although academic literature has failed to explore LUC in detail, this finding suggests that achieving LUC is restricted by access to skilled help and understanding of the ETS, that it is costly, time consuming, requires skilled help and that it is intensive and risky. This finding reveals the importance of the ETS and possible limitations of achieving LUC. Thus questioning the ability of RPV5 to achieve LUC. Whilst one regulator claims the scheme will not realistically achieve 100% buy–in, but that a value for N has provide an incentive and created certainty.

Academic literature covered in section 3.2 and 3.3 has not explicitly explored the drivers for LUC under MBI. In this effect analysis has uncovered two unique drivers for land use change in the catchment. Firstly the government fund administered by LTPT has been integral in achieving both purchases of land for conversion to lower nitrate leaching land uses as well as the purchase of NDA. Furthermore a more lucrative driver of LUC has been the potential income of carbon forestry from the NZ ETS. This reveals that RPV5 alone with its small market of independent buyers (other than LTPT) has only played a small part in LUC in the catchment. These findings highlight some of the unintended consequences of market for nitrogen function. As the following section will illustrate, further unintended consequences of the N trading market have led to more perverse incentives, often to the contrary of resource management goals under RPV5.

6.3.3. Increase in Dairy farming

Stakeholder narratives reveal that since the notification of the proposed plan change in 2000 that there has been a marked increase in the number of dairy farms operating in the catchment. Firstly stakeholders associate the increase in dairy farming with the period of uncertainty surrounding the policy development phase and the subsequent reduction in land values in the catchment around that time. Secondly stakeholders suggest that the added flexibility to purchase N and expand farming operations through the market instrument have led to the expansion of dairy farming in the catchment. This demonstrates the propensity of lucrative market incentives under MBI to result in unintended consequences as expressed in section 3.2.3 in critique of scientific and knowledge based assumptions which may result in unintended consequences. This is excited under RPV5 NDAs can be increased to cater for dairy farming by purchasing N, this would be necessary for example to convert a lower N leaching sheep and beef farm to a more intensive dairy farm. According to stakeholder narratives, large scale farming in catchment is now more commercially viable than smaller land holdings due to economies of scale which appear to be a result of the N market. This is because it has become economically rational for large farms to establish or expand because economic conditions present favourable outcomes for large dairy farms to establish as a result of a slump the property market and because the price of N is low enough for dairy farmers to realize potential economic gains on investments in the catchment.

One regulator admits that an unintended consequence of the market in action is that "Dairy farming is now the only farming system that can afford N so there is increased chances of an increase in dairy farming in the catchment" (Interviewee, 2010). A sheep and beef farmer confirmed this claim, "the value of nitrogen is probably only affordable for a dairy farmer to get a return from it. If I went to buy N to increase my operation I think the returns wouldn't be there to do it" (Interviewee, 2010).

A further concern is that in the attempt to allow farmers greater flexibility under their NDA, as previously discussed, regulators have allowed for NDA buffers for individual farmers, or "paper nitrogen". Although the total amount of N allowed to enter the lake has been benchmarked and capped at that level, the actual amount of N entering the lake is likely to be less as many farmers are farming under their NDA because they have a buffer. With the added flexibility allowed under the scheme farmers looking to expand can now buy this un-utilised N and increase their NDA output on their farms. This in turn has the potential to actually increase the total amount of N entering the lake. "Paper nitrogen" as it is called, which is not being used, can now be bought and utilized, generally by dairy farmers as suggested by the narrative bellow:

> So although we had 163 tonne assessed through our overseer as being the amount of N going into the lake, there's going to be a significant amount of farmers that have a buffer and aren't going to utilise it, and I call that paper N. Whereas [name omitted] buying that and actually turning it into real N, and that comes back to that hot spot we were talking about. [name omitted] is utilising that ability to farm up and intensify, but there's sort of a side benefit to the lake but that paper N is sort of sitting in limbo and not being used (Interviewee, 2010).

This further exemplifies the unintended outcomes of the underlying market instrument and assumptions as expressed in section 3.2.3. Furthermore the same regulator argues that the NDA buffers will not likely lead to farmers farming up to their NDA cap limit (but this is yet to be seen) because of economic and environmental constraints:

> There's a disincentive for farmers to radically change their farming systems to utilise [paper nitrogen], because of there is a cost. Say you said, right I'm going to put in more crop, I'm going to go up in another 100 cows just to utilise the N, there is the constraint of buying those cows and whether constraints of soil and

climate at that time allow it. So there's market forces and environmental forces that come in to it (Interviewee, 2010).

This narrative firstly reiterates the point that only dairy farmers can afford to raise the capital to invest in more intensive land use within the catchment by purchasing N, but on the other hand it confirms that dairying faces the same environmental constraints as others and thus identifies a possible constraint on possible full scale dairy conversions occurring in the catchment.

Narratives reveal that as a result of a combination of factors, namely the reduction in property prices across the catchment during the period of uncertainty since 2000 , and the flexibility introduced through the ability to purchase N there has been an increase in dairying in the catchment. This finding contradicts that rational choice theory will achieve the intended goals of MBI. This is because economies of scale, favourable to large dairy farm operations, now exist in the market under RPV5. The incidence of dairy farms establishing and expanding within the catchment show how unintended consequences of the market in action lead to perverse incentives. This is an example where rational choice theory has failed to achieve its intended outcome as it has become economically rational to be a large land owner and to be dairy farming.

One negative aspect of the number of dairy farms increasing and expanding in the catchment is that it concentrates a higher N leaching land use activity on a smaller area of land. Now although the goal of RPV5 is to manage the total N load to the lake and dairy farmers moving into the catchment, like any other farmers, will need to purchase N to increase the level of NDA on previously non-dairy land, it has the effect of concentrating N leaching in particular areas. As the next section will show, the increase in N hotspots in the catchment is both a consequence of the flexibility allowed under the market approach and its effects are not well understood.

6.3.4. Nitrogen leaching hot spots

Literature indicates that one major concern of NTPs is that trading may result in concentrations or emissions "hot spots" that can occur within catchments (Nash and Revesz, 2002). Similar to concentrations in fishing activity in Quota Management Systems (QMS) hot spots in NTP may also occur due to spatial concentrations of emitters in one area prior to, or as a result of, emissions rights trading. With the introduced

flexibility of the market instrument to spatially and temporally disperse fishing activity in order to preserve the resource, it was questionable whether QMS translated into the actual incentives to do so. Mansfield (2001) found that spatial clustering is an unintended economic consequence of the market at work under QMS and demonstrates the unpredictable outcomes of environmental markets resulting in perverse and unintentional incentives. Fundamentally, Ackerman and Gallagher (2000) argue that market instruments cannot guarantee that producers will do the right thing, protecting environmental values; it may only ensures that those who do the wrong thing will be punished through economic disincentives.

Stakeholder narratives have indicated that spatial concentrations of N emissions on particular farms have occurred as a result of the NTP. One regulator admits as an unintended consequence "there is some real potential for concentrations and hotspots of N" (Interviewee, 2010). A regulator and a number of farmers argue that the increased potential for N hotspots has been brought about through the increased flexibility in the scheme.

> [the nitrogen trading] actually encourages peoples to sort of push nutrients onto a smaller area and intensify a piece of nice land…people are walking away from very ordinary land and putting more intensity on the flatter land and so if anything more nutrients heading into the lake.....
>
> I don't think that's what they intended to do at all they should have, yeah I think the hot spots create more damage than the large extensive areas (Interviewee, 2010)

A further consequence of localized concentrations of emissions may result in environmental injustice may also result where emissions trading leads to disproportionate localized concentrations of emissions or 'emissions hotspots'. Pollution trading in California's RECLAIM scheme has inadvertently led to higher public health risks in certain areas because it concentrates pollution in neighbourhoods surrounding polluters which tend to be lower income communities (Drury et al, 1999).

> There's definitely a hot spot developing. We'll see it probably in 20 years' time where [name omitted] has bought out or established four or five dairy units, maybe six or seven, so what he's done is bought up I think somewhere around 20

> ton of N himself. What he's done is bought that from areas which were low intensity, moderate intensity sheep and beef farming, and he is now concentrating that all in the corner of [name omitted] road there, and [name omitted]. Now, will we see degradation in this part of the lake in 20 years' time from that concentration of particularly dairy animals? I don't know. I suggest we might, but under our rules [omitted] allowed to do that. There's been no increase in N into the lake, but it's been concentrated in one spot, and that's one hot spot that I'd be concerned about (Interviewee, 2010).

This narrative reveals a number of contentions underlying RPV5. Firstly it reveals that there are uncertainties in RPV5 science in terms of the function of concentrated N hotspots in the catchment. Secondly, it demonstrates the effect of increased flexibility of the market instrument, in that there is potential for N to be brought and concentrated. Thirdly it suggests that areas of concentrated N leaching may lead to areas of spatial concentrations of N and degradation of these areas in the lake. The counter argument in this case is that the intention of RPV5 is to control the total load of N entering the lake and thus concentrations do not matter. Although there are uncertainties behind the science of concentrated N leaching in the region as the same regulator responds, this science around N concentrations of N was never considered.

> My gut feeling is that it was never understood, never envisaged that it would happen. It has happened, and I think it's just a consequence now, there's nothing anybody can do about it, it's allowed under the rules. So I don't think it was ever addressed or ever thought of, mainly because policy people really didn't have much practical input into that part of the policy. I'm not saying it's bad, I'm just saying there may be a consequence down the line of that action (Interviewee, 2010).

This narrative reiterates that hot spots were never really addressed by regulators. Similar to Mansfield's (2001) findings, hotspots are merely an unintended consequence of the market at work and were never fully considered in the original policy development process of Quota Management Systems in fisheries. It is important to note here that analysis cannot provide any conclusive evidence of ecological effects of hotspots as a consequence of the policy. This is because the scheme is still in its infancy and because of

the large temporal scale at which ecological change takes place, as it takes 20 to 30 years for diffuse N to enter the lake.

An additional unintended consequence of the market is the likely increase in the price of nitrogen over time. As the following narrative will show an increase in N will put increased financial pressure on the already set and limited fund given to LTPT to purchase nitrogen from farmers:

> Placing the value on nitrogen has worked. Its increased the value of some of the farms and while putting a value on the nitrogen it is an easy way of taking the nitrogen out of the catchment and there has been money thrown at it to take it out but there is demand for nitrogen now with these farms getting developed so the cost of nitrogen might actually go up and I guess in my opinion the cost of nitrogen in the catchment will go up and that will make it harder for anyone to take it out because it will cost more money for them to take it out, so if it's an open market they will have to buy it at the same price of any individual (Interviewee, 2010).

This narrative highlights one of the more pervasive outcomes of an open market for nitrogen - whilst a value on nitrogen allows NDAs to be purchased by LTPT to subsequently be either taken out of the catchment or converted to lower N leaching land use, if the price of N increases LTPT will need more government funding to be able to purchase the same 20% required. This is simply an example of the market functioning. Although the NTP and a public fund seem a fair alternative to simply regulating farmers down 20% across board, there has been a number of examples provided that demonstrate the underlying contradictions of neoliberal environmental governance.

6.3.5. Conclusion

Analysis and discussion have revealed a number of important unintended consequences of the N market. Such findings have confirmed claims that rational choice theory and the market operating may undermine the claims of effective environmental governance claimed by neoliberal advocates.

The lessons from Taupo show that underlying economic assumptions may contradict the goals of resource protection if left unchecked. Importantly findings contradict the neoliberal assumption that rational choice theory will achieve the intended

goals of MBI. A level of uncertainty surrounds the ecological outcomes of RPV5, this is particularly the case because of the temporal scale of environmental response to N leaching, as it takes around 20-30 years for N to reach the lake from point of discharge (Vant, 2008). This highlights the importance of conducting further research into the ecological outcomes of the NTP in future. It is uncertain to what degree scientific models prepared for/by EW reflect the coincidence of hotspots, but it is clear that there is no mechanism in place to prevent the spatial concentration of farming activity which appears to have become an unintended consequence of nitrogen trading in the catchment.

The unintended consequences of nitrogen trading, difficulties of policy implementation and the complex socio-political outcomes highlight the uncertainties shrouding RPV5's NTP. The following section will explore the concurrent theme of uncertainty and the lessons from stakeholder narratives of the possible future of NTP in New Zealand agriculture.

6.4. Inherent uncertainty in RPV5

Uncertainty surrounding RPV5 has been an important recurring theme present throughout most stakeholder narratives. The academic literature seems to overlook the importance of uncertainty upon the outcomes of MBI. This section will explore three concurrent themes of uncertainty present throughout stakeholder narratives: There is an unprecedented level of uncertainty during the initial plan change notification process. There are uncertainties surrounding the science behind RPV5 and there are uncertainties in the future ecological outcomes of RPV5.

Firstly farmers claim there has been uncertainty throughout the four years the consultation phase took place (2000 – 2005). Farmers claim uncertainty changed lifestyles 'the uncertainty in [RPV5] forced changes in lifestyles' while another claims that farm sales dropped markedly during this time as a result of this uncertainty, "no one could sell and get out of the catchment" (Interviewee, 2010). Some farmers claim that during this time there were no rules in place and some suggest that there has been the possibility of a number of farms in the catchment to "cheat their NMP by running over their NDA" (Interviewee, 2010) whilst others suggest some farmers may have been "moving stock on and off the catchment" to take advantage of the "absence of monitoring" under RPV5. This theme reveals the findings of claims by political

ecologists that it may be economically rational for resource users to partake in activities which may undermine the effectiveness of policy. According to one particular farmer the level of uncertainty during the policy development phase meant a number of large farms had the opportunity to increase production beyond their benchmark year, an economically rational choice if farmers believed they could get away with it given the absence of a monitoring regime at that time. This is shown in the following narrative:

> I think the delay in getting the variation notified hasn't helped because it has allowed the [name omitted] to come in and convert perhaps without needing that nitrogen… Presumably Environment Waikato will know, but it has allowed people [name omitted] to run well over what we know their benchmark figure is because there was no certainty (Interviewee, 2010).

Another farmer stated that uncertainty in plan changes allowed farmers to continue bringing in cattle from outside the catchment before RPV5 rules had come into effect "There have been a lot of people without that necessary allegiance to the land that have continued to bring in a lot of cows and graze them and not give a toss, just for the buck" (Interviewee, 2010).

One farmer concludes that during the consultation phase there was uncertainty on what the final rules were going to be "There is no way over that four year period that we could really envisage where we were going to end up" (Interviewee, 2010). One regulator now claims that there was uncertainty before but now there is more certainty with RPV5, "now NDAs are done there is a little more certainty in catchment, people are not so much in limbo" (Interviewee, 2010). Whilst another claims that with increased certainty of release of the final plan variation there has been a subsequent increase in market activity "N market activity has subsequently picked up" (Interviewee, 2010).

Secondly, there is a level of inherent uncertainty in the science behind RPV5 and subsequently stakeholders question the validity and role of science in the scheme. This finding confirms the claim that stakeholders question the validity of science as discussed in section 3.2.3 this is demonstrated in the following narrative:

> Everything starts out as this big concept, saying we want to protect the lake and we're going to regulate you. That, to any land owner, would be, whoa, what are you going to do? And you're going to restrict me, and not let me do what I want

> to do and everything else that comes along with it. , so you've got to make sure that, in giving them that information, you're also giving them the justification and the appropriate reasons behind it, and what it means for them, and that's essentially what farmers need to know. [It's a] hard thing being you don't exactly know what it means for them until you get to this end phase, because you could have envisaged an end result, but through appeals and everything else, the end result may be quite different from what we started out with, but that's just part and parcel of the process (Interviewee, 2010).

Uncertainties continue to remain a pervasive aspect of the scheme and will so into the future as the ecological outcomes of the scheme and more science becomes available. Uncertainty lies at the forefront of the future of the catchment. Uncertainty in science and the cap means there is uncertainty in how much will need to be reduced in future as with advances in science and understanding over time one stakeholder reveals "we will know how much we need to reduce" (Interviewee, 2010). As the following narrative explains uncertainty remains in the future direction of RPV5 due to possible changes after a review in 2015, "we don't know what is happening in the future in terms of the review and in terms of the 20%" (Interviewee, 2010). Although certainly more uncertainty lies ahead, the lessons from the initial policy development and implementation phases of RPV5 provide important insight into the future of similar NTP throughout catchments across New Zealand.

The theme of uncertainty throughout the policy development and to a lesser degree through implementation has clear cost implications, furthermore exasperating the imposition of RPV5 upon farmers and regulators alike. Stakeholders have argued there is a need to emphasize more certainty through education and meetings in order to develop a mutual understanding of what lies ahead for the catchment. This has important implications for the future of RPV5 other regulatory bodies in New Zealand looking to implement a NTP. The following section explores the lessons from RPV5 and concludes the narrative analysis and discussion of this thesis.

6.5. Lessons from RPV5 for nitrogen trading in New Zealand agriculture

In addition to uncertainties unique to the case study, interviewees have provided insight into the potential effectiveness of other NTP employed in New Zealand Agriculture. As such a number of narratives provide important advice to policy makers on the lessons learned from the policy development and implementation phases of RPV5. The following section explores some of these narratives;

One farmer outlines the current issue with New Zealand freshwater resources associated with diffuse pollution from agriculture stating that they are well overdue for needed compliance, "The agriculture industry has been sheltered from environmental regulation, especially around non-point [emissions] and in terms of compliance, it's probably well overdue" (Interviewee, 2010). We recall the conclusion that one regulator comes to stating that, "The policy problem of diffuse nutrients essentially leads you towards cap and trade mechanisms with less costs to the community" (Interviewee, 2010). In order to implement a NTP one regulator claims what is needed is community value of a water body otherwise no potential for buy-in. What is also needed is clear benefit of implementing policy change in order to provide protection for the water body(ies), as seen in the following narrative:

> You wouldn't just go and do this anywhere. You've got to have a community value [water] body, whether it's a river or a lake or a wetland, so that's the first thing and that's the political decision that needs to be made because unless you've got to that step, then all the intervention in the world is questionable…..
>
> It's the same political question, what are we trying to achieve? What's the community benefit and EW is an organisation where our core activity is to create public value, and that public value is all about, well if we're talking about water quality, it's about the value that people have for water bodies, and you've got to translate those values into some kind of limit or target, until you do you don't know how far you are towards achieving that with all your intervention. So that's why I like cap and trade for the nutrients. Once you've set [a cap] you know where you want to get to (Interviewee, 2010).

Essentially regulators claim that cap and trade is better than regulation because it sets a limit on emissions and a goal to achieve. "RPV5 sets a cap and goals and its better than the alternative of regulating everyone down" (Interviewee, 2010). Whilst a regulator claims that "[RPV5] allows for enough flexibility for farms to function economically and

also achieve some LUC in the catchment" (Interviewee, 2010) although some farmers continue to debate this claim as one farmer states "there is not enough flexibility for [smaller farms] it only provides flexibility to large land owners" (Interviewee, 2010). The counter argument to these claims is provided by a representative from a farmer lobby group states "cap and trade will not achieve reduction without serious negative costs" (Interviewee, 2010). These statements are a clear indication of the clear contrast and disagreement between some stakeholders within the catchment, both within and between farmers, regulators, advisors and members of groups.

As revealed by analysis, education and key relationship building have been found to be important throughout the consultation process, as the following narratives clearly states "Key people and building relationships are essential...this is especially the case before notifying [plan changes]" (Interviewee, 2010). This concept seems to ring true as stakeholder opposition to RPV5 reduced with the beginning of an open consultation process "once they started listening to us, once we had some meetings and thrashed it all out…we started to get somewhere" (Interviewee, 2010). As indicated by the literature in section 2.4 and 3.2, there are inherent complexities associated with market instruments. In order to reconcile these complexities stakeholders suggest education and consultation have assisted RPV5 proceed from the policy consultation to implementation phase. Generally farmers hail the consultation process as a positive process and outcome of RPV5. EW credits a lot of the success of the policy development process to Taupo Lake Care (TLC) as one regulator describes:

> I would credit a lot of the success with was the very fact that TLC formed themselves. They could have fought the policy and they decided not to, there were some very smart people who just said, this isn't going to work and they approached the council (Interviewee, 2010).

Some farmers report the success of the scheme comes down to the practical regulators working at EW who engaged with farmers regularly and policy analysts who listened to what farmers had to say in meetings.

> I would think that, in hindsight, it is possibly better to have a practical person, someone who was thinking about how this would work on an on-farm basis in, having that you potentially might have resolved a number of fears to start with, or

> could potentially have been resolved by having someone involved in terms of how this going to work on the ground rather than a "this is what we want to achieve and we are going to put some rules in place that do this" approach (Interviewee, 2010).

Although absent from the political ecology literature as a suggested solution to some of the political issues raised throughout chapters five and six, what has become clear is there is a need for community consultation and consideration of the potential combination of social, ecological and economic outcomes of policy. "The initial shock to farmers somewhat delayed the process" (Interviewee, 2010) one regulator claims. Thus there is a need to start communicating the concept clearly so those who will be affected understand exactly how this policy will impact them otherwise there will be a potential backlash as was the case in the initial stages of RPV5. One farmer/researcher defends this point around the need for certainty and ensuring farmers are aware of what is happening in their catchment:

> I would implore anyone doing this anywhere else to get the modelling done, give farmers some certainty of what they are in for, be up front with everyone get all the players around the table and tell them this is what we are going to do and this is what it's going to cost you (Interviewee, 2010).

In concluding another farmer researcher states "if we can't do it here where are we going to do it. It is a small catchment with a huge will and with some money thrown at it as well, so if we can't do it here then God help anywhere else" (Interviewee, 2010).

6.6. Conclusion:

Chapter six has explored the stakeholder narratives surrounding the implementation phase of RPV5 and the NTP in the Lake Taupo catchment. Similar to the findings of chapter five, chapter six has found clear examples of the shortfalls of neoliberal environmental governance theory. Narrative analysis has revealed that whilst MBI attempt to use neoliberal economic theory to manage the nature-society relationship they often overlook important aspects of this relationship. The unpredictability of MBI outcomes are shaped by complex political institutions, ecological aspects of nature and unanticipated market incentives.

The initial difficulties of policy implementation are telling of the contentions underlying neoliberal theories as suggested by (Bailey, 2007; Henderson and Norris, 2008). Contrary to the literature that advises regulators of the potential efficiency gains of MBI, MBIs do not avoid compliance costs and negative effects generally associated with meeting regulatory policy for pollution control efforts. As suggested by the literature and narratives, more emphasis needs to be placed on the inevitable socio-economic impacts brought about by new implementation difficulties associated with NTPs. This is even more prominent as the literature and case study reveal through the resource consent process of the RMA, Taupo's NTP has the potential to create new injustice by shifting the weight of administrative burdens from Government to resource users. This reinforces the case made by Henderson and Norris (2008) that in order to reconcile the environmental and economic objectives of MBI, more attention needs to be paid to instrument design and the potential institutional constraints to political, economic and environmentally salient policy. Furthermore analysis has confirmed that achieving environmental benefits at the farm level requires the support of land owners, facilitated by initial government assistance and non-restricting policy as suggested by (Bailey, 2007).

The unique outcomes of this research which do not seem to be covered by political ecology literature demand more attention. Although added complexities of MBI have explored by theoretical literature, empirical solutions to complex land management methods are absent from the literature. . Producing models and management plans in adherence with RPV5 rules has proved difficult in the absence of records and the understanding of such models. Therefore it has been found that education along with consultation appears to have been a dominant theme of RPV5 which has had little exploration in the political ecology literature.

Consistent with the literature, institutional capacity dilemmas which may impede the management and outcomes of RPV5 have been found to exist on a number of levels associated with the functional aspects of the N market and difficulties of trying to value, in an unrestricted market, environmental externalities. A lack of price and information dissemination, a shortage of buyers in the market and the inability of small farmers to participate effectively have all proven the potential for possible constraints on the effective and fair function of MBI as observed by Bolduc (2004). Furthermore the monitoring and measurement program was found to depend upon the technical expertise of council staff and scientific discrepancies. There were a number of examples where the

science did not match the implementation and temporal scale variability overrode the capacity of institutions to implement RPV5 effectively. These insufficiencies are in part responsible for the complex and often adverse or unexpected social, ecological and economic outcomes, political ecologists have argued are typical of neoliberal policy approaches to environmental management.

What is further relevant to the literature from the findings of analysis are a number of political and ecological outcomes. Political ecology literature such as Guerin (2003), Schlamadinger et al. (2007), Adjilambrinos, (1999), and Hahn (2000) suggests the injustice failings of a number of MBI are associated with a failure of some neoliberal projects to address political issues and social needs. Congruent with the literature of Guerin (2003), RPV5 had the potential to inadvertently marginalise smaller stakeholders. Furthermore, as suggested Schlamadinger et al. (2007), RPV5 may result in perpetuating the inequitable distribution of wealth among farmers within the catchment, and outside the catchment further exasperating structural inequities.

Interestingly, there is an absence of political ecology literature on factors which have resulted in land use change under MBI. Although interestingly narratives have revealed the importance of a number of unexpected factors that have resulted in LUC under RPV5 so far. Land use change appears to be a result of a combination of incentives from selling NDAs to the newly implemented NZ ETS.

Adverse LUCs in the catchment have occurred as a result of perverse incentives under RPV5 and the effect of an open market for N. This confirms literature in political ecology that MBI may provide perverse incentives to policy goals through complex market forces. Furthermore the increase of dairy farming in the catchment is also seen as one of the many perverse outcomes of market incentives as is the condition of spatial concentrations of activity. This has led to hotspots of N under the market forces of RPV5 and subsequently spatial concentrations of N which may or may not have adverse spatial concentrated outcomes on Lake Taupo.

The consistent theme of uncertainty throughout narratives indicates an important finding. An outcome of the inherent uncertainty attached to narratives of RPV5 stakeholders and the outcomes of policy implementation so far have led stakeholders to question the future potential success and viability of similar NTP in New Zealand agriculture.

In summary the case study has revealed a number of important outcomes consistent with political ecology literature whilst some outcomes of RPV5 remain unique to the case study and seem to be overlooked in the literature. It is apparent that more research is required around the use of MBI to achieve comprehensive LUC, utilising in particular nutrient trading programs.

Chapter 7 CONCLUSION

7. Conclusion

Resource managers face an inherently difficult task in developing a management response to non-point emissions from agriculture, said to be the Achilles heel of New Zealand fresh water management (Jay, 2004). Resistance to be regulated from farmers and the absence of national guidelines to water quality standards have meant that dangerous increases in non-point source emissions of nitrogen (N) have gone relatively unchecked. In response to increasing levels of environmental degradation associated with increased N levels in Lake Taupo, Environment Waikato have developed New Zealand's first catchment scale nutrient trading program (NTP) intended to achieve comprehensive land use change (LUC) to lower N leaching land use activities. In the form of a Regional Plan Variation (RPV5) this option was chosen over regulation because it was believed it would provide least cost to farmers and allow flexibility to reduce negative socio-economic impacts of the policy response. Underlying such an approach are the ideals of neoliberal environmental management and market environmentalism, which depicts that free market approaches are appropriate and effective means to achieve goals of resource management. This response is significant and unique as it is the first example of a NTP on such a wide scale in New Zealand intended to achieve comprehensive land use change within a catchment. Furthermore RPV5 provides a number of important lessons for other catchments facing similar issues throughout the country where resource managers may look to implement similar market based instruments to incentivise resource protection. However, efforts to understand the success of MBI to date have often been limited by economic cost-benefit analysis and overlooking the important political and ecological outcomes of MBI. A growing body of political ecology (PE) literature is beginning to provide a theoretical framework for the comprehensive review of market instruments,

providing important insight into understanding both the theoretical inputs of neoliberal ideology and the material outcomes.

PE literature has contributed to the understanding of MBI, revealing the logical contradictions and perverse incentives of these instruments. PE reveals potential limitations of neoliberal environmental governance theories, especially in the absence of consideration of prominent political, economic, social and multiple scale considerations. PE research to date has provided a critical exploration of the underlying assumptions of MBI and contributed to a body of empirical research of case studies which disprove a number of claims about the efficiency of neoliberal environmental management. Although this body of literature has provided important lessons it has lacked in-depth analysis of MBI in agriculture in developed countries.

This thesis has made a unique contribution to a wider body of political ecology literature by evaluating the underlying neoliberal ideology of MBI, and their effectiveness and appropriateness in environmental management for agricultural sectors of developed countries. In doing so, analysis has identified a noteworthy gap in PE literature in such endeavours. Specifically analysis has revealed a number of similarities and some pervasive differences with a body of PE literature. This study has therefore provided a unique PE perspective of a MBI intended to achieve comprehensive land use change within a catchment.

This study explored the political ecology of the nutrient trading program (NTP) and RPV5. The analysis therefore focused on four specific research questions. 1) Do the neoliberal theories attached to MBI accurately reflect and manage the nature-society relationship. 2) Does the neoliberalisation of nature through MBI deliver what underlying neoliberal environmental governance assumptions promise – more efficient and cost effective environmental governance. 3) Test the hypothesis that manipulation, resistance and delay to implement RPV5 is congruent with uncertainties, contradictory outcomes and justice implications of neoliberal environmental governance and MBI. 4) Explore the three core political ecology claims of MBI, that they inadvertently have the potential to perpetuate negative socio-economic inequalities, face challenges in modelling and managing complex ecological phenomena, and may inadvertently create unintended consequences and perverse incentives to environmental protection. In the endeavour to

explore and answer these questions similarities to the wider body of PE and some unique contributions were achieved.

7.1. Reviewing the research findings

Political ecologists have revealed that neoliberal ideology at the forefront of MBI policy prescriptions is often over simplistic, misleading and hyperbolic overlooking the importance of the political ecology of resource struggles. A review of political ecology literature has revealed the disparities that have emerged in the process of rewriting the priorities of environmental policy to instil more effective and efficient environmental management through the neoliberalisation of nature. Empirical examples of MBI demonstrate the logical contradictions between the theoretical and intended function of MBI and the material outcomes of market environmentalism. Stakeholder narratives have largely confirmed the contradictory goal set at the centre of RPV5's MBI.

Consistent with PE literature, it is revealed that nature and environmental issues in the Taupo catchment cannot be understood in isolation from the political, ecological and economic contexts within which they are actively produced, contested and reconstructed through discourse (Bryant and Bailey, 1997; Escobar, 1999; Castree, 2001). As such ecological problems are inherently social and political problems. Research reveals contradictions in economic incentives, historical and institutional factors, contentions in science and potential failing of social justice have contributed to the success and failure of RPV5. The case study confirms the proposal that contradictions in neoliberal environmental governance theory exist on two levels; firstly, through the use of market principals to guide environmental management decisions. Secondly, as an outcome market based resource allocation and management has the potential to create and perpetuate negative socio-economic inequalities, faces challenges in modelling and managing complex ecological phenomena, and may inadvertently create unintended consequences and perverse incentives to environmental protection. The findings of this thesis provide a unique contribution to the political ecology literature which is deficient in its exploration of nutrient trading programs and land use change in developed countries.

The initial difficulties of policy implementation are telling of the contentions underlying neoliberal theories. Findings have revealed instances of the three negative

outcomes of MBI commonly critiqued by political ecologists. Narratives reveal RPV5 has the potential to inadvertently perpetuate negative socio-economic inequalities, face challenges in modelling and managing complex ecological phenomena that may inadvertently create unintended consequences and perverse incentives to environmental protection. Contrary to the claims of some political ecologists, analysis revealed that although the scheme provides some market incentives for unsustainable behaviour, it does not compel farmers opposed to the scheme to commit unsustainable practices.

Research confirms the PE claim that MBIs do not avoid compliance costs and negative effects generally associated with meeting regulatory policy for pollution control efforts. Findings also confirm MBI have a tendency to shift the cost of administrative burdens to resource users, in this case through the RMA section 36(1)(b)(c) imposing new costs, burdens and complexities upon resource users. What political ecologists may overlook in their exploration of these added costs and burdens are new cost structures of experts and advisors that many farmers have agreed are necessary to remain profitable farming under the cap. Unique to the outcomes of RPV5, narratives indicate that the shift of administrative burden has been more costly for some types of farm systems than others. Life-style farmers are said to be the most perversely affected group economically, whilst those who have traded N face increased auditing and on-going monitoring costs. These unexpected outcomes may suggest that closer attention needs to be paid to some of the less obvious administrative burdens and opportunity costs inherent in trading schemes by political ecologists.

Often accompanying administrative burdens and opportunity costs are injustices. This research confirms that injustice examples identified by the literature have been found to exist in RPV5. An important finding of research indicates that RPV5 has inadvertently led to a loss of community and property values in the catchment. This is an area not widely explored in PE literature. Research also confirms injustices as a result of RPV5 include: barriers to entry into the market, the redistribution of administrative costs and burdens upon resource users, outcomes counteractive to the economic development of communities, further marginalisation and exasperation of structural inequalities among individuals and groups inside and outside the catchment and localized concentrations of emissions. Stakeholders argue that these injustices need to be considered in open public consultation in the search for politically salient management solutions. Perceptions of

injustice have resulted in political resistance to implementation, modification of policy for political saliency and delay to implement RPV5..

As suggested by PE, the public consultation process also provided the opportunity for political power to influence the shape and direction of market based policy under RPV5 through the environment court. The first such concession granted as a result of public consultation and the environment court mediation process was the decision to implement a market instrument rather than simply regulating farmers down. The second concession was basing the allocation mechanism on the best year of production rather an averaging. Consistent with Memon (2010) and PE scholars, the EC process tended to become costly, bogging down the regulatory process. In the case of Taupo, the modification of proposed plan changes confirms the hypothesis that manipulation, resistance and delays to implement RPV5 are congruent with the uncertainties, contradictory outcomes and justice implications of neoliberal environmental governance of MBI. Importantly these concessions were regarded by all but one interviewee to constitute an environmental compromise it effectively increased the allowable amount of N into the lake from what had been proposed.

A further unique lesson from Taupo is that the stakeholders regard the government funding to purchase and reduce N as integral to achieving a reduction in N. An important consideration for other catchments looking to implement similar schemes is that regulators in Taupo suggest such funding may not be available elsewhere. Although intending to provide an equitable way to remove N from the catchment, this funding has failed to prevent a number of the injustices mentioned above. These injustice issues suggest that the imposition of market based NTP inherently fails to address political issues and social needs. What can be learnt from RPV5 is that an appropriate response to social needs, such as dealing with complexities of implementation with education, demonstrates how institutions can counteract the inherent inability of market mechanisms to cater for social outcomes. What this demonstrates is that in order to reconcile the environmental, political and economic objectives of MBI, more attention needs to be paid to instrument design and institutional capacity and the constraints imposed upon market instruments, through exploration of the political ecology of resource issues.

This study found that historical institutionalised land use practices and land use intensification, widely overlooked in the search for a solution to the current resource dilemma has contributed significantly to the level of N now entering Lake Taupo. Research revealed an important scalar mismatch exists as temporal risks of changes in the structure of political and social contexts over time, as well as the reduction in effectiveness of the $81 million dollar fund. In contrast to many PE studies, wider spatial scale factors do not seem to play as an important a role as suggested.

Narrative analysis has revealed that whilst MBI attempt to tie neoliberal economic theory with scientific models to manage the nature-society relationship, they often overlook important aspects of this relationship. Research analysis has found that the outcomes of neoliberal theory are shaped by complex political institutions, ecological aspects of nature and unanticipated market incentives. Furthermore, research findings have revealed unique drivers for land use change, institutional capacity dilemmas and that wider temporal scale has played an important role in RPV5.

These findings correspond with analysis reflected in Hadjilambrinos' (1999), that market price and function is not simply determined by supply and demand under MBI but rather other market and political influences. Analysis revealed that institutional capacity dilemmas were a prominent theme in narratives. It was found that institutional capacities of the scheme are limited by the particular arrangement that Lake Taupo Protection Trust (LTPT) would not purchase less than three tons of N and thus limits smaller farmers in catchment to actively participate in N trading. This may inadvertently discourage the uptake of alternative land uses, an obstruction to the policy goal of comprehensive LUC. This is an important finding as PE scholars have paid less attention to the influence of institutional capacities to create barriers to participate in the market for emissions permits.

Importantly, research has revealed the key role that the New Zealand Emissions Trading Scheme has played in addition to the N fund in achieving LUC. Whilst regulators claim the public fund to buy N is integral to achieving LUC, a number of stakeholder narratives reveal a more lucrative explanation for the LUC. The ability to convert to lower leaching trees is only made economically viable due to the potential income from carbon credits under the NZ ETS. Therefore, resource managers looking to implement

NTPs need to consider wider scale market incentives and external influences upon catchment scale policy.

Research also contributes to the understanding of nutrient based scientific models for market based environmental management. It has been revealed that Overseer, the nutrient budgeting model at the centre of RPV5 is inherently complex for farmers, has a margin of error up to 20% and may also ignore important ecological and farm management practices. The linear application of science and the limitations of the Overseer nutrient budgeting model are therefore important considerations because of the possibility of wider application of the model to manage nutrients in catchments throughout New Zealand under similar NTP. Although narratives have suggested it may, it is inconclusive whether the model has or will undermine the scheme as the scheme is only in its preliminary stages.

This research has also revealed perverse incentives for LUC under RPV5 and the effect of an open market for N. Flexibility to freely purchase and distribute N, market incentives of lower property prices and economies of scale have resulted in an increase of dairy farms in the catchment and the subsequent concentration of N on these farms. It is inconclusive whether the spatial concentration of N on farms will lead to concentrations of environmental degradation in the lake although stakeholders suggest it may. Examples from RPV5 have thus shown that neoliberal theories attached to MBI do not reflect nor manage the society-nature relationship appropriately and may lead to perverse outcomes to environmental protection and unforeseen injustices.

Uncertainty surrounding RPV5 appeared as a common theme in narratives, although appeared absent in a majority of PE inquiry. Analysis revealed that uncertainty in the scheme has led to socio-economic problems, as farmers could not sell their farms and property values dropped drastically. Although there is said to be more certainty now with-in RPV5 than in the initial stages, uncertainty still remains in the science and future outcomes of the NTP. Stakeholders agree there is a need to address this uncertainty and emphasize more certainty through regular meetings and education. The finding that education of stakeholders is necessary to reduce inherent uncertainties is important for regulators looking to implement similar NTP throughout New Zealand.

Despite the prevalence of MBI in a broader shift toward neoliberal approaches to environmental policies, disparity exists between the ideology of neoliberal projects and the outcomes of MBI. It has been revealed that the inability of MBI to manage the nature-society relationship, the resulting disputes over science and injustice, as well as modification of MBIs and resistance to their implementation, as effectively as promised, questions the validity of MBI as effective and appropriate tools for environmental management. The findings of this thesis suggest a number of important considerations for the political and ecological factors acting upon MBI which may inhibit their effective development and implementation. Whilst the case study has revealed a number of important outcomes consistent with political ecology literature, a number of findings unique to RPV5 present an important contribution to the literature. It is apparent that more research is required around the use of MBI to achieve comprehensive LUC, utilising in particular nutrient trading programs. Thus, findings which are not covered by political ecology literature demand more attention.

Taking the results of this analysis into consideration, regulators are faced with an imperfect market instrument and continuing to allow flexibility within the catchment or choosing to explore, consider and employ political ecology considerations during MBI policy development and implementation. Analysis puts into question the ability of the MBI behind RPV5 to achieve its intended goals of sustained lake water quality. Analysis has demonstrated this is an unfortunate result of the underlying contradictions of neoliberal environmental governance. The researcher does not disagree that MBI serve a useful purpose in resource management as expressed by neoliberal advocates. However, a more holistic consideration of their application is necessary if resource managers are going to get the right combination of social, ecological and economic good from market based instruments used for environmental management. As suggested by political ecologists, overlooking the socio-economic costs of market instruments may underestimate the true costs of MBI policy, as seen in the outcomes of RPV5. With the growing popularity of MBI as solutions and alternatives to regulation, there is a clear need to address the political ecology of MBI.

7.2.Summary of the contributions

The findings of this study are important because of their implications for the New Zealand agricultural sector, the preservation of New Zealand's 'clean green' image and also the need to preserve the natural resources of New Zealand for current and future generations. Thus it is important that we find politically, economically and ecologically effective solutions to non-point source emissions from agriculture which threaten the harmony of all three. In realising this, market instruments do provide a possible solution to the problem of non-point source emissions but it is important that we explore and thoroughly understand their theoretical promises and practical outcomes. We need to understand that in reality such approaches may not be as effective and appropriate in all situations as promised. The results and analysis of the research findings provide important lessons for market based approaches and provide a more holistic consideration of MBI application in New Zealand's agricultural sector.

7.3. Limitations and future directions

An unfortunate limitation of the research was the timing of research. This research would have benefited greatly from a longevity study in order to monitor the ecological outcomes of RPV5. Although providing important narrative data on the policy development and preliminary policy implementation phases of RPV5's NTP, little could be revealed in terms of its ecological outcomes other than speculation. As such it inconclusive whether the Overseer nutrient budgeting model has or will undermine the outcomes of RPV5. It would be recommended that outcomes of perverse incentives leading to spatial concentrations of N under the NTP be monitored closely. RPV5 would benefit greatly from a longevity study exploring the ecological outcomes of spatial concentrations of N in the catchment. This will provide scientific evidence to support or debunk claims that market incentives indeed lead to perverse environmental outcomes. Further research needs to be undertaken on the exploration of future outcomes. It is imperative such work is undertaken if Overseer is to be applied to other catchments looking to employ similar NTPs.

One limitation of this study may be the overwhelming response focussing on negative outcomes and weaknesses of RPV5. This was simply the nature of stakeholder narratives as stakeholders have used the researcher as a vessel to communicate what they see as important aspects of RPV5. Future research may benefit from a stronger emphasis on cooperative aspects between farmers and EW, focusing on integral issues such as

education and consultation. Although added complexities of MBI have been explored by theoretical literature, empirical solutions to complex land management methods are absent. Analysis suggested that education and building key relationships to find solutions for land management issues played an important role in advancing RPV5 policy from development to implementation. Therefore, future research may take the form of exploring possible solutions to complex land use issues.

It is also recommended that further research be undertaken to explore the drivers for LUC in the catchment. As results have shown there are synergies between RPV5s NTP and the NZ ETS, which function together to achieve LUC. Future research should further explore these synergies to assess the viability of the two schemes working closer together for mutual benefits (for further research see: Kerr and Kennedy, 2008).

Finally, the overarching effect of spatial and temporal geographies of scale, which were seen to have played a role in the function of RPV5 outcomes, were not as significant as emphasised in the PE literature. Future research of the outcomes of scale upon RPV5 may reveal different results and thus provides an important area for future analysis.

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APPENDIX I

Appendix I: Step-by-step benchmarking and consent process and information required for consents

The diagram below shows the benchmarking for a Nitrogen Discharge Allowance and the application for consent to farm process under RPV5.

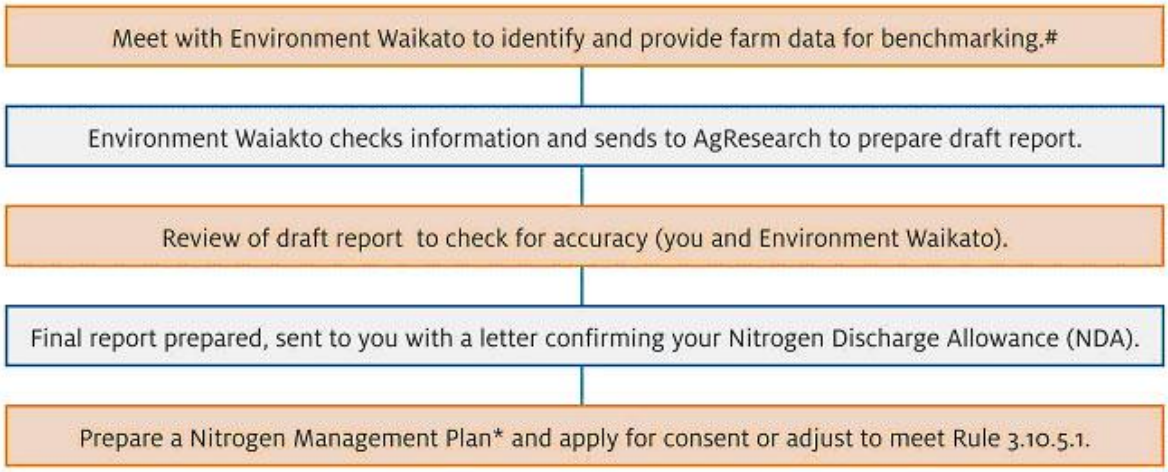

Figure 3 - Benchmarking for a Nitrogen Discharge Allowance. Source: Environment Waikato (2009).

Information required for consent:

The following is a list of the information that we need in order to benchmark and assign a nitrogen discharge allowance (NDA) and total annual nitrogen discharge (TAND) to your property:

- Annual accounts.
- Detailed stock records.
- Total numbers of all classes of stock and stocking rates.
- Percentage of male cattle
- Number of stock purchased and/or sold, natural increases and deaths.
- Winter management practices.
- Grazing on/off your farm

- Replacements grazed on/off your farm.
- Fertiliser application
- Total amount of fertiliser applied
- NPKS (nitrogen, phosphorous potassium and sulphur) quantities applied to each block, area applied to and month applied.
- Supplements brought onto and removed from your farm including amount, destination on or off the farm and block fed on if on farm.

APPENDIX II

Appendix II: Permitted activity decision tree.

The diagram below shows the process used to identify whether the existing or intended stocking rates for farms are classed as permitted activity or non-permitted activity under the RMA. If non-permitted – farmers need a consent to farm under Lake Taupo catchment under RPV5 legislation.

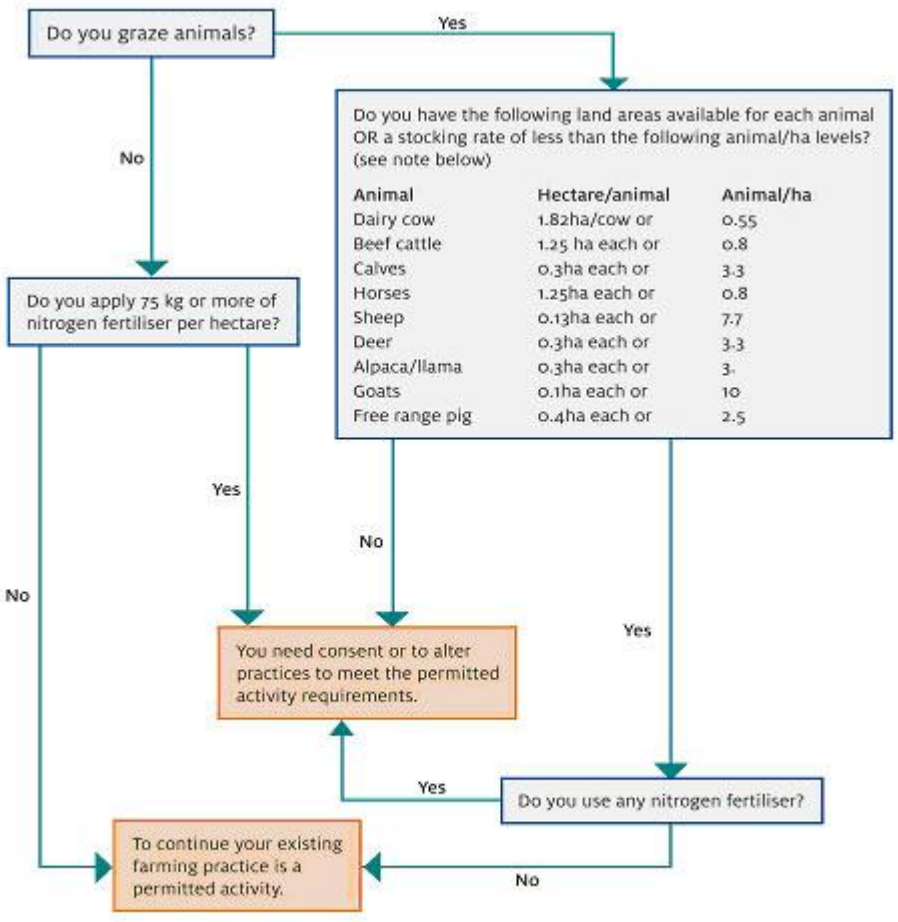

Figure 4 - Benchmarking for a Nitrogen Discharge Allowance. Source: Environment Waikato (2009).

APPENDIX III

Appendix III: Consent Forms and Participant Information

SCHOOL OF ENVIRONMENT

Human Sciences Building,
Level 6, 10 Symonds Street
AUCKLAND
Tel. 64 9 373 7599 ext. 85923
FAX: 64 9 373 7434

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

Consent Form: Participant

THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF SIX YEARS

Project title: From Dung to Dollars: Lessons for development and implementation of market based trading instruments in agricultural nitrogen management – the case of Lake Taupo Nitrogen Trading

Researcher: Ben Bartle

I have read and have understood the purpose of this research project. I have had an opportunity to ask questions and have them answered.

I understand that this interview will take 1-2 hours of my time and will occur during work hours if applicable at a physical location/setting proposed by myself. I understand that I may withdraw myself and any information traceable to myself during the interview or within one month after the interview. If I do decide to withdraw from this study I will not have to provide a reason, and if I choose to do so, any information pertaining to myself will be destroyed. Withdrawal or participation in this study will not affect my employment status or relationship with my employer or within my organisation.

I understand that any digital recordings of the interview will be erased after the interview has been transcribed. I also understand that transcripts will be kept in a secure place for a period of six years after research is completed, after which it will be destroyed.

I understand that although I may only be identified by a generic job title, that nonetheless I may become identifiable.

I understand that upon my request, I will receive a summary of the research findings upon the completion of this study.

- I agree to take part in this research.
- I agree/do not agree for the interview to be digital audio recorded.
- I consent/do not consent to my job title being used in the research.
- I would/would not like a summary of the thesis findings.

Signed: _____

Name: (please print clearly) _____

Date: _____

Consent Form: Manager

THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF SIX YEARS

Project title: From Dung to Dollars: Lessons for development and implementation of market based trading instruments in agricultural nitrogen management – the case of Lake Taupo Nitrogen Trading

Researcher: Ben Bartle

I have read and have understood an explanation of this research project. I have had an opportunity to ask questions and have them answered.

I understand that my staff may withdraw themselves and/or any information traceable to them from this study during the interview or within one month after the interview. I understand that my staff will not have to provide a reason for their withdrawal from this study and that any information traceable to them will be destroyed.

I understand that although staff may be identified by a generic job title, that nonetheless this may mean that they may become identifiable.

I understand that interviews are expected to take approximately 1-2 hours of my staff's time. Also, I understand that the information given will be kept in a secure place for a period of six years after research is completed, after which it will be destroyed. I understand that I and my staff will receive a summary of the research findings if desired.

- My staff's participation in this research will be voluntary.
- I permit my staff to take part in this study during work hours.
- I understand that my employee's participation in this research is voluntary and their participation or non-participation will not affect my relationship with them or their employment status.
- I would/would not like a summary of the thesis findings.

Signed: _____

Name: (please print clearly) _____

Date: _____

SCHOOL OF ENVIRONMENT

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Tel. 64 9 373 7599 ext. 85923
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THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

Participant information sheet: Farmer, Government/Non-Government Employee, Organisation Member

Project title: From Dung to Dollars: Lessons for development and implementation of market based trading instruments in agricultural nitrogen management – the case of Lake Taupo Nitrogen Trading

Researcher: Ben Bartle

Participant Information Sheet
For;
Farmer, Government/Non-Government Employee, Organisation Member

My name is Ben Bartle. I am a Masters student in Environmental Management at the University of Auckland. I plan to conduct research to investigate the Lake Taupo Nitrogen Trading Scheme as a market based policy instrument. The purpose of this research is to explore what can be learnt from the initial stages of the scheme to better inform the proposal to integrate agriculture into the nationwide Emissions Trading Scheme and the use of other such market based trading schemes in agriculture. In particular, I am interested in exploring farmer and government/non-government employee attitudes and insights into the perceived effectiveness and appropriateness of such market based policy instruments in managing agricultural emissions.

An important part of this research is talking with a number of key people who have involvement in the Lake Taupo Nitrogen Trading Scheme. You are receiving this Participant Information Sheet as you are likely a suitable research participant. I will be conducting interviews with farmers and representatives from government and non-government agencies. I will also analyse documents to identify how the scheme works. If you think you may be of assistance in this research I invite you to share your opinion and experiences of the Lake Taupo Nitrogen Trading Scheme during an interview. Consent to participate can be given by signing the attached Consent Form. A summary of the research findings will be made available after the completion of the project to those who are interested in receiving a copy.

This research addresses the need for further exploration of this contentious issue and the need for better stakeholder representation in the decision making process. Your help may contribute to an improved understanding of the potential effectiveness and appropriateness of trading schemes in management of agriculture emissions. Information obtained during research may inform policy makers whether the proposed integration of agriculture into the Emissions Trading Scheme or any other such trading schemes for environmental management are an appropriate or effective means to manage agricultural emissions.

With your permission, interviews will be recorded by means of a digital voice recorder. Recordings will later be transcribed by me. You are free to refuse to be recorded or to stop recording during the interview. Information obtained from research participants will be analysed and included in a final report. Analysis will reveal pertinent issues arising from research which will be explored in depth and presented in the research findings. I will ensure that accurate transcriptions of interview recordings are made and that the research output is sensitive to all participants' views/opinions and that they are not misrepresented or overemphasized in the research output.

You may be a member of a group or a Government/non-government organisation, and will be representing yourself in the position you hold at that organisation in which case a generic job title will be used. If this is applicable to you I have obtained permission for your participation from your manager and gained his/her assurance that your decision to participate or not will not affect your relationship or employment/membership status. This interview would be held during work time, unless a time outside of working hours would be more convenient for you. I anticipate that this interview will require approximately 1 to 2 hours of your time.

Participation in this study is voluntary. Participants may withdraw from the project and withdraw their authorisation for the use of any information they have provided either during the interview or within one month after the interview.

All information collected about participants will be kept confidential. Personal information about participants will be excluded from this research and every possible effort will be made to ensure that the identity of participants remains anonymous. You will not be identified by name within the research, although with specific approval from you a generic job title may be used. Although names will not be mentioned in my research, individuals may still become identifiable by what they say and/or the use of a generic job title.

To ensure confidentiality of the information you provide me, after transcription of the interview the audio recording will be erased. All other data collected during this research project will be kept in storage in a locked cabinet in my supervisor's office at the University of Auckland for six years after which time it will be destroyed. In the case of electronic data they will initially be safeguarded by passwords and then deleted from all computerised storage spaces and hard drives after completion of this research.

Contact details

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Auckland
New Zealand

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of the Vice Chancellor, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711.

Participant information sheet: Manager

Project title: From Dung to dollars - lessons for development and implementation of market based trading instruments in agricultural environmental management – the case of the Lake Taupo Nitrogen Trading Scheme.

Researcher: Ben Bartle

Participant Information Sheet
Government/Non-Government/Organisation Manager

My name is Ben Bartle. I am a Masters student in Environmental Management at the University of Auckland. I plan to conduct research to investigate the Lake Taupo Nitrogen Trading Scheme as a market based policy instrument. The purpose of this research is to explore what can be learnt from the initial stages of the scheme to better inform the proposal to integrate agriculture into the nationwide Emissions Trading Scheme and other such market based approaches. In particular I am interested in exploring farmer and government/non-government employee attitudes and insights into the perceived effectiveness and appropriateness of such market based policy instruments in managing agricultural emissions. This research addresses the need for further exploration of market based policy instruments. Information obtained during research may inform policy makers whether the proposed integration of agriculture into the Emissions Trading Scheme is an appropriate or effective means to manage agricultural emissions.

An important part of this research is talking with a number of key people who are involved in the Lake Taupo Nitrogen Trading Scheme. You may be receiving this Participant Information Sheet as you are the employer/manager of a suitable research participant(s). I would like to invite your employee/member to participate in this project and to share their opinion and views on the Lake Taupo Nitrogen Trading Scheme. To conduct these interviews, however, I must first have your permission to interview your member of staff and assurance that their decision to participate or not will not affect their employment status. This assurance can be given by signing the attached Consent Form. Interviews will be recorded by means of a digital audio recorder. This interview would be during work time, unless a time outside of working hours would be more convenient for you and/or your employee. I anticipate this interview will require approximately 1 to 2 hours of your employee's time.

Participation in this study is voluntary. Participants may withdraw from the project and withdraw their authorisation for the use of any information they have provided either during the interview or within one month after the interview.

All information collected about participants will be kept confidential. Personal information about participants will be excluded from this research and every possible effort will be made to ensure that the identity of participants remains anonymous. You and your employee/member will not be identified by name within the research, although with specific approval from the participant, a generic job title will be used. Although names will not be mentioned in my research, individuals may still become identifiable by what they say and/or the use of a generic job title. Steps will also be taken in order to ensure that organisations remain anonymous in research. The names of organisations will not be used and only a description of organisation type and a generic job title may be used in research output. However, due to the small number of possible

organisations from which research participants will be interviewed it is possible that someone with knowledge of the organisations involved may be able to identify an organisation by what is said by a participant in that organisation or by the use of a generic job title or identification of organisation type.

To ensure confidentiality of the information provided, after transcription of the interview the audio recording will be erased. All other data collected during this research project will be kept in storage in a locked cabinet in my supervisor's office at the University of Auckland for six years after which time it will be destroyed. In the case of electronic data they will initially be safeguarded by passwords and then deleted from all computerised storage spaces and hard drives after completion of this research.

Contact details

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For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of the Vice Chancellor, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711.

APPENDIX IV

Appendix IV: Legislation

Discharged Soldiers Settlement Act 1915

Environment Act 1986

Local Government Act 2002

Resource Management Act 1991

State Owned Enterprise Act 1986

Te Ture Whenua Maori Act 1993 (Maori Land Act 1993)

Town and Country Planning Act 1977 (repealed).

Water and Soil Conservation Act 1967 (repealed).