THE POLITICS OF SUSTAINABILITY IN NEW ZEALAND:
A CRITICAL EVALUATION
OF
ENVIRONMENTAL POLICY, PRACTICE AND PROSPECTS
THROUGH
A CASE STUDY OF THE DAIRY INDUSTRY

A thesis submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy
in

Political Science & Public Policy
at

The University of Waikato

by

JEANETTE WRIGHT

THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2015

Abstract

This thesis examines the politics of sustainability in New Zealand through a case study of the dairy industry. New Zealand's 'clean and green' image was bolstered by the passing of the Resource Management Act (RMA) (1991) to much international acclaim. Yet, since its adoption, the country has seen a dramatic expansion and intensification of dairy farming which has resulted in significant environmental decline. The thesis seeks to answer why this has occurred despite the provisions of New Zealand's apparent world-leading environmental sustainability legislation.

The thesis examines the history of agricultural practice and environmental legislation in New Zealand, contemporary environmental policy and its implementation, dairy industry responses to the challenge of sustainability, and a lakes restoration initiative. Informed by a critical discourse analysis approach, the thesis developed a discourse analytic framework to identify technological, ecological modernisation and sustainable development discourses within environmental policies and processes and dairy industry practice and explore the implications of these discourses. The framework is also applied to the analysis of stakeholder interviews, a Q-sort survey, and texts from a variety of governmental and nongovernmental organisations. The analysis offers insights into the disjuncture between the intentions of the RMA and actual environmental outcomes.

The thesis found that policy practice was dominated by the ecological modernisation discourse. Despite the RMA being underpinned by a sustainable development normative framework, in practice the ecological modernisation discourse has informed the implementation mechanisms and social processes required by government and the dairy industry to realise primarily economic goals. The ecological modernisation discourse has enabled continued support for a productivist and utilitarian approach to the environment.

The research also found there were small-scale instances of a different institutional approach, involving bottom-up initiatives and widespread community participation in decision processes, which offered an example of more environmentally sustainable policy and practice. Specifically, in the Central North Island lakes catchments, where dairying has led to a sharp decline of lake water quality, the policy response has been normatively and institutionally shaped by the sustainable development discourse. A critical outcome is that pastoral farmers within the lakes catchments are now required to farm within the limits of the carrying capacity of these regions. These comparative cases offer a powerful alternative, and a possible blueprint for the institutionalisation of sustainable agriculture into the rest of the country.

A comparison of the findings of the larger dairy industry study and the small-scale study of the lakes reveals that despite the Resource Management Act offering the same legislative context in both instances, the ecological modernisation discourse predominates in the first instance and the sustainable development discourse in the latter case. The contrasting outcomes may be explained by a range of factors such as the political will to act on environmental degradation, the importance of the lakes to the tourism industry and hence presenting an economic imperative, and the desire of the local community including Maori, most significantly, to ensure the survival of the lakes. Such factors are not evident in the more diffused national context of the dairy industry. The lakes study and the Q-survey results also reveal that a sustainable development approach has the potential to lead to better long-term environmental sustainability results.

Ultimately, the thesis demonstrates that different sustainability discourses shape different sustainability outcomes. It illuminates how nature-society relationships in New Zealand continue to be marked by power relations and power struggles that are shaped by political ideologies. The study concludes that an overwhelming emphasis by the government and the dairy industry on economic productivism has trumped any concern about environmental sustainability enshrined in the Resource Management Act, although interventions driven by a sustainable development discourse remain possible on a local scale.

Acknowledgments

Writing a PhD is a long journey which requires finding a depth of self-discipline and tenacity to not give up and complete the research. It is a process in which one tentatively takes one step forward and then what feels like ten steps back. It consists of endless drafts, and rewrites, as one grapples with how one can best, offer a contribution to the field of environmental policy and sustainability praxis. It is a lonely and challenging journey and feels like a process that will never end. The fortunate part of this experience for me was having my chief supervisor Associate Professor Priya Kurian and supervisor Dr Patrick Barrett always there, to offer support, encourage, and rigorously challenge me while I have been undertaking this research. They have critiqued innumerable drafts, and kept me going in the right direction. My success in completing this research is in no small part due to their ongoing support, endless patience and belief in my capacity to undertake a PhD. I thank them.

I would also like to express my gratitude to the following organisations. I was a recipient of the University of Waikato Doctoral Scholarship, as well as a PhD Study Award from the University of Waikato, School of Biology through the Lake Ecosystem New Zealand (LERNZ) research project. Without this financial support this study would not have been possible.

The support, patience and love of my Timbrell family are not forgotten. My children: Jethro Timbrell and Kiri Jones I thank for computer upgrades, and food and firewood drops at strategic times, and delightfully enlarging Andrew's and my family with a new granddaughter Sally Timbrell; my daughter Zoe Timbrell, Mauro Bassi and my darling grandson Oscar Cole, who have had less of my time than they should have in the last few years; my son Ivan Timbrell who has quietly helped with practical problems along the way and tried to train me in 'mindfulness' to keep me focused and on track. I also thank my mother Lois Wright and my late father Ken Wright who opened as many windows of opportunity to me as possible and long supported my achievement. For Lois, hard work coupled with a song is a winning combination. Not to be forgotten are my

eight brothers and sisters and extended family who have been my cheerleaders during my preoccupation with the PhD process.

The collegiality, interest and support of the many PhD candidates in the political science and other department (particularly Ben Nwosu my office companion of three years), you have all been a strength. Not forgotten also is the support of the Faculty of Arts and Social Sciences and the Political Science & Public Policy Programmes. I am indebted to you for the assistance that I received. I thank the people I interviewed, and the participants who undertook the survey for my research for sharing their perspectives, hopes and concerns on sustainability and the dairy industry. I also thank the physiotherapists, gym trainers and salsa dance teacher who enabled me in different ways to recover in a positive way from a hip injury sustained early on in my PhD journey. You reminded me of the importance of balancing intellectual and physical achievements. I thank Gillian O'Neill for proofreading the thesis.

Alongside those mentioned I thank the many friends who have had to settle for mostly on-line communication but steadfastly supported me to eventually write myself out of the maze of words which is a PhD.

Finally acknowledgment must also go to the participants in public forums for democracy who in the face of known institutional bias and at times personal danger persist in raising their concerns in the hope of a more just and sustainable society.

Table of Contents

List of Tables

Chapter 1
Introduction

Sustainability is not a pious invocation but a call to action (Secretary General UN Koffi Annan, 2002).

Introduction

Environmental sustainability is a goal to which most states including New Zealand subscribe. Yet, the conflicted relationship between economic growth and environmental protection remains a key dilemma for governments. Under the auspices of the United Nations Environment Programme, the highest priority for sustainability action has been accorded to two concerns – addressing climate change and the sustainable management of natural resources (OECD, 2001a). The latter directive led to nation states being encouraged to implement national sustainable development strategies which incorporate long-term planning, the integration of environmental concerns into different policy sectors, cooperative governance, self-regulation and participation (Jänicke & Jorgens, 2009).

The response in western democracies to this call to action has been shaped by the reformist discourses of sustainable development and ecological modernisation (Dryzek, 1997, Dryzek & Dunleavy, 2009). These discourses contain assumptions about how changes in policy relate to broader social change, and offer competing normative values and institutional mechanisms through which to realise sustainable environmental outcomes (Milanez & Bührs, 2007; Sharp & Richardson, 2001; Wright & Kurian, 2010). For example, sustainable development, as articulated by the World Commission on Environment and Development (WCED), is informed by social justice, equity and ecological sustainability on a global scale (WCED, 1987). It also requires a state in which national government plays a major role in coordination, monitoring and long-term planning for sustainability (Jänicke & Jorgens, 2009). In contrast, ecological modernisation involves a lesser role for the state, with the key relationship being between government and industry. This discourse, positions "the government's role [as being], to set environmental targets and leave market actors to decide on how best to achieve them" (Barry, 2005, p. 309). The role of the state is to establish transparent regulatory frameworks which determine environmental risks,

outline rules and responsibilities, and ensure the availability of experts to determine technocratic risks of development (Wright & Kurian, 2010).

Despite a vast scholarship on sustainable development and ecological modernisation which includes analysis of their enactment in specific countries particularly in Europe and North America, academic analyses of how these discourses are being translated into contemporary institutional policy and practice in New Zealand remain limited. Given the potential of these discourses to profoundly shape environmental sustainability outcomes for the country, it is crucial to explore whether and in what ways the New Zealand state adopts one or both of these discourses in environmental policy and practices. This thesis addresses the gap in the scholarship through an in-depth analysis of the discourse of sustainability in New Zealand with a specific focus on the dairy industry.

Background to the Study

The subject of this thesis is sustainability and, from a systems perspective, sustainability can be seen as a "strategically deployable shifter" (Kirsch, 2009, p. 5) which has enabled alignment across divergent theoretical, ideological and political perspectives. Such an alignment assumes that it is simultaneously possible to continue to have economic growth while managing the environment. However, growing scientific evidence of economic development impacting fresh water in particular has meant that environmental concerns have become a contentious issue in New Zealand. The environmental impacts of economic development can be seen in the growing frequency of health alerts stating that lakes and rivers should not be used for any activity involving skin contact because of toxic algal blooms (Waikato Regional Council, 2014). That water has been left to degrade to such an extent challenges the clean and green image of New Zealand, as well as the long-held belief of many New Zealanders that clean, fishable and swimmable water is a public right. In other instances, such as greenhouse gas emissions, the physical impacts on the environment have not been as evident. Thus the challenges of sustainability in New Zealand have both visible and invisible dimensions that have implications for the policy response.

It is important to note that what society has desired to sustain has had different discursive meanings in different eras. This desire is hegemonically maintained,

and intertexually linked to past discursive and sociocultural processes of negotiation (Fairclough, 1992, 1996). Therefore, to interpret how sustainability is being constructed within contemporary environmental policy discourse, it is necessary to understand the social, historical and cultural specificity of how nature-society relationships were established because contemporary environmental policy problems emerge from and often echo the historical ideologies and beliefs about nature and society (Pepper, 1996). Such problems are the outcome of historically established social processes which continue to structure existing political and economic institutions, and the power relations between them (Lipschutz, 2004, p. 6). From this point of view, all policy including environmental policy, is "immersed in time, straddling past, present and future, both in imagination and in actual experience" (Wagenaar, 2011, p. 284).

Drawing on a historical understanding of sustainability is particularly important to this research because, in New Zealand, there has been a close and supportive alignment from colonisation to the present between government institutions and the agricultural sector. Other than a brief hiatus during the neoliberal era of the 1980s, the dominant approach has been that government and the agricultural industry together shaped what, and how, land use problems needed to be solved. Understanding contemporary sustainability policy, practice and politics, therefore, requires clarifying the historical norms, values and institutional practices that have been formative in establishing attitudes to the land, land use, and land use change in New Zealand.

Given the above, this research recognises that sustainability and policy for sustainability in New Zealand are about more than competing contemporary environmental discourses. Rather, they are part of a wider struggle in which a number of other factors impact environmental outcomes. These include the historical legacy, the global and national economic contexts, entrenched institutional relationships, neoliberal economic ideology, political leadership and priorities, sociocultural values, and public expectations about economic growth and environmental protection. It is the discursive struggles across, and between, these factors that shape policy and impinge on sustainability outcomes. Tracing these struggles makes it possible to better understand the changes that have been made, and helps explain why anticipated policy results did, or did not, eventuate

(Sharp & Richardson, 2001). This thesis explores these factors through a case study of the dairy industry in New Zealand.

Sustainability Politics

Similar to many other countries, New Zealand has been a part of the UN-driven environmental treaty process to address global sustainability concerns. This commitment was demonstrated in the domestic context through the introduction of the Resource Management Act (1991) (RMA). When introduced, the RMA was viewed as world-leading environmental legislation with a clear focus on sustainable development, offering an integrated approach framed by sustainable environmental management (Bührs & Bartlett, 1993; Bührs & Christoff, 2007; Department of Prime Minister and Cabinet, 2003). The RMA framed sustainability as needing to address ecological, economic and sociocultural concerns together. The purpose of the RMA was to promote sustainable management by "avoiding, remedying or mitigating the adverse effect of proposed activities on the environment" (RMA, Part2, Sec 2(C)).

Nevertheless, there is growing evidence that the self-image of New Zealand as a champion of sustainability, which is clean and green and '100% pure', is a myth (Charteris-Black, 2005; Joy, 2012; Ministry for the Environment, 2001). For example, being able to measure the state of the environment is considered pivotal to the diagnosis of the health of the environment of a country. Therefore, having in place environmental monitoring and reporting mechanisms which provide the means to identify probable cause of environmental damage and demonstrate the success or otherwise of remedies is an imperative for sustainability. However, despite the introduction of the RMA in 1991, it took until 2007 for national environmental reporting to be established to demonstrate the state of New Zealand's air, atmosphere, climate, fresh water, land, and marine environment (Ministry for the Environment, 2007).

Similarly, the expectation of the Brundtland Report (WCED, 1987) was that sustainable development goals would be integrated across all sectors of society. Yet, a survey of New Zealand businesses found that only 11 per cent carry out sustainability reporting (Collins, Lawrence, & Roper, 2007). This contrasts with, for example, Japanese businesses where 80 per cent carry out sustainability

reporting, and the United Kingdom which has 71 per cent reporting. The survey showed that, while some excellent voluntary changes were happening, overall there was no strong internal or external pressure to adopt environmental or sustainability practices (Collins, et al., 2007).

On another front, climate change is perhaps the most serious global environmental concern that needs to be addressed today, and New Zealand is a signatory to the UN Framework Convention on Climate Change (UNFCCC). Despite this, the State of the Environment report *Environment New Zealand 2007* demonstrated that New Zealand's greenhouse gas emissions per capita ranked New Zealand in the top 12 countries worldwide, with a 15 per cent increase above 1990 levels (Ministry for the Environment, 2007). The 2013 Ministry for the Environment's *Sixth National Communication* to the UNFCCC has projected that net emissions will have risen by 160 per cent above 1990 levels by 2030, which will constitute a further 47 per cent increase above 2011 levels (World Wildlife Fund, 2013). Unlike most developed countries, the agriculture sector is responsible for 48.5 per cent of greenhouse gas production in New Zealand, and this growth in emissions is linked with the growth, and projected growth, of the agricultural industry (Guy, 2013c; Ministry for the Environment, 2007).

A further concern is that in 2008, the *WWF Living Planet Report* ranked New Zealand's ecological footprint sixth largest in the world, with New Zealand moving from requiring 5.9 global hectares per person in its 2006 report, to an average of 7.l7 global hectares per person in the 2008 report (World Wide Fund for Nature (WWF), 2008). While the 2012 WWF report demonstrates a lowering in New Zealand's environmental footprint to 4.41 global hectares per person, this footprint is still more than twice the average of 2.1 hectares available per person globally (WWF, 2012).

Of particular concern as an environmental problem in New Zealand has been the growing evidence of the rapid decline in fresh water over the last 30 years as a result of the cumulative effects of more intensive agricultural activities growth (NIWA, 2010b; PCE, 2010; Vant & Huser, 2000; White, 1983; Wilcock, 1986). This decline has been strongly linked not only to historical effects of land-use

practices, but also to the rapid growth and intensification of the dairy industry (Hamilton, 2006; PCE, 2004, 2012).

These studies, alongside Barnett and Pauling's (2005) critique of the impacts of free market reforms on the environment and other works (see e.g., Bührs, 2003; Bührs and Christoff, 2007; Bührs and Bartlett 1993), indicate that current environmental policy and institutional management of the environment is still fragmented and reactive despite the RMA. The scholarship overwhelmingly suggests that the current regulatory approach, although supportive of short-term economic growth, is failing to embed sustainability within New Zealand quickly enough to offset the country's environmental impacts. The outcomes also seem to run contrary to the UN sustainability imperative which has called for countries to address climate change, and shift away from the recent trend to high production farming models, and move instead towards development of environmental performance standards, and strengthening of agricultural knowledge systems which are more environmentally benign (Bawden, 1991; Hardi & Zdan, 1997; OECD, 2001a; United Nations Environment Programme, 2013).

The above studies indicate policy failure in realising environmental sustainability, and this failure is exemplified by the dairy industry, as discussed below. The dairy industry offers an opportunity to analyse and illustrate the complexities involved in trying to balance economic growth and environmental protection, and provides a basis for evaluating how shifting power relations between institutional, industrial, and environmental actors can influence environmental sustainability (Curran, 2009).

The New Zealand Dairy Industry: A Case Study

The dairy industry is not only a major driver of the New Zealand agricultural economy, but is also the largest industry in New Zealand, accounting for 29 per cent of total exports in 2012 (DairyNZ, 2013b). Dairy farming in New Zealand has long been shaped by a productivist approach to land use, and, in keeping with this approach, it has continued to grow and become more intensive over the last few decades. For example, in 1980 there were 2 million cows in the national dairy herd; by 2012, the number had grown to over 6 million. During this time the land used for dairy farming has increased by only 12 per cent. The average herd size has risen from 126 in 1980 to 343 in 2012 (DairyNZ, 2012; Statistics

New Zealand, 2012). This growth has seen milk production rise from 5,868 million litres in 1980 to 19,129 million litres in 2012. In 1990, a hectare of dairy pasture produced 351 kilograms of milk fat; in 2007, it produced 534kg (Greenpeace New Zealand, 2009, p. 4). This growth has been achieved by a significant increase in the use of external feed inputs, and an increase in the use of synthetic fertilisers, particularly nitrogen (Cameron, Barrett, Cochrane, & McNeill, 2008). The increase equates to an 800 per cent increase in synthetic fertiliser use, which represents an average of 162 per cent more fertiliser being used per hectare across New Zealand (PCE, 2004, 2013b).

The growth and intensification of the industry were driven by a combination of concerns and opportunities including the loss of subsidies to the broader agricultural sector during the 1980s. This situation led farmers from other agricultural sectors making economic choices to change their land use to dairying because of the increased value and demand for dairy milk products in the global market (Cameron, et al., 2008). Due to its own productivist growth goals over this period, the industry supported this land-use change, with the result that the industry has remained a dominant producer of milk products in the global agricultural market. Although direct subsidies were removed by central government after 1984, sustaining the economic success of the dairy industry has remained strategically important because of its centrality to the broader New Zealand economy. Therefore, successive governments and the industry have focused on establishing free trade agreements in order to provide tariff free access to international markets, and there has been ongoing support by government to increase production. The current government seeks to double agricultural production by 2025 (Guy, 2013b; Ministry of Primary Industries, 2013; Willis, 2013).

In undertaking an initial literature review to ascertain how the dairy industry had incorporated sustainability into its goals, there was little evidence that, despite the RMA having been in place since 1991, there had been any strategic focus or leadership on environmental sustainability concerns by the dairy industry prior to 2002. This omission meant there had been little industry support, and no industry requirements, for farmers to address sustainability concerns in their farming practices. The goals of the industry had remained firmly productivist. Likewise,

regional policy requirements for sustainably managing the dairy industry had been shaped by a reductive approach. The RMA devolved the responsibility for sustainably managing the effects of development on the environment through their planning processes to regional councils. Through their plans, regions were charged to develop regional rules for sustainable management of land and water. In keeping with the effects-based requirements of the RMA, in the development of the first regional plans, the focus of rules for farmers was to address the environmental effects of stock in water bodies through such actions as increased riparian planting, and the effects of effluent on water through establishing new rules, and enforcing better effluent systems on farms. The cumulative impacts of diffuse pollution from all dairy farms in a region or catchment on water quality, through the increasing intensity of land use and growth of the industry were, therefore, not the focus of regional planning processes. Their narrow goal was that individual farming enterprises should act within the new rules for point-source pollution in order to reduce their individual environmental effects on water (Waikato Regional Council, 2013a, RC11). The consequence of not holistically evaluating environmental problems as linked concerns was that water quality in rivers and lakes has declined over the last few decades.

This research seeks to address the question of how and why there has been such a disjuncture between the sustainability intentions of the RMA and the actual outcomes for the environment. Through a case study of the dairy industry, this research will provide a practical example of the relationship between discourse and practice, discourse and power, and discourse and social change (Fairclough, 1992). The case study will demonstrate the influence of institutional discourse in shaping the construction of land and land use in New Zealand, thus helping to clarify how political discourse and policy ideology have contributed to stronger or weaker ecological sustainability outcomes.

The Dairy Industry and the Environment

Primary industry has historically had a huge impact on the environment in New Zealand, with nearly half of the country's land area currently used for primary production (Ministry Agriculture and Forestry (MAF), 2007; Parkyn, Matherson, Cooke, & Quinn, 2002; Wynn, 2002) (See Chapter 4 and Chapter 5). However, of particular concern has been the increasing evidence of fresh water decline.

While the causes of fresh water degradation were being repeatedly identified by scientists, and regional and central government, it was not until 2001, when Fish and Game[1] drew attention to its growing concern about the adverse consequences of dairying on waterways (Parkyn, et al., 2002), that pressure for the dairy industry to address its impacts on land and water began to emerge. A campaign under the name "Dirty Dairying" successfully brought the linkages between water degradation and the dairy industry into the public domain (Deans & Hackwell, 2008a; Edgar, 2009; University of Otago, 2011a).

Since then, monitoring has continued to provide longitudinal evidence of the decline in lakes, rivers and streams, and this decline has been attributed to the impacts of the intensifying of dairying (NIWA, 2010b). The North Island's Waikato region is the largest dairying area in New Zealand. The Waikato Regional Council have demonstrated that 75 per cent of the waterways it monitors are now too polluted for people to swim in, and this pollution is linked to the six-fold increase in fertiliser use on dairy farms in the region (Singleton 2007 in White, 2007). In addition, other Waikato scientists have affirmed that the pollution effects on lakes and rivers in the region are caused by increased dairy intensification (Hamilton 2010 as cited in Neems, 2010, p. 7) (see also McCrone, 2011; Neems, 2010; White, 2007).

Evidence of water decline being linked to the growth and intensification of the dairy industry is now well understood and documented (Deans & Hackwell, 2008a; Environment Waikato, 2007a, 2010; Hamill & McBride, 2003; NIWA, 2010a; Valentine, Hurley, Reid, & Allen, 2007; Valentine & Kemp, 1999; Vant, 1999). I next summarise the pathways by which farm pollutants have an impact on water.

The Impacts of Farm Pollutants on Water

Fresh water quality in New Zealand is affected by three main diffuse pollutants, namely, pathogens, sediment, and nutrients. Diffuse pollutants move into waters through overland runoff, direct access to water by livestock, and leaching to groundwater (Howard-Williams, Davies-Colley, Rutherford, & Wilcock, 2010). Pathogens are caused by animal manure. Pathogens in water can make people and animals sick, and pollute fish and shellfish in water. Increased sediment from

land leads to murky water, changing water flows, and the smothering of aquatic life. Increased nutrients from fertiliser entering water via both runoff from direct application, or through cow urine leaching into groundwater leads to unsafe drinking water, and loss of aquatic life (PCE, 2012).

While direct application of fertiliser is a problem, cow urine has now been identified as a major concern. Cow urine can concentrate nitrogen up to 1000 per cent, and it is the leaching of this nitrogen through soil and into rivers and groundwater from higher stocking rates which is a major problem for water quality. Leaching can lead to more frequent algal blooms, and algal blooms can be highly toxic to shellfish, people, and animals. Increased algal blooms have led, for example, to more frequent closures of lakes and waterways to the public. This problem has not only affected the New Zealand public, but also tourism, which is the second biggest industry after the agricultural sector in New Zealand (Abell, Hamilton, et al., 2011; Hamilton, 2006; Morgan & Simmons, 2014; PCE, 2004, 2012; Waikato Regional Council, 2014). Another consequence of these water pollutants is that nationally 35 per cent of native plants and animal species are on the brink of extinction, with around 60 per cent of freshwater fish species listed as threatened or extinct (Chug, 2011; Joy, 2012).

The RMA (1991) was hailed as world-leading sustainability legislation, and sustainability has been part of the dairy industry rhetoric since the 2003 Clean Streams Accord (Ministry Agriculture and Forestry (MAF), 2003 (c)). Yet, the environment is continuing to deteriorate despite an apparent focus on sustainability by government and the dairy industry. All the environmental indicators are demonstrating that the core principle that framed the RMA's guiding purpose, that is "to sustainably manage natural and physical resources, and safeguard the life supporting capacity of air, water, soil and ecosystems" (RMA 1991, Part 2 (2), has not been achieved. The overarching question of this thesis is to ask why New Zealand's performance on the sustainability front has failed to live up to the stated importance of sustainability evident in relevant legislation and in the rhetoric articulated by dairy industry.

Research Questions

Through a case study of the dairy industry, this thesis sets out to examine how sustainability has been socially constructed in New Zealand environmental policy,

practice, and processes. The overarching question for the research asks why, despite seemingly having world-leading legislation for sustainability, New Zealand's environmental indicators have demonstrated significant and continuing deterioration.

Sustainability politics and environmental policy are locked in a struggle over ideas (Stone, 2002), and the current institutional arrangements are "embedded in a broader, historically defined normative order" (March & Olsen, 1989, p. 107). Therefore, evaluating how historical institutional discourse established a particular view of land and land use in New Zealand is important. This evaluation is necessary in order to understand how historical discourse has influenced the broader context within which government institutions, the dairy industry, farmers, and community actors enact their interpretations of what is required for environmental sustainability.

The following specific questions are addressed:

1. a. What were the impacts of historical institutional processes, sociocultural norms, values, and discourses of successive governments on Māori, wider society, the economy and the natural environment?
   b. How did these impacts affect the growth of the dairy industry and shape dominant attitudes to land use and the environment?
2. What is the nature of the sustainability discourse that has been embodied in the RMA (1991)?
3. a. Which sustainability discourse has influenced the actions of the dairy industry in addressing sustainability concerns?
   b. What is the relationship between the dominant institutional sustainability discourse and the dairy industry's sustainability outcomes?
4. What kind of institutional transformations are required for strong sustainability outcomes?
5. How do we engage with the diverse perspectives of key stakeholders in order to arrive at viable policy alternatives?
6. To what extent can sustainable development as a goal of environmental policy be realised given the current state of environmental policy in New Zealand?

Addressing these questions is important to not only extend theory building in environmental policy but also to understand, at a practical level, how better environmental sustainability outcomes may be achieved in New Zealand.

Methodology and Methods

The research is underpinned theoretically by a critical approach, social constructionism, and critical discourse analysis (CDA). Critical research is focused on understanding how discourse, beliefs, opinions, metaphors, and symbols give meaning to individuals and society. Critical research is concerned with exploring the relationships between power, knowledge, and ideology in the policy making process, and uncovering the influences that may promote or support an unequal social order (Bobrow & Dryzek, 1987).

As a framework of analysis, CDA is focused on making explicit the significance of discourse in the production, maintenance, and change of social relations in order to demonstrate the political effects of the texts and the discursive and sociocultural processes of institutions. It is, therefore, concerned with revealing the role of language in politics, and the influence of language in practices (Hajer & Versteeg, 2005; Jaworski & Coupland, 1999). Through attention to these dimensions, CDA can demonstrate how dominant discourses can include or exclude alternative discourses and discursive practices (Fairclough, 1989, 1992).

To guide the substantive analysis in the thesis, the knowledge field of sustainability and the discursive approach of CDA were brought together in a discourse analytic framework (see Chapter 2). The framework encapsulates the normative values and institutional mechanisms that are implicit in three dominant discourses: the technological, the ecological modernisation, and the sustainable development discourses.

A three pronged framework was necessary because, while the ecological modernisation and sustainable development discursive frames can demonstrate the different 'reformist' approaches to sustainability in policy and practice, the technological discursive frame allows an analysis of those aspects which are antithetical to sustainability, and which remain focused on economic growth at the expense of the environment. The framework serves as an analytical tool through

which to analyse the effect of discourses on historical and contemporary institutional practices, and to determine the extent to which these discourses are embedded in the institutional realities of current environmental decision-making in New Zealand. This framework of discourses is used to analyse and compare institutional, industry, and community discourse, and to illuminate how particular values and ideologies are perpetuated or transformed in environmental policy and practice in New Zealand (Sharp & Richardson, 2001).

As stated earlier, the overarching method for this research is a case study of the dairy industry. Case studies are useful when research is seeking to describe, understand, and explain 'how' and 'why' questions about a particular object of study (Brown, 2008; Tellis, 1997a; Yin, 1994, 2003a). A mixed methods approach is deployed to carry out the case study. This comprised gathering historical, legislative and policy documents and stakeholder interviews, along with a Q-sort survey. Q-methodology is a participatory process suited for the study of issues that are socially contested. Importantly, it is able to generate a snapshot of shared discourses, subject positions and preferences of different actors. In contrast to other surveys which seek to understand statistical patterns across traits, Q-sort surveys seek to establish patterns within and across individuals (Watts & Stenner, 2005). It is a particularly appropriate method for this research as it focuses on discourses, not individual worldviews (Dryzek & Niemeyer, 2008). Importantly Q surveys can help identify common ground between different discursive positions, but once identified can provide a basis for democratic discussion. It can therefore help to shift what are often seen as entrenched positions where people talk past each other. It can provide a means to help inform policy action on very controversial issues through demonstrating policy pathways which are sensitive and responsive to different stakeholder's discourses.

Each of the research methods employed in this thesis has, thus, been chosen to provide insights, in different ways, into how the sustainability 'problematique' has been constructed and interpreted by institutions, different actors and different communities (Bartlett, Kurian, & Malik, 1995).

Delimitations

This research focuses on the impacts of environmental policy on 'productive land', and specifically on the RMA (1991) — the legislation that is influential in shaping sustainable land use policy for the agricultural sector. The focus is not on the Conservation Act or the conservation estate directly, even though these are important parts of natural resource management. The artificial separation of the conservation estate from the 'productive' estate has long underpinned how the environment has been ideologically and legislatively managed in New Zealand.

Structure of Thesis

The thesis is organised into 10 chapters. This opening chapter has provided an overview of the thesis, its objectives and rationale. The next two chapters lay the theoretical and methodological foundations for the thesis. Chapter 2 examines the field of sustainability and provides an overview of three dominant discourses within it, that is, the technological, ecological modernisation, and sustainable development discourses. Drawing on this review, a discourse analytic framework of analysis is constructed as the overarching framework to guide data analysis. Chapter 3 presents the overview of the theories and methods that have framed the research, and outlines the procedures undertaken in order to carry out the research. Chapter 4 begins the substantive analysis of the thesis. Its focus is on the colonisation/pioneering era and the conflicting normative and institutional sustainability goals of two communities – *Pākehā* and *Māori* [2] and the subsequent development of dairying as central for New Zealand's economic stability. Chapter 5 continues the historical overview of the institutional and dairy industry relationship, and focuses on the productivist land era. It assesses two different phases of productivism, before and after the 1984 neoliberal government reforms. It also evaluates two discourses that ran parallel to these phases of productivism. The first was the groundswell of conservation and environment concern in New Zealand and internationally, and the second was the re-emergence of the Māori worldview into dominant institutional discourse through the Treaty of Waitangi claims processes, and subsequent Treaty settlements.

The focus of Chapter 6 is on the integration of sustainability into the institutional discourse of government. It evaluates the RMA (1991), which is the preeminent environmental legislation for sustainability. Chapter 7 turns to an analysis of the

dairy industry. It evaluates how the network of institutions that comprise the New Zealand dairy industry have internally responded to government and community concern that the industry needed to be more sustainable. Chapter 8, by means of two comparative cases of the Taupō and Rotorua lakes regions, examines the sustainability outcomes of targeted policy intervention at a local level within the scope of the RMA. It demonstrates that it was possible within the RMA to have better ecological sustainability outcomes and makes clear the power of participatory processes to enable this. Chapter 9 presents the results of the Q-sort survey. It demonstrates the overlapping and diverging sustainability subjectivities of the key stakeholders and identifies what is required for a sustainable dairy industry normatively and institutionally.

Chapter 10, the conclusion, provides a summary of the major findings of this research. It concludes that there are contradictions between the normative values and the dominant institutional approach established through the RMA (1991). Although the normative values prioritise sustainable development, the regionalisation of implementation guided by environmental effects management enabled a fragmented approach to resource management – informed by ecological modernisation – to become entrenched**.** Yet it is noteworthy that a more holistic approach to sustainability is evident at a smaller scale as seen in the case of the clean-up of the Rotorua and Taupo lakes.

The research illustrates how sustainability policy outcomes are a function of political discourse rather than a technical issue of scientific fact, or an ethical weighing up of communities' social/cultural values. While the RMA indicates that there was scope for a more inclusionary and integrated approach, this seems to have been lost in translation in the dominant institutional mechanisms established for implementation. Rather than seeking a balance between economic and environmental goals, current government policies continue to pursue economic imperatives at the expense of the environment.

I now turn in Chapter 2 to a discussion of the different theoretical understandings of sustainability.

[1] Fish and Game was established in 1990 as a statutory body charged with managing all fish and game sports under the Conservation Act 1987. Its focus is on water quality in lakes, streams and wetlands and the prevention of over extraction, pollution and development. It has a statutory role in resource consent processes; its interests must be taken into account in regional, and district plans. It has the ability to impose conditions on consents to ensure damage to water habitats are minimised (University of Otago, 2011).

[2] *Pākehā* is a term first used by Māori to describe the early European settlers of New Zealand. The word originated from Pakehakeha, which meant "Imaginary beings resembling men, with fair skins" (Williams Dictionary, 1957, p. 252). It subsequently became a term that some European settlers in turn adopted to describe themselves. It must be seen as opposed to the 'term '*Māori'* which meant native, indigenous, or ordinary. In colloquial usage it has come to mean a New Zealander of non-Maori heritage (Ranford, n.d.). http://maorinews.com/writings/papers/other/pakeha.htm. I note here that I have chosen to *italicise* any text that is the Māori language. In New Zealand Māori and English are both official languages and while some of the words used will be known locally, they will not be known internationally.

Chapter 2

Discourses of Sustainability

> *In the context of the sorts of capacities for ecological damage now available to most human cultures, self-reflective and organised social capacities to correct human-induced ecological deterioration are required for human ecological survival. For modernist societies capable of very major and rapid ecological impacts, to lack adequate ecologic correctiveness is rather like having a vehicle which is capable of going very fast but has a faulty or poorly developed brake and steering system. (Plumwood, 1998, p. 561)*

Introduction

Sustainability as a concept has been elevated to the stature of a "mantra or shibboleth" (Mebratu 1998 in Manderson, 2006, p. 85). It is a rhetorical talisman with doxic[3] effects (Luke, 2005) which "is increasingly presented as a pathway to all that is good and desirable in society" (Holden & Linnerud, 2007, p. 174). Sustainability is now an inseparable element of what is required for current and future action (Hull, 2008). It has entered the discursive realm of "contemporary techno-science and civic discourse" (Luke, 2005, p. 230) as a means of disciplining the body, and regulating populations (Foucault 1980 in Luke, 2005, p. 230). It has led to a watershed in thinking on the environment, development and governance as a means to "to recalibrate institutional mechanisms at the global, national and local levels" (Sneddon, Howarth, & Norgaard, 2006, p. 254), and now defines what is good and what is bad, what is right and what is wrong (Luke, 2005). The focus of this chapter is the examination of the subject field of sustainability. It presents an overview of environmental worldviews, and three dominant discourses the technological, ecological modernisation, and sustainable development discourses. A discourse analytic framework is developed from this literature review. In terms of environmental policy making, each of these discourses offers potential pathways, which have different consequences, for achieving sustainability goals (Dryzek, 1997). The framework will act as the heuristic to guide the substantive analysis for this research. It will help to identify the values and practices that have shaped institutional, dairy industry and community discourse over time.

The concept of sustainability has become all pervasive. We see it now used as a prefix like adjective in diverse political and cultural arenas, such as sustainable housing, sustainable business, sustainable communities, sustainable agriculture, sustainable technologies and, perhaps oxymoronically, sustainable mining (Kirsch, 2009). This diversity of interpretation and contextual application reflects at least partly the porousness of the concept which has seen it deployed to describe divergent theoretical, ideological, and political perspectives (Bell & Morse, 2008; Holden & Linnerud, 2007; Kirsch, 2009; Manderson, 2006). Sustainability, therefore, can be understood as an example of a 'strategically deployable shifter':

> Shifters are words or phrases that lack a standard lexical meaning or definition because their referential value depends on the context. Their key function is to indicate social alignment. (Kirsch, 2009, p. 5)

For example, a literal interpretation of sustainability, from a systems perspective, is the ability to sustain, an interpretation which can be applied across many apparently contradictory arenas to demonstrate that it exhibits a theme of desired continuity (Manderson, 2006, p. 94). As Manderson explains:

> Sustainability can be considered as a universal principle common to all systems. Each system is sustained in some manner by other systems, and will in turn contribute to sustaining other systems. We can therefore validly link the sustainability concept to any context that can be explained from a systems perspective. This applies to any situation or context that exhibits continuity, particularly when this continuity is desirable from an anthropocentric perspective. (Manderson, 2006, p. 94)

The initial understanding of sustainability was from an ecological perspective, which made clear links between ecology, health, and sustainability (Paehlke, 1998). It shifted the focus of policy towards recognising the needs of current and future generations, and helped to question the assumption that technology alone could resolve future resource needs (Daly, 1998; Dobson, 1990; Hardin, 1998). These concerns had built on research undertaken in the 1960s and 1970s which had flagged concern that the current growth rate of industrial society could not be physically sustained, and might lead to ecosystem collapse. There was a looming tragedy, and for the world to survive what was required was "limits to growth" (Meadows, Meadows, Randers, & Behrens, 1972). From this survivalist viewpoint, a reduced dependence on nonrenewable resources, a balanced approach to resource extraction, and the minimisation of human impact on

ecosystems were required to ensure the long-term ecological viability of industrial society. From this perspective, sustainability required: (1) the minimisation of the negative impacts of human activities on ecosystems, wilderness, and habitat, as well as the maximisation of biodiversity; (2) the minimisation of negative impacts on human health; and, (3) the determination of resource allocation and use primarily in terms of long-term sustainability (Dobson, 1990; Meadows, et al., 1972; Paehlke, 1998).

Creating sustainable societies, therefore, required that "humans must focus more on a system's abilities to resist or recover from disturbances, stresses, and shocks than on its ability to produce goods" (Peterson, 1997, p. 16). The maintenance of environmental quality through addressing carrying capacity was central to sustainability from an ecological perspective (Bell & Morse, 2008; Eckersley, 1998). Such a concern, dubbed strong sustainability, was framed by a principle of environmental conservation. Strong sustainability required keeping some aggregate of environmental assets or natural capital constant over time. This style of sustainability is less anthropocentric in its focus and views nature as finite, as having rights, and not just as an exploitable resource (Eckersley, 1998; Hediger, 1999).

More recently, a weak version of sustainability has emerged, which has hollowed out the ecological aspects of the original definition of strong sustainability (Rist, 2002). This form of sustainability has been embraced by most states and business and industry actors. It allows for changes in environmental quality to be evaluated and traded off against changes in aggregate income and vice versa (Hediger, 1999; see also Kirsch, 2009; and Williams & Millington, 2004). Unlike ecological (strong) sustainability which recognises that environmental constraints set the limits on economic growth and production, weak sustainability:

> … sees sustainable development as an invitation to keep up development, that is, economic growth. It is not the survival of ecosystems which sets the limits of development but development which determines the survival of societies. (Rist, 2002, p. 193)

The ecological sustainability view ran up against "competing value systems, particularly the instrumental values of the market paradigm" (Gillroy, 1993, p. 1). Within this weak sustainability view, the impact of industrialism on the material

environment was no longer the only bottom line, and socioenvironmental and economic considerations were seen as needing to be balanced or addressed under the sustainability rubric. For example, the International Institute of Sustainable Development (IISD) states:

> In general terms, the idea of sustainability is the persistence of certain necessary and desired characteristics of people, their communities and organizations, and the surrounding ecosystem over a very long period of time (indefinitely). Achieving progress toward sustainability thus implies maintaining and preferably improving, both human and ecosystem wellbeing, not one at the expense of the other. The idea expresses the interdependence between people and the surrounding world. (Hardi & Zdan, 1997, p. 8)

Here sustainability can be seen as being linked to three main dimensions: the natural, social, and economic (Benn & Dunphy, 2005; Peet, 2006). However, Yencken and Wilkinson (2001) suggest that there are now four interrelated but competing pillars that have emerged with regard to sustainability. Alongside the biophysical (natural), the economic, and the social systems, a fourth important dimension is the political system through which power is exercised. It is here where decisions about the way social and economic systems use the biophysical environment are made. This fourth sphere, the political or institutional dimension, functions as "the referee that arbitrates in relation to the different and often incompatible claims made by the actors of the social and economic sphere" (Peet, 2006, pp. 2-3). How much emphasis is placed on these different dimensions or pillars may be linked to different schools of thought, discourses, rationalities or world views regarding the importance of the environment versus economic growth (Kurian, 2000; O'Riordan, 1999; Redclift, 1987; Wright, 2006; Bartlett, 2005; Baber & Bartlett 2005). In the next section, I outline the broad spectrum of environmental thought and rationalities that underpin contemporary sustainability discourse.

Environmental Worldviews and Sustainability

The continuum of environmental perspectives on sustainability demonstrates varying emphases on either altering the resource side or the demand side of the equation (Williams & Millington, 2004). They reflect a spectrum from a dark green ecological perspective (Bookchin, 1998; Eckersley, 1998; Goodin, 1992; Lovelock, 1988) to a light green perspective (see Pearce, Markandya, & Barbier, 1989) which draw on different epistemological assumptions and rationalities. The

strong sustainability label previously discussed is more linked to the dark green spectrum, and the light green to the weak sustainability approach.

From a dark green perspective, an ecologically rational approach must have lexical priority (Bartlett, 1986; Dryzek, 1987; Bartlett, 2005; Baber & Bartlett, 2005), and ecological values should drive environmental decisions. It is a holistic perspective recognising the interdependence of environmental and social systems. From this viewpoint, there are finite resources and limits to the natural life supporting systems of the earth. Furthermore, the capacity of the biophysical environment to absorb the impacts of modern technology, are being severely challenged. By contrast, from a pale green perspective, technological and economic rationalities in conjunction with technical solutions should guide how environmental, social, and political problems are managed (Bartlett, 1986; Fischer, 1995; Hudson, 2005).

A dark green perspective recognises that sustainability requires the preservation of nature and eco-centric ethics (Bookchin, 1998; Eckersley, 1998; Williams & Millington, 2004, p. 100). Nature is viewed as having intrinsic value irrespective of its use value. For Eckersley (1998), the world is an:

> Intrinsically dynamic, interconnected web of relations in which there are no absolutely discrete entities and no absolute dividing lines between the living and the non-living, the animate, and the inanimate, or the human and the non-human. (Eckersley, 1998, p. 374)

Achieving ecological sustainability calls for a significant reduction in material living standards, and radical changes in the dominant social relations of production. The environment is not viewed as a commodity, nor are market mechanisms deemed appropriate when it comes to allocating environmental goods and services efficiently. The properties of ecological systems run counter to those of "the atomistic-mechanical world view which is epistemologically predisposed towards a reductionist view of resources and their utility" (O'Riordan in Redclift, 1987, pp. 40-41). A dark green perspective, therefore, challenges positivist modes of thinking which offer technocratic answers to environmental problems (Fischer, 1995), the ideology of progress which has emerged out of reductionist scientific understandings of the world (Torgerson, 1990), and technical experts as arbiters of environmental risks.

By contrast, from the light green perspective, a technological fix is envisaged as possible within the current relations of production. This perspective supports an instrumental valuing of nature with regard to how nature's resources should be used. There is acceptance of a trade-off between economic and environmental objectives, and the market is seen as the prime resource allocation mechanism (Hudson, 2005).

As with the dark green view, there is a spectrum of views within this perspective. An extreme view is the free-market or economic rationalist approach, which sees all environmental problems as a function of market failure and environmental goods as needing to be priced and treated exactly like any other commodity for which there is a market. It assumes that technical solutions developed and decided on by experts are all that are needed to solve social and political problems (Dryzek, 1997). The environmental (or planetary) management approach views technology and innovation as the best means to manage limited resources, while the stewardship approach is framed around the understanding that there must be an ethical approach towards managing the earth's finite resources through environmentally beneficial forms of economic growth (Dryzek, 1997, 1998). In contrast with the dark green view, the light green perspective takes an anthropocentric and utilitarian view of nature with environmental policy analysis, environmental management, and environmental risks needing to be determined and quantified through instrumental means such as cost benefit and risk management analysis (Wynne, 2000). As will be demonstrated later, these boundaries are permeable and different elements are drawn on from both sides of the spectrum. This heuristic, however, enables the establishment of the broad parameters that frame the continuum of contemporary environmental discourse. The summary table, Table 1 below, presents the core attributes that frame the spectrum of environmental worldviews.

Much of the impetus for change in the ideological landscape of environmental politics is still driven from the dark green, strong sustainability, ecological world view (Eckersley, 1998; Hay, 2005; Williams & Millington, 2004). In practice, however, it is the status quo technological discourse, which is antithetical to sustainability and the discourses of sustainable development and ecological

modernisation, which have light green 'reformist' tendencies according to Dryzek (1997) that inform the current institutional approach.

Table 1: Spectrum of Environmental Worldviews

Key elements	**Light Green-Technological**	**Dark Green- Ecological**
Policy instruments	Quantitative, cost/benefit and risk assessment	Both quantitative and qualitative assessments required
Governance	Hierarchical top-down; Environmental management approach; Policy solutions and goals set by scientific and technological discourses; Ethical and cultural values not prioritised; management of key actor networks	Non-hierarchical and values based; Legitimates both scientific knowledge and non-scientific knowledge, with both needing integration into environmental policy decisions; Management of stakeholder networks
Attitude to nature	Anthropocentric and utilitarian approach; Trade-off between economy and environment; Nature viewed as a sustenance base	Humans are interdependent and part of nature; Intrinsic values should be protected; Undermine ourselves by undermining nature
Sustainability achieved by	Economic and social sustainability; Continued economic growth and technological innovation	Ecological sustainability; Ensuring that ecological systems maintain corrective capacity and the economy is balanced within the earth's carrying capacity; Guided by community ethics and values

Source: Bartlett, 1986; Fisher, 1995; Wright, 2006

These discourses have become the dominant points of reference from which the goal of, and standards for, the integration of environment, economic development, and social concerns are now framed and contested (Dryzek, 1997; Lafferty, 1999). While similar in that they are grounded in the assumption that it is possible to have continued economic growth and environmental protection, ecological modernisation and sustainable development are driven by divergent ecological, ethical, and technological imperatives with regard to "what knowledge or interpretations should provide a basis for decisions and actions" (Bührs, 2009, p. 73), and who should inform this knowledge.

The focus of the chapter now turns to an examination of the three dominant discourses – the technological, ecological modernisation, and sustainable development discourses. These discourses offer potential pathways to achieve

sustainability goals. It is from this literature review that the discourse analytic framework which acts as a guide for the research is developed.

The chapter proceeds by outlining the key normative and institutional mechanisms that underpin each discourse, and concludes with a summary table (Table 2) which brings together the key attributes of each discourse. The resulting framework will serve as an analytical tool by which to analyse the effects of these discourses on historical and contemporary institutional practices, and as a means to help determine the extent to which the discourses are embedded in the institutional realities of current environmental decision-making in New Zealand. This tool thus provides a systematic method for the evaluation of how dominant discourses inform and vie for ascendancy within the institutions that construct meaning for sustainability in New Zealand.

The framework will be applied to an analysis of the texts and the discursive and sociocultural practices of key actors and institutions. The framework rejects a dualistic approach to environmental change and instead views policy and policy negotiations dialectally as intertexually linked to past discursive and sociocultural processes which remain significant within present policy discourse and discursive struggles. I start with an overview of the technological discourse.

Discourse Analytic Framework

Technological Discourse

Normative Values

The technological discourse is linked with traditional analycentric approaches drawn from enlightenment theories. It has long been the official discourse which has sculpted the attitudes towards nature and environmental issues in modern western society (Pepper, 1996). The technocentric ideology, epistemological assumptions, and discursive practices emphasise technical solutions to social and political problems (Fischer, 1990; Merchant, 1980). Technological progress through the development of new technologies is the key to material wealth and social wellbeing (Hill, Couchman, & Gidlow, 1990). The ideology of technocracy is rooted in the myths and ideals of technological progress in which there is "a belief in the ascendant wisdom of scientific, technological and rational instrumental modes of reasoning" (Fischer, 1990, p. 95). Technocentric ideology

assumes that mankind is able to understand and control events to suit its purpose and that science can manage nature (O'Riordan, 1971, 1999).

The technological discourse, therefore, has a deterministic, anthropocentric, and utilitarian view of nature. Humans are outside of nature, and nature serves human ends. The natural environment is "neutral stuff from which man could profitably shape his destiny" (O'Riordan, 1999, p. 33). Nature is a free good and the primary concerns are economic efficiency, sustaining continuous growth, and the ability of capital to maintain itself (Pepper, 1998). It assumes that "as our knowledge about the world increases so does our ability to control it" (Sandström, 2002, p. 25). It takes a reductionist approach to nature which is framed by the belief that "all aspects of complex phenomena can be understood by reducing them to their constituent parts" (Hayward, 1994, p. 16).

The technological discourse "promotes a dualistic ontology in which the environment is ours to master. It is a pantry of resources, to be used in advancing our positions" (Sandström, 2002, p. 25). Resources are there to be consumed, and waste is acceptable if there is no profit to be gained by preventing it. Competition and the market place should dominate the resource allocation process (O'Riordan, 1971).

The technological discourse is identified by instrumental rationality. Instrumental rationality "looks upon the non-human world as so many tools and resources to be manipulated for human ends, and sees only those ends which can be measured in terms of efficiency and economy as being valuable" (Levy, 1999, p. 204). Normatively then, the technological discourse assumes that humans can have power over nature through controlling technological advancement. Self-interest is the main motivator and self-interest will benefit all.

Institutional Mechanisms

Alongside the belief that science should provide policy guidance, there is also the belief that the political and administrative systems need also to be technologically oriented and managed by experts and policy elites (Fischer, 1990). Policy making, from a technological view, assumes that it is apolitical and impartial with everyone's interests being given equal standing. Hence, there is no need to evaluate the social or cultural contexts of a problem. In fact, the technological

positioning has a "deep seated animosity toward politics – particularly democratic politics coupled with an unswerving commitment to scientific decision making" (Fischer, 1990, p. 21). Due to the complexity of environmental problems, according to this view, what is required is less democracy, and more expertise and specialised organisations. While conceding that decentralisation and public participation may have their uses, they should not, according to Torgerson and Paehlke, hinder "the serious business of [central government] administration in an advanced industrial society" (2005, p. 3).

The technological discourse assumes that "problems [can be] defined in terms of finding and pursuing the most efficient use of human and natural resources" (Torgerson, 2005, p. 99). All policy problems including social and political problems can be reduced to technical decisions, which is why there is no need to evaluate the social or cultural context. Supported by an administrative state apparatus focused on the requirements of an industrial society "the administrative state responds by reflex to its emerging problems" (Torgerson, 1998; p. 111). Environmental issues and risks are dealt with reactively, in an adhoc, case-by-case approach as problems arise because of particular economic activities. The focus is on ameliorative (react and cure) approaches rather than preemptive or proactive intervention (Hajer, 1995).

From this approach, it is possible to rely on instrumental goals and technical efficiency as the basis for decision-making. The focus is on the application of rational and "value-free" scientific and managerial techniques by a professional elite" (O'Riordan, 1999, p. 33). Experts are the dominant organising force, with policy options being shaped by experts who are committed to scientific "objective" decision-making. Public knowledge is excluded because it is seen as irrational and non-scientific. Values are seen as subjective, unprovable and inferior to scientific discourse because they rest on irrational foundations. Values cannot be verified as "truth": therefore, they are personal preferences. Such rationalisation means partisan value conflict can be sidestepped, with social problems being constructed simply as issues that are in need of improved management and better programme design (Fischer, 1995).

This reductionist approach is acceptable because the social world is seen to be composed of component parts which can be abstracted from the social whole and

independently analysed by specialists. In its contemporary guise, the technological discourse can be seen in environmental policy-making framed by technical language and environmental management in which the vocabulary of risk is the primary language for environmental policy analysis (Beck, 1992, 1995; Fischer, 2005; Wynne, 2000). Beck (1992, 1995) suggests that the risk society allows 'hazards' to be turned into obfuscation and thereby:

> Permits a type of 'technological moralisation' which no longer need employ moral and ethical imperatives directly…. one could say that the calculus of risk exemplifies a type of ethics without morality, the mathematical ethics of the technological age. (Beck, 1998, p. 329)

A technically rational decision or policy draws on empirical analytic science-based techniques such as cost-benefit and scientific risk analysis, environmental impact statements, and technology assessment as the test for good decisions (Fischer, 1995, 2005). Such methodologies are considered "value-free and allow a focus on issues independently of competing political ideology" (Fischer, 2005, p. 61). This positioning fits with the utilitarian ideal that empirically measured consequences are the appropriate standards for policy-making, and a necessary prerequisite of rational decision-making.

> It is a hierarchical approach which excludes public knowledge or marginalises it as irrational and non-scientific. Institutional experts are the dominant organising force, with options for change or managing 'risks' being shaped by experts through scientific 'objective' decision-making. The outcome is a system of governance in which technically trained experts rule by virtue of their specialised knowledge and position in dominant political and economic institutions. (Fischer, 1990, p. 17)

While "technocentrics" accept that environmental problems do exist, they do not see them as problems to be solved by a reduction in industry or changing administrative systems. Rather, environmental problems should be "left to the experts". Problems will be solved by using more science, using rationalistic policy analysis techniques supported by administrative rationalism (Dryzek, 1997). From this stance, the way forward and the solutions to environmental problems lie in more scientific and technological advancement. There is an emphasis on efficiency at the expense of democracy. Policy issues can be reduced to technical problems and it becomes possible procedurally to calculate and generalise solutions (Clemons & McBeth, 2009).

Bringing "technical knowledge to bear on organisational performance [with regard to the environment] requires the systematic division and subdivision of tasks" (Fischer, 1990, p. 62). This statement supports the presumption that it is possible to compartmentalise problems and isolate them from the whole. There is a focus on standardisation, specialisation, and more science and technology in order to maintain or enhance economic bottom lines, and significant resistance to ecological values taking preeminence over economic growth. This faith in technology sees an institutional preference for more sophisticated technological solutions and administrative structures that call for more standardisation and consistency (i.e. cleaner production, audit systems, ISOs) (Sandström, 2002). The paradigm of growth remains uncontested, and the solution for what Daly calls "the malfunctioning of growth" is more growth (Daly 1973 in O'Riordan, 1976, p. 86). Institutionally, the environment is "still out there" (Sandström, 2002, pp. 274-275). Expertise remains the political ideology (Fischer, 2009), and the economy remains king.

Perceptions of state failure and the inadequacies of the ad hoc approach of the technological discourse to manage environmental concerns resulted in a more explicit focus on environmental protection. In the discourse of ecological modernisation discussed next, there is a similar focus on expertise and on technological solutions to environmental problems.

Ecological Modernisation Discourse

Normative Values

The discourse of ecological modernisation emerged in the 1980s partly as a reaction to an earlier era dominated by ideas of limits to growth, which had seen environmentalists, scholars, and policymakers prescribe centralised rules and regulation in order to curb environmental degradation (Dryzek, 1997; Meadows, et al., 1972). The impetus for the development of ecological modernisation theory must be understood as emerging from these original environmental debates which were premised on theories of "de-modernisation, de-industrialisation or counter-productivity" (Mol & Spaargaren, 2000, p. 19).

The ecological modernisation discourse challenged the notion that there was a need for a fundamental reorganisation of the institutions of modern society in order to achieve longterm sustainable development (Fischer & Freudenburg,

2001; Jänicke, 1985). It envisaged that environmental improvements could occur alongside economic growth, thus constructing a synergy between the economy and ecology (Berger, Flynn, Hines, & Johns, 2001; Huber, 1982). From this perspective, the ecological crisis could be overcome by technical and procedural innovation (Hajer, 2009). As a discourse, it offered an approach which could counter the doomsayers and avoid the 'romanticisation' of the environmental movement. It gave a central role to science, technology, and capital to address environmental improvement (Buttel, 2000, p. 60).

In contrast to other theories of modernisation and nature, ecological modernisation is an integrated programme of technological, economic, and political change seeking "the institutionalisation of ecology into the social practices of production and consumption" (Mol, 1996, p. 306). It suggests that technological innovation can contribute to solving environmental problems; that the economy can continue to develop while protecting the environment; and, that this goal can be achieved through less prescriptive and more participative processes that focus on anticipative and preventative problem-solving (Mol 1995 in Neale, 1997, p. 3).

Ecological modernisation is framed around the twin beliefs that it is possible to integrate and reconcile economic growth and environmental protection (Dryzek & Schlosberg, 1998; Fischer & Forester, 1993), and that the innovative/adaptive capacity of technology can resolve environmental problems and reduce environmental impacts to sustainable levels (Bührs, 2009, p. 79). This premise means that the sustainability of economic growth is envisaged as key to enabling environmental sustainability. The ideology of ecological modernisation is that through the "re-embedding of the economic sphere of modernity within ecological limits" (Mol, 1995, in Bulkeley, 2001, p. 157), and the institutionalisation of ecology into the social practices of production and consumption (Berger, et al., 2001), the difficulties of "collective ecological problems" could be turned into "economic opportunities for market actors (aided by the state)" (Barry, 2003, p. 310).

Ultimately ecological modernisation theorists argue that success requires technological innovation that can address, and then change, the industrial metabolism towards clean technologies (Andersen & Massa, 2000; Huber, 2000;

Korhonen, 2008)[4] that offer consistency[5] in material flows and that reembed production and consumption into the earth's ecology (Huber, 2000). The success of ecological modernisation must then considered in terms of its proffered outcome, that is, "has the reduction or decoupling of the material impact of technological products and processes on the environment in absolute terms occurred in spite of economic growth" (Milanez & Bührs, 2007, p. 580).

As a discourse, ecological modernisation is framed by a utilitarian and anthropocentric view of nature, with a central focus on the 'economisation of ecology'. Placing an economic value on nature aims to encourage economic actors to take the environment into consideration (Mol, 1995). Couching environmental change in the language of economic rationality is the reason it has been so successful:

> Environmental interests are considered only to the extent that these interests can be translated into the economic language …. In order for the environment to be protected it must first be demonstrated to be a resource with some direct and immediate economic benefit. (Barry, 2003, p. 315)

It is efficiency oriented in that it "frames environmental problems in monetary terms, portraying environmental protection as a matter of good management and potential cost savings" (Dryzek, 1997, pp. 144-145). This approach assumes that "ignorance is the problem, and that, if industry is shown the advantages of using clean technologies, innovation will follow" (Neale, 1997, p. 99).

Ideologically, ecological modernisation is grounded in the notion that continued "modernisation is required to make the economy environmentally responsive" (Cahill, 2002, p. 62), that environmental protection is a precondition of long-term economic development (Berger, et al., 2001), and that "the imperative for economic growth (is) compatible with the imperative to protect environmental quality" (Barry, 2003, p. 304). It is a "discourse of reassurance" that claims that "no tough choices need to be made between economic growth and environmental protection" (Dryzek, 1997, p. 146). In other words, anthropocentric, modernist systems can continue, but they must now include the development of cooperative partnerships between government, business, moderate environmentalists, and scientists to "restructure the capitalist political economy along more environmentally defensive lines" (Dryzek, 1997, p. 146).

Institutional Mechanisms

Ecological modernisation focuses predominantly on prioritising the ecological dimension only to the extent necessary that doing so will preserve economic growth and lifestyle (Littig & Griebler, 2005). Similar to the technological discourse, this discourse supports technically rational decision-making which draws on empirical analytic science-based techniques such as cost-benefit and scientific risk analysis, environmental impact statements, and technology assessment as the test for good decisions. This approach fits with the utilitarian idea that empirically measured consequences are the appropriate standard for policy-making. With its focus on technical solutions, it places no great importance on community ethics and values, or behavioural change (Hudson, 2005; Van-Zeijl-Rozema, Corvers, Kemp, & Martens, 2008).

Experts are the dominant organising force with options for change or managing 'risk' being shaped by experts through scientific 'objective' decision making. While ecological modernisation technocentrics accept that environmental problems exist, they do not see them as problems to be solved by a reduction in industry or changing administrative systems. Problems will be solved by using more science, using rationalistic policy analysis techniques supported by administrative rationalism (Dryzek, 1997). Policy issues here can be reduced to technical solutions, and it becomes possible procedurally to calculate and generalise solutions (Clemons & McBeth, 2009). Sustainability for ecological modernisation requires changes in discursive practices within institutions and industry with regard to the inclusion of ecological principles into policy and strategic goals (Barry & Paterson, 2004; Howes et al., 2009).

The ecological modernisation discourse proposes distinctive roles for the key actors, the state, industry, and the public which are discussed below.

Ecological Modernisation and the Politically Modernised State

As a policy goal, ecological modernisation has been readily accepted because it does not require major structural change. As a supply side rather than a demand side approach to environmental policy, it is primarily concerned with means (greener growth), rather than ends, which means it can ignore disparate environmental values. The focus of ecological modernisation is environmental

policy reform to address normal environmental problems found at the national and local level. Its appeal to the state lies in the fact that this approach can easily be administered by technocratic policy makers within traditional regulatory regimes (Langhelle, 2000).

The focus is on what changes in state, market, and civil society relationships would best enable ecological modernisation (see Jänicke, 1985; Simmonis, 1989). The ecological modernisation view holds that it is beyond the ability of the state alone to provide the steering capacity to solve environmental problems, and that there, therefore, should be:

> An increasing interweaving of state, market and civil society, and an inevitable interference and co-operation between their respective agencies, in which the common formulation of the problem and the design of its most adequate solutions are part of the policy-making process. (Van-Tatenhove & Leroy, 2009, p. 193)

As a result, ecological modernisation narratives envisage a state/industry partnership where problems are solved together. New governance arrangements would include regulatory frameworks decided on by: markets and nonstate actors; voluntary agreements; non-binding standards and rules; self-regulation; and, standards and certification programmes (Baker, 2007; Hutman, 2007). The state, while still steering the direction of social change, should do so in a more inclusive way. Processes such as decentralised problemsolving, negotiated policy solutions, and anticipatory policy are preferred (Buttel, 2000, p. 61). As an approach to environmental reform, the state continues to establish minimum ecological standards, and to define which long-term environmental problems should be addressed through regulatory means; however, implementation is transferred to decentralised actors (Jänicke, 2009). This new relationship is deemed important because it will increase procedural justice, improve implementation and compliance as interest groups are included in policy formulation which will reduce knowledge asymmetries, and make implementation faster because of acceptance of policy decisions (Fischer, Fritsch, & Anderson, 2009, p. 145). Participatory processes then are seen as a positive way to build consensus between state, industry, and environmental groups to solve specific pollution issues (Van-Tatenhove & Leroy, 2009). However, given that the primary participatory relationship envisaged is between state and industry, “ecological modernisation

may well be achieved without public participation in decision making. Similarly, the presence of public participation does not in itself guarantee that ecological modernisation will occur" (Wright & Kurian, 2010, p. 401).

This shift from centralised to decentralised policy implementation reflects a movement away from government to governance (Weidner, 2002). The chosen governance approach is a participatory, hierarchical approach with the government still in control of the agenda, but accepting that there is "a shared responsibility to deal with societal problems by representatives from the state, the market and civil society" (Berger, et al., 2001, p. 59). In practice, this system still continues, for the most, to be hierarchical and top-down with the government firmly in control of agenda setting (Jänicke & Jorgens, 2009). Nevertheless, it has transformed how states act with regard to the development and implementation of environmental policy in that there are now "increasing interconnections and interdependencies, and a range of policy influences among a growing numbers of actors, policy levels and policy instruments" (Jänicke & Jorgens, 2009, p. 162)

The second linked strand of institutional reform was that change was needed in order to support the development of 'clean' technological environmental innovations in industry. The market, and market competition, was seen as being the best means of forcing appropriate technological innovation (Jänicke, 1985).

In contrast to the technocentric ideology of the market-driven neoliberal agenda, the focus of ecological modernisation was to unravel and reconfigure the complex industrial systems of modernity, the goal being the decoupling of the environment from the economy. In this sense, it is a self-reflective economic market-based strategy 'imagined' to support the environmental goal. It differs, therefore, from "promethean and economic rationalist discourses [such as neoliberalism], which have little time for systems complexity" (Dryzek, 1997, p. 144). In addition, it calls for a cooperative and consensual hand (Dryzek, 1997), rather than an invisible hand.

Collaboration between government, industry, and a strong science and technology sector with requisite research and development funding is key to solving environmental problems (Howes, et al., 2009; Huber, 2000). While accepting the

contribution that science and technology have made in creating environmental problems, they are seen as central to their resolution. Science, therefore, provides the means to better detect environmental dangers, and technological innovation enables the development of alternatives (Andersen & Massa, 2000; Cahill, 2002; Carter, 2007).

Through the setting of strategic objectives, the state steers rather than rows, with implementation being left to business and other actors. Environmental regulatory instruments based on economic incentives are preferred to command and control approaches (Barry, 2003; Carter, 2007). The preference, therefore, is for an environmental management approach, with the application of market-based instruments such as eco-taxes and labelling, certification systems, market instruments, and voluntary accords in conjunction with regulation and environmental liability laws. The goal is to steer production and consumption in a more environmentally benign direction (Carter, 2007). The key to its success lies in the integration of a precautionary environmental approach into all relevant industrial sectors, and into all levels of policy-making. There must be a "strong belief in managed technological modernisation, and innovation to reduce inputs without affecting outputs" (Kitchen & Marsden, 2009, p. 277).

Ecological Modernisation and Industry

For industry, the twofold requirements of ecological modernisation are that technological environmental innovation will be evident in product redesigns, and that the environment should also be part of the strategic vision of the company (Dryzek, 1997; Huber, 2008). Industry is required to internalise production externalities and promote ecological responsibility through the development of clean technologies.

Because of the view that solutions are best sought where problems occur (Huber, 2009), the notion of self-regulation by industries to determine their own environmental objectives and monitor them is key (Neale, 1997). For industries to be proactive in incorporating environmental protection into their businesses (either through voluntary, regulatory, or public pressure) requires the development of environmental management systems. Such systems include environmental information for monitoring and reporting, as well as the integration of

environmental concerns into organisational goals and personnel development. The goal is the development of institutional reflexiveness whereby industry is able to be self-critical concerning its practices. For industry, the responsibility is to realise new technological pathways and to shift away from narrow economic cost-benefit calculi. The motivation for change comes from the competitive advantage to be realised through the development and sale of cleaner, more efficient production technologies (Cahill, 2002), reinforcing the idea that pollution prevention pays (Dryzek, 1997).

For industry, an ecological modernisation approach is built on both a carrot and stick approach. Intrinsic factors include the market advantage clean technologies can bring to a business in being a leader in their development. This innovation, in turn, can bring new opportunities for greater profits, and cost savings made by less resource and energy use. Alongside these, ecological modernisation can build an industry's or business's public reputation as a good environmental citizen (Huber, 2009).

Recent scholarship, however, is critical that ecological modernisation has been conflated or interpreted by business as only requiring it to become more eco-efficient; this is seen as undermining its initial core understanding (Huber, 2000; Korhonen, 2008).

While green consumerism and building sustainability into industry goals through recycling and substitution are important components of industry and community change, eco-efficient approaches alone are not a long-term solution for the issue of sustainability because "non-renewable minerals cannot be extended indefinitely by recycling and substitution [therefore] improvements in eco-efficiency will soon be negated if growth in population and consumption is allowed to continue" (Husemann, 2004, p. 264).

This confusion between what constitutes ecological modernisation, and the conditions that may be conducive to supporting its occurring demonstrates that, while new policy arrangements and consumer preferences may be required to bring about change, they do not of themselves guarantee the reduction of environmental impacts (Milanez & Bührs, 2007; Neale, 1997). For ecological

modernisation, the decoupling of economic growth from environmental impacts requires an extra ingredient, that is, the introduction of clean technologies which are environmentally compatible with nature into industry (Huber, 2000; Murphy & Gouldson, 2000).

Ecological Modernisation and Environment Groups

For environment groups, ecological modernisation requires: 1) a change in ideology; 2) a modification of position vis-à-vis other actors; and, 3) a transformation in strategic operations, which means that environmental NGOs have lost their radical edge and become reformist. Although environmental change is still called for by environment groups, the transformation of industrial society is no longer required. Instead, environmental change is now oriented towards "refining and fine-tuning institutions of modernity" (Mol, 2000, p. 48). The second change is that groups have a single focus on environmental quality, not broader movements for social change, and, therefore, broader social movements are not central to agenda setting (Van-Der-Heijden, 1999). The third change leads from the second, in that environmental debates are now more complex, involving an increasing number of actors including environmental bureaucracy, industry, and scientific institutions. Dialogue, therefore, is an important tool of ecological modernisation to "promote a greater sense of responsibility among the principal actors" (Neale, 1997, p. 6). The focus of environment groups is on building coalitions and strategic alliances between industry and environmental groups and the state (Cohen, 2006; Mol, 2000). Environmental groups influence change through identifying problems, building local concern on issues, and offering solutions. This effort can focus on (or force) both government and industry to make positive environmental change.

The key elements of the ecological modernisation discourse are presented in the summary Table 2 below. I next turn to an analysis of the discourse of sustainable development.

Sustainable Development Discourse

Normative Values

Concerns about the contradictions and conflicts between environment and development along with the destructive effects of development on the environment emerged in the 1960s and 1970s. These concerns suggested that

development approaches were failing to integrate the environmental costs of development or satisfy basic needs, and that limits to growth on the planet would be reached within the next 100 years "if present growth trends in world population, pollution, food production, and resource depletion continued" (Meadows, et al., 1972, p. 23).

Efforts to reconcile the often competing desires for development and environmental protection (Kurian & Bartlett, 2011; Baber & Bartlett, 2011) subsequently emerged through UN processes. The release of the UN Declaration in 1972 culminated in 1983 in the establishment of the World Commission on Environment and Development (WCED). The resulting Brundtland Report *Our Common Future* (WCED, 1987) gave a fresh impetus to sustainable development which sought to ensure continued Third World development aspirations, but took cognisance of broader environmental concerns, and the disparate resource use by the developed world.

The Brundtland report defined sustainable development as:

> … development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (World Commission on Environment and Development (WCED), 1987, p. 43)

Since then sustainable development has become a globally accepted norm that rhetorically frames both policy responses to and public perceptions of sustainability and development issues. It compels an uneasy and wobbly consensus as to what strategies are required to bring about holistic global environmental change (George, 2007).

The aim of the development project has been to support industrialisation and achieve economic growth in apparently undeveloped economies. The project was based in the modern western ideology of 'progress', which proclaims that the natural evolution of society is linear, moving from traditional to modern industrial society. Thus, development required continued economic growth within a western market model. However, within the development project, little attention was paid to the environment. The environment was viewed as a natural resource, the raw material through which to facilitate economic growth and enable development (Kurian & Bartlett, 2011).

The drawing together of sustainability and development meant that the focus shifted and sustainability was now a problem of society. Sustainability as understood from within ecology is a process or state maintained indefinitely, whereas economic development, in contrast, requires environmental modification. Through a sleight of hand, the sustainable development discourse of the Brundtland Report removed the contradiction between capitalism and ecology (Jabareen, 2004). Sustainable development allowed for contradictions to be swept aside, and limits to growth became negotiable and measureable. Environment and development were put at the centre of economic and political decision-making in such a way that environmental health was seen as a precondition of social and economic success (Jabareen, 2004). Central to this shift was the acknowledgment that:

> Care for the environment is essential to economic progress; that the natural resources of our planet are the base of all agriculture and industry; and that only by sustaining that base can we sustain human development. (Peterson, 1997, p. 6)

The Brundtland Report clearly had an expectation that sustainable development had different implications for developing and developed nations. While accepting that growth is necessary for development, it argued for a change in the quality of growth (i.e., it should be less energy and material intensive with the ultimate limits based on the availability of energy and the biosphere's carrying capacity), and, as such, economic growth must be framed by the discourse of needs and limitations. Natural resources from the environment needed to be distributed more equally, which would require different goals for different social/spatial entities (countries, regions) (Langhelle, 1999; Peterson, 1997). From this perspective, an activity with negative environmental effects is not necessarily a contradiction for sustainable development if it is facilitating the 'development' of emerging economies (Littig & Griebler, 2005). However, at a minimum, sustainable development must not endanger the natural systems that support life on Earth. The sustainable development discourse envisaged that this dual approach would allow the current imbalance and disparity between resource users to be righted (Holden & Linnerud, 2007; Langhelle, 1999).

The Brundtland Report chose a language of common interests rather than competing interests. It repositioned poverty as a major *cause* rather than an *effect* of environmental degradation and underdevelopment (Peterson, 1997). It challenged progress by proposing a reordering of the relationship between humans and nature to that which exists through science (Cahill, 2002). Sustainable development entailed a shift away from a focus "on the adverse impacts of development on the environment [to the] impacts of a degraded environment on the prospects of development" (Pezzoli, 1997, p. 55).

Similar to the concept of sustainability (as discussed earlier), sustainable development may also be seen as a 'strategically deployable shifter'. It is variously understood as a global ethic constrained by the notion of humanistic solidarity (Langhelle, 1999), an ethical paradox (Jabareen, 2004), or with "mystifying internal contradictions" (Peterson, 1997, p. 2). Additionally, as a discourse of international society, it has been framed around the "rhetoric of reassurance" (Dryzek, 1997, p. 132)**.**

Although sustainable development is a contested concept, and has spawned multiple understandings and approaches (Langhelle, 1999, 2000), this lack of conceptual precision is not necessarily problematic. Dryzek (2005) argues that just as with democracy "it is not unusual for important concepts to be contested politically" (p. 125). Like democracy, the proliferation of sustainable development definitions shows the importance of sustainable development, and demonstrates different actors with different interests staking their claim in the sustainable development territory (p. 124). Lafferty (2004b) adds, "sustainable development like democracy, is universally desired, diversely understood, extremely difficult to achieve and won't go away" (Lafferty, 2004b, p. 26). It has provided common ground for discussion across a range of developmental and environmental actors who are usually at odds with each other (Sneddon, et al., 2006). This actuality reflects that from the outset sustainable development was oriented away from decision-making framed by technical choices only, and "required value choices about the priorities of individuals and communities, and about the distribution of costs, benefits and risks" (Meadowcroft, 2004, p. 165).

The Brundtland Report's view of sustainable development has determined the discourse parameters within contemporary environmental policy. All signatory governments claim to be committed to its principles. Many countries (including New Zealand) have affirmed their support for this environmental treaty system through being signatories to successive UN proceedings, conventions, and treaties such as the 1992 Rio Declaration and the 2002 Johannesburg Agreement (United Nations, 1992, 2002). They have continued to be involved in the contested development of, struggle over, and implementation of subsequent agreements such as the Kyoto Protocol (Bell & Morse, 2008; Carter, 2007; Littig & Griebler, 2005; United Nations, 2005), and the Copenhagen Agreement (United Nations, 2009).

The expectation or normative understanding of sustainable development is that the three mutually reinforcing pillars (or dimensions) of ecological integrity, social equity, and economic security must be considered together (Sneddon, et al., 2006, p. 259). As a normatively grounded strategic framework, it aims to balance bio-physical sustainability, inter- and intragenerational equity and global solidarity in an integrated way (Langhelle, 1999; Solow, 1992), with the need to preserve living standards being the motivator to preserve the environment (Sen, n.d.). It is not, however, overly prescriptive, and as a discourse it seeks to describe a development system that meets key social values, and then determine how we might fortify their ability to withstand disturbances and stresses.

Langhelle (1999) reminds us that much of the contention over the definition that has arisen since the Brundtland Report is because there has been an emphasis on environmental sustainability rather than sustainable development. He interprets 'development' as the process in question and 'sustainability' as the condition under which development should take place. Drawing on Dixon and Falloon's (1989) typology of sustainability, Langhelle argues that sustainability as encapsulated in the Brundtland Report is a "socio-economic" concept whereby "it is the process of development that is to be sustained" (Langhelle, p. 134), but under conditions of long-term ecological protection.

Sustainable development then is ideologically an ethical/political discourse. Embedded in the ideology of sustainable development is the twin goal of respect

for natural ecological processes and cultural values and finding means to balance the two (Peterson, 1997). The essential elusiveness of sustainable development lies in the fact that it is decentred, incremental, and pluralistic, which means that no avenues are ruled out, so that all kinds of new possibilities may be unearthed (Torgerson, 1994). Sustainability, as understood within sustainable development then, is not limited to environmental sustainability, but encompasses political, social, economic and cultural arenas and rationalities.

However, within the Brundtland definition, there is a clear hierarchy of various legitimate goals derived from sustainable development. The three most important are: (1) safeguarding long-term ecological sustainability; (2) satisfying basic human needs; and, (3) promoting intra- and intergenerational equity (Holden & Linnerud, 2007).

Institutional Mechanisms

Dryzek argues that "the success or failure of sustainable development rests on dissemination and acceptance of the discourse at a variety of levels, but especially that of global civil society" (Dryzek, 1997, p. 134). The 'glue' is in the "commitment to the discourse itself" (1997, p. 135). It requires "systematic social learning by ecosystem managers through cooperative learning strategies" (Dryzek, 1997, p. 132). As an adaptive management approach, sustainable development is experimental and open to problem-solving and it can tolerate policy failure. It must operate on an ecological time scale (not bureaucratic or electoral ones) with the view to reconciling industrial, environmental, and public good values (Dryzek, 1997; Dryzek 2006).

Key to successful implementation of sustainable development is the development of steering strategies by the state. The state is crucial for the development of any governance strategy for sustainable development because sustainable development requires change to the organisational arrangements of democratic politics to include ecological lifecycles. Such change requires the development of political processes which include a long-term, intergenerational time scale (Lundqvist, 2004). The sustainable development state must coordinate, monitor, and invest in long-term planning for sustainability and act as mediator in the development of common interests across conflicting goals. Institutionally, the state is required to develop supportive legal frameworks, facilitate productive

networks, engage in coalition building to disperse knowledge, and build public and business environmental awareness and capacity to realise sustainable development (Jänicke & Jorgens, 2009).

What has emerged as a means of facilitating the longer term requirements of sustainable development has been called a 'management by objective and results' approach (Jänicke & Jorgens, 2009). This adaptive management approach is based around setting targets, deadlines, results and monitoring, accompanied by appropriate feedback to enable assessment of progress towards sustainable development goals (Jänicke & Jorgens, 2009). The goal is the internalisation and integration of sustainability concerns into all relevant sectors. The sustainable development state legitimates itself through ongoing support at all spatial levels to build awareness, participation, and acceptance of sustainable development goals (Lafferty, 2004b).

For Lundqvist (2004), the key requirements for states wishing to address sustainable development are:

1. Clear and explicit goals with political and legal backing and requisite budgetary allocation for implementation
2. Integration of policies across sectoral lines such that sustainability is part of the mandate of all policy arenas and different sectoral groups and actors
3. Chosen instruments are reflective of what different actors at different levels of implementation determine most appropriate
4. Monitoring, feedback and evaluation through ecological performance indicators which are easily understood by decision makers and citizens
5. Participation at all levels of decision making by state and non-state actors in goal setting. (Lundqvist, 2004, pp. 101-103)

Given the core role of the state, despite no formal blueprint for sustainable development having been formulated, an itinerary of actions and targets to assess progress of member countries across different spatial scales has been created as a result of directives and undertakings from the World Commission on Environment and Development (WCED). They included a directive to adopt national sustainable development strategies framed by Agenda 21 goals (United Nations, 1992, 2002). The overarching goals are: the quality of life; efficient use of Earth's resources; protecting the global commons; management of human settlement; management of chemicals and waste; and, sustainable economic growth (Mirovitskaya & Asher, 2001). With regard participation, Agenda 21

encouraged the creation and implementation of policy that can represent concerned interests, encourage deliberative interactions, integrate different forms of knowledge, and promote societal learning (Meadowcroft, 2004, pp. 166-167).

Sustainable development as a discourse has been constructed and shaped by international agreements, and is disseminated through national governments. The aim is to integrate environmental concerns into sectoral policy, and to develop and integrate community knowledge concerning sustainability. As a discourse, it accepts that economic and environmental benefits can still be simultaneously generated, while addressing the internalisation of the harmful externalities of production and consumption through the wise and precautionary use of resources. It is based on the recognition that the social, political, and economic changes necessary to address environmental constraints have ethical implications because constraints on resource use will impact differently on different communities and different countries. As such, it is framed by a distributive justice ethic, which recognises the prioritisation of the needs of the world's poor to continue to develop but within ecologically sustainable constraints.

Institutionally, key to enacting change is the development and adoption of national sustainable development strategies, and strong public participation in the development of strategies and in sustainability decision-making. National strategies must be founded on the integration of economic, social, and environmental concerns as outlined in Agenda 21, and implemented in an integrated way within all sectoral (not just environmental) policy decision-making. An adaptive management approach to policy frames sustainable development. This framing favours a cooperative and nonhierarchical governance approach, rather than a competitive and hierarchical management approach. Sustainable development is framed around setting goals and targets for all the different spatial levels, with appropriate monitoring and feedback loops. For long-term sustainability outcomes, the development of strong bottom-up participatory processes across and between global, local, and civil society networks is seen as essential**.**

Monitoring for sustainable development has been carried out mainly by the UN, OECD, and the World Bank. The UN, for example, carries out an annual

mapping of the 'state of play' for countries through evaluative national reports (McGuinness, 2005, p. 18). Furthermore, since 1992, the OECD has undertaken environmental reviews of member countries to evaluate how well implementation of domestic and international environmental policy is being integrated across economic, social, and environmental decision-making. Similarly, the World Bank examines and reports on national environmental strategy and action plans (McGuinness, 2005). To support stakeholders and practitioners, the International Institute for Sustainable Development (IISD) in 1996 developed the Bellagio Principles for Assessment of Progress towards sustainable development (Langhelle, 1999; Mirovitskaya & Asher, 2001) (see Appendix I). Currently climate change and the unsustainable management of natural resources are the main concerns (OECD, 2001b; Dryzek, Norgaard & Schlosberg, 2013).

Conclusion

The purpose of the review of scholarly literature undertaken in this chapter has been to develop a critical discourse analytic framework by which to assess which sustainability discourse is represented in policy and practices. Clearly, although sustainability is the long-term goal of all good environmental policy, the three discourses offer different understandings of what sustainability normatively and institutionally requires. A three-pronged framework was necessary because, although the ecological modernisation and sustainable development discursive lens can demonstrate the "reformist" approach to sustainability in policy and practice, the technological discursive lens helps to provide the evidence of status quo policy and practices focused on economic growth at the expense of the environment which remain antithetical to sustainability.

Drawing on the above literature review, Table 2 below presents the key elements that characterise each discourse. The table provides elements which can enable both a normative and explanatory critique, with both being necessary in order to evaluate social change processes (Fairclough & Fairclough, 2012). The elements enable consideration of what normative values, democratic processes, institutional mechanisms, implementation processes, and approach to environmental risk is shaping institutional, industry, and community discourse. These elements allow for evidence of the distinctive dimensions or attributes of each discourse to be

assessed not just singly but as elements of the whole discourse. This assessment also allows contradictions between how institutional, industry, and community actors integrate sustainability discourses in to their thinking and practices to be seen more readily. From a critical standpoint, evidence of power disparity is found in both normative and institutional mechanisms, and the framework enables questions to be asked across these different discursive dimensions in terms of what discourse and which actors are considered inside or outside the social construction of environmental policy problem-solving for sustainability in New Zealand.

The next chapter offers an overview of the methodology and the techniques of data collection I have undertaken in order to address the central research questions of this thesis.

---

[3] Doxa refers to a society's taken-for-granted, unquestioned truths, common beliefs, and popular opinion (Bourdieu, 2012).

[4] "Clean technologies are processes or products which fulfil a non-environmental objective as their primary purpose, but which integrate environmental considerations into their design…. Control technologies are technologies which address production processes by capturing or treating a waste emission in order to limit its impact on the environment – control technologies are a reactive response, while clean technologies are more anticipatory in their nature'"(Murphy & Gouldson, 2000, p. 36).

[5] "Consistency applied to ecological issues means that industrial material flows and energy use should be environmentally compatible with nature. This requires closed technological cycles or ones whose processes fit in with relatively little problem in their natural setting"(Huber, 2000, pp. 280-281).

Table 2: Sustainability Discourse Framework

Key Elements of Discourse	Technological	Ecological Modernisation	Sustainable Development
Normative Values	Unlimited economic growth through technological innovation; Nature a free good; Denies existence of environmental limits; Anthropocentric: nature and humans separate; Utilitarian: action stems from calculated self-interest, equity not a primary consideration; Reductionist: social world constructed from component parts; Social, cultural and non-anthropocentric values can be ignored; Facts objective and values subjective	Assumption that economic and environmental benefits can be simultaneously generated; Acknowledgment of interdependence of economy and ecology; Unlimited economic growth through technological innovation; Economisation of the environment Equity not a primary consideration; Environmental risks viewed as technical problems best solved between government and industry; Anticipatory environmental policy	Assumption that economic and environmental benefits can be simultaneously generated; Acknowledgment of interdependence of economy and ecology; Strong 'precautionary principle' required; Economic growth constrained by imperatives of technologies and wise use of resources to meet present and future needs; Intergenerational and intra-generational equity, distributive justice and environmental protection are fundamental to sustainable development; Anticipatory environmental policy-making;
Democratic Process	Representative democracy; Weak participatory processes	Representative democracy; Weak participatory processes	Representative and discursive democracy; Strong participation through global/local civil society networks
Institutional mechanisms	Technical solutions to social and political problems; Strong central government oversight; The ends justify the means;	Transparent regulation that outlines responsibilities and rules; Voluntary agreements; National/domestic level of policy-making	Adaptive and integrated environmental management that addresses social, environmental and economic aspects of development; Policy and action enacted at international, national and local levels

Key Elements of Discourse	Technological	Ecological Modernisation	Sustainable Development
Implementation processes	Specialisation; Quantitative empirical techniques	Process focused; Environmental management systems i.e., ISO, audits; performance measurement, benchmarking, life cycle assessments; Environmental vision statements; Strategic planning	Process and outcome are both critical; Cooperative rather than competitive;
Approach to environmental risks	Environmental risks viewed as apolitical technical problems best guided by technical experts and policy elites; Cost benefit analysis – there is acceptable risk; Amelioration (react and cure); Environmental risks dealt with on a case-by-case basis ad hoc manner in reaction to their effects on economic activity; Key relationship between government, officials, and scientists; Regulatory action undertaken only when scientific certainty demonstrates harm	Environmental risks viewed as requiring increased scientific and technological expertise focused on greening of capitalism ; Cost/risk/benefit analysis; Applying principles of input-output rationalisation more systematically so cleaner products and processes will develop; Trajectory of change from eco-efficiency to consistency; Industry reflexive and self-critical; Partnerships and cooperation between government, industry, scientists, and moderate environment groups; Environment groups reformist rather than radical	Environmental risks viewed as political and ideological issues requiring social, cultural, ethical and intrinsic values to be considered; Understanding root causes; Expert risk assessment balanced with community risk perception; Multiple perspectives and local knowledge acknowledged as important; Research and development focused on holistic long-term solutions; Eco-innovation should lead to eventual equilibrium between three pillars of sustainable development.

Sources: Bartlett, 1986; Fischer, 1990; Wright & Kurian, 2010; Huber, 2000

Chapter 3
Research Design

Introduction

The diversity of worldviews and discourses of sustainability described in Chapter 2 demonstrated that sustainability is a contested concept which is shaped by different beliefs, assumptions, and objectives. As a result, the choice of how sustainability is interpreted and enacted within institutions has environmental consequences. Therefore, analysing sustainability in any meaningful way requires grappling with issues of power. To that end, this research is concerned with establishing the relationship between power and knowledge in New Zealand environmental policy, processes, and practices. It explores how institutional discourse influences sustainability outcomes. Critical theory and a social constructivist lens, in conjunction with qualitative methods, can enable the type of analysis required to answer these questions.

A critical research framework must engage with epistemology, methodologies, and methods, and establish an internal coherence between these three elements. Epistemology is the justification for the knowledge created; methodologies are the theoretically informed justification for action and methods; and, methods are the actions taken by a researcher to create the knowledge (Carter, 2010). This chapter provides an overview of each of these three elements that underpins the study of the discourse of sustainability in New Zealand. The first section presents an overview of critical theory and its attendant element, social constructionism. It outlines the rationale for both the institutionalist approach to policy analysis and critical discourse analysis that underpin the critique of sustainability policy, processes, and practices. The second section presents an overview of the research methodologies drawn on in this research, and presents the methods of data collection and the procedures undertaken to carry out the research

Critical Theory

Critical theory is concerned with exploring the relationships between power, knowledge, and ideology in the policy-making process; it also seeks to uncover the influences that may promote or support an unequal social order (Bobrow & Dryzek, 1987). Critical theory emerged out of the Frankfurt School of social research in the 1920s (Trede & Higgs, 2010). It is distinguished from traditional theory because it deals with issues of power, and has a practical purpose in that it seeks "to liberate human beings from the circumstances that enslave them" (Horkheimer 1982, p244 in Bohman, 2013 n.p.).

Critical social theory was a reaction to positivism and positivism's objective and supposedly apolitical epistemology which accepted the social order as a given, rather than as a human construct subject to human agency (Moe-Lobeda, 2002). Horkheimer, an early critical theorist, argued that reality was more than logic and facts, and that there was a dialectical and interdependent relationship between values and facts (Horkheimer 1937 in Trede & Higgs, 2010, p. 249). From this viewpoint, social inquiry should focus on the normative dimension in order to understand how variously situated actors deploy their knowledge in various contexts. A critical approach then is concerned with critique and transformation (Bohman, 2013; Trede & Higgs, 2010). The focus of critical research is to evaluate societies and institutions in terms of whether they are undermining or supporting the wellbeing of their members and to make visible the obstacles which are constraining societies' ability to overcome them (Fairclough & Fairclough, 2012). Critical approaches, therefore, are concerned with clarifying the dialectic between structure and agency (Giddens, 1984) and illuminating the interrelationship between knowledge, power, and practice, and their constraints on democracy and human flourishing, the aim being to produce a more just society (Trede & Higgs, 2010, p. 246).

Consequently the focus of critical research is on understanding the discourse, beliefs, opinions, metaphors, and symbols that give meaning to individuals and society. It:

> Seek[s] answers by examining various social settings and the groups or individuals who inhabit these settings …. [and] how inhabitants of these settings make sense of their surrounds through symbols, rituals, social structures, social roles and so forth. (Berg & Lune, 2012, p. 12)

Hajer (1995) reminds us that policy-making is the major way in which latent social conflict (such as sustainability concerns) is dealt with in contemporary society. Indeed, policies not only seek to solve problems, but also to shape and define relations of power by means of the way that in which problems are defined and solutions conceptualised. This research seeks to illuminate how, and with what consequences for the goal of ecologically sustainable outcomes, the current institutional approach has discursively framed the policy problem of sustainability.

Policy problems, from a critical perspective, do not exist independently of their social construction (Shiva & Moser, 1995; Stone, 2002). A social constructionist view sees policy problems and policy decision-making as operating within existing social relations and meanings, and involving values, ideas, beliefs, politics, institutions, and discourses (Howlett & Ramesh, 1995). As the outcome of "struggles over ideas" (Stone, 2002, p. 11), policies constitute competing interpretations or representations of political issues whose effects have material consequences (Baachi, 1999; Clemons & McBeth, 2009). Policies, therefore, are enmeshed in the relations of power between citizens, experts, and political authorities, and empirical data cannot be viewed independently of the normative assumptions upon which it is founded (Fischer, 1995; Keeley & Scoones, 1999). In assessing policy from a social constructionist approach, there are four basic assumptions, that: (1) there will be a critical stance taken towards taken-for-granted knowledge; (2) knowledge is historically and culturally specific; (3) knowledge and social action go together; and, (4) knowledge is sustained by social processes which determine currently acceptable conventions (Burr, 1995, p. 187).

This research takes an institutionalist approach to policy analysis, an approach which is based on the notion that when rules and values and routines are transformed, societal change takes place. From this perspective, political institutions define the framework within which politics takes place. Therefore, the way in which an institution socially constructs a problem plays a significant role in contributing to both stability and change in society (March & Olson, 1989). Institutional power relations can determine "what knowledge is sought, how it is judged and how it is applied in practice" (Stott & Sullivan, 2000, p. 248).

This means that what weighting is given to an issue is, consequently, a political decision tied up with current institutionalised worldviews (Wright, 2006). In essence, institutional bias is hegemonically maintained within institutional discourses and sociocultural practices (Fairclough, 1992, 1995).

From an institutionalist position, the state is not an homogeneous force but, rather, "consists of multiple intersecting relations and arenas" (Gonzalez & Healey, 2005, p. 2058). Discursive struggles across these relations and arenas condition what happens in specific policy-making processes (Sharp & Richardson, 2001). Consequently, evaluating the success (or otherwise) of sustainability as a transformative discourse will entail an analysis of the formal rules and procedures, as well as "the context in which people think and act, to see whether there has been a shift in culture, values, norms, principles and ethics" (Bartlett & Kurian, 1999, p. 425).

In summary, this research is informed by a critical theoretical approach that draws on a social constructionist and institutionalist analysis to demonstrate the connections between "policy context, process and content, and how both processes and contexts influence the definition of policy problems" (Clemons & McBeth, 2009; Duncan & Reutter, 2006). Such an approach helps to demonstrate the influence of ideologies and values within dominant institutional discourse on policy definitions and solutions.

In the next section, I present an overview of discourse analysis as a research method, and explain why CDA has been chosen as the discourse method for this research.

Taking Account of Discourse

From a critical institutionalist perspective, policy reality is socially mediated through discourse, and ideas are manifested in particular types and forms of discourse (Fairclough & Fairclough, 2012, p. 79). To understand the construction of policies and how they determine the boundaries for sustainability consideration in New Zealand, I draw on discourse analysis.

Discourse analysis offers a means to uncover the processes through which policy problems and policy arenas are constructed, maintained, and changed (Feindt &

Oels, 2005). Discourse analysis is focused on "understanding how dominant discourses which structure the activities of social agents are produced, how they function, and how they are changed" (Howarth, 1995, p. 115). The process is concerned with questioning the ontological and epistemological assumptions of problems in order to understand the apparent "common-sense" realities that underlie social practices (Kumar, 2000, p. 26).

Critical social science views "discourse" as one site where ideas and concepts about social life are manifested. Specifically, discourse may be understood as:

> A specific ensemble of ideas, concepts and categorisations that are produced, reproduced, and transformed in a particular set of practices and through which meaning is given to physical and social realities. (Hajer, 1995, p. 44)

Foucault's social theory of discourse recognised that ways of knowing the world are historically and culturally specific, that knowledge is sustained through social processes, and that knowledge and action go together (Sharp & Richardson, 2001; Wright, 2006). Foucault observed that modern democracies were controlled less by violence than by pronouncements of expert discourse. He demonstrated how power was explicitly linked to knowledge, that certain meanings became fixed by collective usage and by institutionalisation over time and space (Burton & Calen, 1979), and that "power relations are present in all forms of social interaction" (Feindt & Oels, 2005, p. 164).

The pervasiveness of power is evident in policy-making which embodies a "constant discursive struggle" (Fischer & Forester, p. 1). In addition, Stone (2002) points out:

> Every idea about policy draws boundaries. It tells what or who is included or excluded in a category. These boundaries are more than intellectual; they define people in and out of a conflict or place them on different sides. (p. 34)

Dominant discourses, therefore, are understood to be established on the principle of exclusions or antagonisms. They involve the exercise of power, as they involve the exclusion of certain possibilities through highlighting certain realities over others. They are antagonistic because "social agents are prevented from attaining their identities by an enemy who is deemed responsible for their failure" (Howarth, 2004, p. 260). They are, as a result, intrinsically political in that they

define insiders and outsiders, and privilege certain ideological realities over others (Fairclough, 1995; Howarth, Norval, & Stavrakakis, 2000; Laclou & Mouffe, 1985).

This partial vision of the social world reflects the power relationships within society, and these power relationships are played out within institutions that embody knowledge and practice (Fischer, 1995). For example, the concepts of "environment" and "sustainability" are currently mediated through the dominant reformist discourses of sustainable development and ecological modernisation (Dryzek, 1997). These contemporary environmental discourses have emerged through a discursive struggle over the instrumental, economistic, and exploitative approach to the environment, but they continue to be linked to elements of the technological discourse that preceded them such as still being framed by an anthropocentric and utilitarian approach to nature, and being supportive of bureaucratic methods for solving environmental policy problems.

While acknowledging Foucault's contribution to a framework of thinking about knowledge and power, and about power struggles within a discourse that construct "resistant" oppositions (Danaher, Schirato, & Webb, 2000, p. 95), critics argue that his approach did not offer any concrete means to evaluate how institutional structures get to be as they are, or how they change (Fairclough, 1992). Foucault was criticised for being overly deterministic, "reducing people to helpless actors who are subjected to the immutable forces of power and history" (Wagenaar, 2011, p. 163). Missing were "the means to reconcile the connections between the use of language and the exercise of power" (Fairclough, 1995, p. 209); acceptable and unacceptable forms of power (Fraser, 1989); any useful analytical tools by which to examine power from the view of the subordinated – both how the subjected "subjects" are formed or how they resist (Butler, 1990, 1997; Hartstock, 1999; Pile & Thrift, 1995); or, the material consequences of ideology and political hegemony on individuals and institutions (Fairclough, 1992). In response to these critiques, scholars such as Van Dijk (1998) and Fairclough (Fairclough, 1989, 1992, 1995) developed Critical Discourse Analysis (CDA) as a normative framework by which to operationalise Foucault's social theory of discourse. I next present an overview of CDA.

Critical Discourse Analysis

The usefulness of CDA as a methodological approach is its focus on drawing attention to, and analysing how, dominant discourses naturalise particular power relationships and ideologies through everyday conventions such as rules and regulations. It assumes that identity, and subjectivities, inclusions, and exclusions are hegemonically maintained within institutionalised relations of power, and that through the analysis of language within texts, alongside analysis of discursive and sociocultural practices, these systems of domination can be made visible**.**

CDA provides an analytical method to analyse spoken and written texts as concrete instances of discursive practice, what Fairclough calls "texts in context" (Fairclough, 1992). CDA is part of the "linguistic turn" which has:

> … called attention to language games that construct alternative realities, grammars that transform the perceptible into non-obvious meanings, and language as a form of action that generates radiating chains of connotations while undermining its own assumptions and assertions. (Duncan & Reutter, 2006, p. 467)

CDA focuses on how language, meaning, and society interrelate, and how different systems of meaning or discourse compete for influence in society. As a framework, it focuses on identifying and analysing how dominant discourse hegemonically naturalises particular power relationships and ideologies through everyday conventions within institutional discursive practices (Fairclough, 1989, 1992). It is concerned with the role of discourse in the production and reproduction of power, abuse, or domination (Van-Dijk, 1998).

CDA takes a three-dimensional approach to discourse. It analyses any discursive event as simultaneously a piece of text, an instance of discursive practice, and an instance of social practice (Fairclough, 1989, 1992). The first dimension is concerned with language analysis; the second dimension with the processes of text production and interpretation (i.e., what discourses are drawn on, and how combined); and, the third dimension with social practice, that is how the institutional and organisational context of a discursive event shapes the discursive processes, and has constructive effects on that discursive event (Wagenaar, 2011, p. 159).

Texts are one form of social practice and are viewed in CDA as social events, which are shaped by social structures. Language in texts, therefore, can act as a set of constraints (similarly to social structures), and, hence, can define a set of possibilities or interpretations. Fairclough states that by:

> Seeing language as discourse and as a social practice, one is committing oneself not just to analysing texts, nor just to analysing process of production and interpretation, but to analysing the relationship between texts, processes, and their social conditions, both the immediate conditions of the situational context and the more remote conditions of institutional and social structures. (Fairclough, 1989, p. 21)

In doing so, CDA takes an intertextual approach. Intertextuality assumes that "no discourse (language in use in social process, language as action) can be understood except in relation to the larger discursive formations or orders of discourse[6] of which it is a part" (Threadgold, 2003, n.p.). A CDA view of discourse assumes that discourse carries the histories of where it has been, and that there is a dialogic relationship between the past and the present, which means there is the potential for constant recontextualisation and resignification (Bakhtin 1986 in Threadgold, 2003). Texts then can transfer prior understandings, restructure existing ideas, and generate new ones.

Discourse is the key ingredient in the constitution of knowledge, and knowledge is not seen as a neutral medium. For CDA, all knowledge is based on acts of classification, and it is through language that classification becomes possible. Language use can reflect and shape a social order, and individuals in a social order (Jaworski & Coupland, 1999). Language is part of society (not external to it) and subject to social conventions; it is a social process, and it is a socially conditioned process (Fairclough, 1989).

Discourse then is seen as a form of social practice. From this view "there is a dialectical relationship between discourse and social structure" (Fairclough, 1992, p. 64), which means that while social subjects are shaped by discursive practices, they can also reshape and restructure these practices through discursive struggle (Fairclough, 1992). For Fairclough:

> Discourses then include representations of how things are and have been, as well as imaginaries representations of how things might or could or should be. (Fairclough, n.d, p. 3)

The critical dimension of CDA focuses on how "social structures relate to discourse patterns (in the form of power relations and ideological effects) and in treating these relations as problematic" (Blommaert, 2005, p. 25).

The effects of ideologies within dominant institutional discourses are an explicit focus of CDA. Ideology is viewed not just as a set of ideas or constructs by which we understand experiences, but also as a key site to unravel the interconnections of language, power, and social processes (Fairclough, 1992). To analyse the effects of ideology, CDA draws on Gramsci's theory of society in which "power is seen as being organised through ideological and political hegemony" (Ryan, 1990, p. 101). Hegemony is understood as the process through which institutions establish their power through the exercising of political, intellectual, and moral leadership which habituates and naturalises attitudes so they appear as 'common sense'. Power viewed as hegemony assumes that power can be hidden or naturalised within taken-for-granted beliefs, language conventions, and everyday practices (Wagenaar, 2011). Ideology, from this view, has a material existence with real effects on the embodied experiences of individuals, which are played out within the discursive practices of individuals and institutions. For Gramsci, power relationships are hegemonic struggles which are never finally secured but continually fought for (Ryan, 1990, pp. 101-104). Ideology here is understood as:

> Significations/constructions of reality built into various dimensions of the forms/meanings of discursive practices and which contribute to the production, reproduction or transformation of relations of domination. (Fairclough, 1992)

The 'power' effect of ideology within discourse is its capacity to hide and appear neutral, natural, or common sense (Fairclough, 1989, 2003). CDA seeks to reveal the "covert ideological elements in ordinary discourse" (Wagenaar, 2011, p. 158).

In order to critique the assumptions, motivations, and hegemony of dominant institutional discourses and actors, CDA undertakes analysis of both the macro and micro levels of discourse. Linguistic theory helps in the analysis of micro practices, the focus being on the "power *in* discourse" (i.e., the way texts give cues to readers for how to interpret or contextualise texts) (Wagenaar, 2011, p. 162 italics in original). In contrast, social theory focuses attention on the macro relationships (i.e., analysis is focused on identifying the power *behind* discourse),

that is the "capacity to impose a certain discourse type upon the situation at hand" (Wagenaar, 2011, p. 162). Both sites need investigation in order to understand the relationship between knowledge and power. For example, examining the 'principles' and 'purpose' as well as the institutional mechanisms prescribed for policy implementation within legislative texts can clarify the normative values and goals, as well as how they are ideologically invested to exclude and include particular discourses.

In summary, CDA as a framework of analysis makes explicit the significance of discourse in the production, maintenance, and change of social relations of power; it demonstrates how existing conventions are the outcome of power relations and power struggle; it deconstructs the 'common sense' ideological assumptions of dominant discourses within policy-making institutions; it demonstrates the political effects of the hegemonies within the discursive processes of institutions; and through these processes demonstrates how together these elements can include and exclude alternative discourses and discursive practices (Fairclough, 1989, 1992).

I now turn to a discussion of the case study approach and the data collection techniques chosen for the research. As Strauss and Corbin (1998) point out, methods are a way of thinking about and studying social reality. They are not neutral tools, but reflective of our underlying perspectives about the nature of social reality, and our perception of how it should be studied. Therefore, choices with regard to research tools or procedures are inextricably linked to our commitment to particular visions of knowing the world (p. 3).

Research Methods

Case Study

A case study approach has been chosen as the overarching method for research. As a method, the case study seeks to describe, understand, and explain 'how' and 'why' questions about a particular object of study (Brown, 2008; Tellis, 1997b; Yin, 2003a, 2003b). The questions I seek to answer in this research are about how sustainability is being discursively produced and enacted in New Zealand policy,

processes, and practices. A case study approach is thus well suited to this research.

Case studies offer the opportunity not only to consider and analyse multiple perspectives and viewpoints of different groups and actors, but also the interactions between them (Tellis, 1997b; Yin, 1994). A case study approach importantly can generate detailed and in-depth information about an issue; and it can uncover interactions, and factors characteristic of the phenomena being studied. A case study also differs from other methods in that:

> It adds two other sources of evidence … direct observation of the events being studied and interviews of the persons involved in the events…. The case study's unique strength is this ability to deal with a variety of evidence - documents, artefacts, interviews, and observations. (Yin, 2003b, p. 8)

Case studies are a useful approach when the investigation or study requires a means to analyse "a contemporary phenomenon within its real life context" (Brown, 2008, p. 6), when an in-depth holistic investigation is needed (Tellis, 1997a), or if the research is seeking to better understand an event, programme, process, institution, or social group (Creswell, 1994). As a research strategy, the case study is an important approach when we want to build knowledge of "individuals, groups, organisations, politics and related phenomena and to contribute to knowledge of individuals, groups, organisations and politics and when the investigator has little control over events" (Yin, 2003b, p. 1).

Berg and Lune (2012) assume two essential elements of a case study, first, that a case requires multiple methods and/or sources of data, and secondly, that the case is part of a much broader event of which it is one component. In this regard, the dairy industry is an important actor through which to analyse the much broader systemic sustainability concerns and challenges that need to be addressed in New Zealand and internationally.

Another important point that differentiates case study from other research methods is the role of theory development prior to the conduct of any data collection. Yin (2003) argues that theory development as part of the design phase of a case study is essential, whether the ensuing case study's purpose is to develop or test theory. A theory-before-research approach can help the researcher specify

what is being explored, and can help stimulate rival theories when undertaking explanatory cases studies (Yin, 2003b, p. 28). It provides both the blueprint for the research in that it can help guide what data to collect, while the use of theory also becomes the main vehicle for analysing the data (Yin, 2003b).

The theoretical framework, therefore, is important. It provides the validity for the research, and the means to search for patterns by comparing results predicted from theory or the literature. It also enables the researcher to look for causal links or rival explanations and to trace changes in pattern over time (Yin 1989 in Creswell, 1994). By focusing on identifying the overall pattern (for example the influence of different discourses on the dairy industry), and demonstrating the many factors and conditions that over time have helped to sustain or change such patterns (Yin, 2003b, p. 6), explanatory case studies can help to build a causal explanation for the case (Berg & Lune, 2012). The analytical framework developed in Chapter 2 provides the theoretical framework for analysis of data gathered for this research.

Case studies are undertaken for different reasons, and this case seems to fit the profile of an 'instrumental case study'. Instrumental case studies are useful to 'provide insights into an issue or refine a theoretical explanation, making it more generalizable' (Berg & Lune, 2012, p. 335). The focus of instrumental research is on a single issue or concern, and draws on a single case to illustrate this item or focus of concern:

> The case in this sense is of secondary importance… the details of the case provide the background against which the larger research interests will play out. .. .. the intention of the research is to better understand some external theoretical question, issue, or problem (Berg & Lune, 2012, p. 335).

While within an instrumental case study the 'the case is still looked at in depth, its contexts scrutinized, its ordinary activities detailed , the choice of case is made to advance or understand , or pursue other external interests' (Stake, 2003, p. 137). For this case, the focus of research is on the dairy industry due to its particular problematic 'record' with regard environmental sustainability. But in this case, I am also trying to demonstrate how the choice of discourse (particularly institutional discourse) has contributed to, or inform sustainability outcomes. The same theoretical model could be applied to another 'case' or concern to illustrate similar or different outcomes.

Case studies also have different design types, and this case study seems to sit within an explanatory case study type. An explanatory case study approach is useful when conducting causal studies, when research is about complexity of organisations or communities, with a plurality of influences (Berg & Lune, 2012). They seek to explain how and why some event occurred, attribute cause, and try to offer some solutions (Yin, 2003a). Through pattern matching for example, explanatory case study can help to discover how the case may be related to some theoretical proposition from theory, or the literature, which may draw on rival explanations. In my case the rival explanations can be viewed as the different presumptions (within normative values and practices) or 'patterns' that construct the dominant discourses of sustainability, as outlined in the discourse analytical framework.

Yin states that 'pattern matching in case study analysis permits case studies to test multiple-variable, complex causal explanations in a single study' (Yin, 2003a, p. 22). By focusing on identifying the overall pattern (i.e. in this case the influence of different sustainability discourses), and demonstrating the many factors and conditions that through time help sustain or change such patterns (Yin, 2003b, p. 6), explanatory case studies can help to build a causal explanation for the case (Berg & Lune, 2012).

Through incorporating an explanatory approach to the case study through a comparative analysis of the dominant sustainability approach with the atypical Lakes variations, the research enables an analysis of the spectrum of sustainability discourses in play in New Zealand. This has made visible a powerful alternative to the sustainability norm which while being challenged in different ways in different regional councils still dominates the rest of the country.

Finally, Yin identifies five research skills necessary for good case studies: one, an inquiring mind and the willingness to ask questions before, during, and after data collection (to constantly challenge oneself about why something appears to have happened or be happening); two, the ability to listen, to include observation and sensing, to assimilate large amounts of new information without bias; three, adaptability and flexibility to handle unanticipated events and change data collection strategies if they are not functioning effectively; four, the goal is not

merely to record data but to interpret and react to these data once collected; and five, unbiased interpretation of the data, with a good test being whether the research is open to contradictory findings (Yin 1998 in Berg & Lune, 2012, p. 332).

The ontological stance of critical research is that it views the world as "socially constructed, dialogued, experienced or perceived by people" (Higgs & Trede, 2010, p. 31), and qualitative research is a means by which to gather data which can demonstrate this view. I next discuss the chosen methods and the procedures undertaken to gather data for the research.

Methods of Data Collection

To carry out the case study, I have chosen a mixed methods approach. The dominant approach for gathering data is qualitative, but I incorporate a Q-methodology survey which has a quantitative dimension. At a practical level, a mixed-methods approach is important because multiple data collection procedures increase the depth of understanding an investigation can yield (Berg & Lune, 2012, p. 8). Higgs (2010) points out:

> Data analysis is a process for bringing a set of interpretive lenses, framed in a research paradigm and strategy, to the task of producing a group of themes or interpretations from a set of individual pieces of data. (Higgs, 2010, p. 165)

The data gathered for this research was used to uncover how the 'sustainability discourse' has been socially constructed. In order to achieve this end, the major methods used have been document analysis, stakeholder interviews, and a Q-methodology survey. The analysis of historical and contemporary documents, and the stakeholder interviews provided the means to analyse the *differences* with regard to the values, beliefs, and discourses that have shaped the government, the dairy industry, and the community's sustainability views. The Q-methodology survey produced a snapshot of the *shared* viewpoints, opinions, subject positions, and preferences of different actors (Watts & Stenner, 2005b). Each of the research methods deployed in this thesis, therefore, has been chosen to provide insights in different ways into how the sustainability 'problematique'[7] has been constructed and interpreted by different institutions, by different actors, and by different communities.

Document Collection and Analysis

Approximately 100 documents spanning legislation and policy, historical records, secondary literature, rural newspapers, and dairy industry reports were analysed. Government documents included environmental legislation, policies, and implementation strategies. Dairy industry documents included strategies and reports produced by the dairy industry networks.

The document analysis also included a selection of historical texts which were analysed in order to clarify the legislative and dairy industry history of New Zealand (see for example Cumberland, 1944; Levy, 1970; Lord Bledisloe, 1932; McMeekan, 1964; New Zealand Farmers Union, 1902; "The New Zealand Settlements Act," 1863; Penlington, 1948; Philpott, 1937; "Suppression of Rebellion Act," 1863)). Those mentioned, in addition to other texts by dairy industry leaders and the state enabled an analysis of the trajectory of social change within institutional discourse and dairy industry discourse with regard to land use change, and the implications of institutional and dairy industry discourse on the environment.

The ready availability of information on the Internet has meant that it was possible to source many of the documents for analysis from online websites of government departments, dairy industry groups, regional councils, and community groups. Websites of political parties, dairy industry actors, NGOs and *iwi* and *hapu* groups (Māori tribe and subtribe groups) also offered other sources for the gathering of data.

Media texts, including a selection of rural newspapers produced in the last 4 years, provided another important source for tracking the shifting dairy industry discourse. These texts have given me insight into the views, issues, and practices of the rural community in New Zealand. Press releases from stakeholders, such as the Green Party, Federated Farmers, Fish & Game, Forest &Bird, and the Parliamentary Commissioner for the Environment (PCE) in reaction to regulatory and policy changes also offered another data source. Because so many documents have been drawn upon, the main documents analysed are presented in Appendix VI, and the historical documents, including the influential legislation and

strategies that constructed the institutional discourse of the pioneering and productivist era, are found in Appendix V.

My research sits within environmental policy scholarship, and the primary focus is an analysis of environmental policy discourse. The driver for this research, however, is my concern with the material outcomes of agricultural practice, particularly dairy farming, on the environment. This concern has meant that I have also spent some time reading scientific documents that enabled me to understand the causes and effects of environmental pollution broadly, and dairy industry pollution specifically (see for example Abell, Hamilton, et al., 2011; Craddock-Henry, 2008; Hamilton & McBride, 2013; PCE, 2010, 2012). Strengthening this area of knowledge has better enabled me to have a more informed view of the complexity of the impacts of environmental pollution. It has provided another lens through which to evaluate the effectiveness of the policy and science and technology responses to sustainability concerns that have been initiated by central and local government, research institutions, and the dairy industry, and acted as a means by which to analyse these against the framework of analysis.

The following is a summary of the core groups whose documents were analysed.

- Central Government
    - Ministry for the Environment (MfE); Ministry of Agriculture and Forestry (MAF); Ministry for Primary Industries (MPI);
    - Parliamentary Commissioner for the Environment (PCE).
    - Crown Research Institutes: National Institute of Water and Atmosphere (NIWA); and AgResearch
- Regional Councils
    - Waikato Regional Council/Environment Waikato (WRC or EW)
    - Bay of Plenty Regional Council/Environment Bay of Plenty (BOPRC/EBOP)[8]
- Dairy Industry
    - Fonterra
    - DairyNZ
    - Dairy Leadership Group
    - Federated Farmers
- Community NGOs and political parties

  Fish & Game, Forest &Bird; Ecologic; Environmental Defence Society ; Green Party; Iwi and Māori leadership groups; Te Arawa Māori Trust Board; Lakes and Waterways Action Group (Taupō); Ngati Tūwharetoa; Taupō Lake Care; Lakes Water Quality Society (Rotorua Lakes)

In-depth semi-structured interviews

Interviews are a useful research tool when the researcher is seeking to understand how values, perceptions, and beliefs have become attached to a certain phenomenon. They can provide a means to unearth the complexities, contradictions, and tensions of a discursive event, and provide mainstream as well as alternative readings of an event. The data gathering processes undertaken in interviews may be viewed as an interpretive performance which is a complex process in which the interviewer needs to simultaneously be an actor in, and director and choreographer of the interview (Berg & Lune, 2012). Seen from this view, interviewing is not a one-sided event but a meaning-making occasion through which to "create an appropriate climate for informational exchanges and for mutual disclosures" in which the constructed relationship of the interviewer and subject is used to draw out information from the subject (Berg & Lune, 2012, p. 108). Rudestam and Newton (2007) point out that "participants are the experiential experts" (p. 107), and Berg and Lune state that "one of the most effective ways to learn about the circumstances of people's live is to ask them" (2012, p. 331). The procedures undertaken for the interview component of the data collection are presented next.

Selection of Participants for Interviews

The interviews were an important component of the research. They provided information for the broader research and were also used as data in the development of the Q-sort survey. Fourteen interviews were undertaken with key stakeholders; the interviewees were selected because of their special knowledge, expertise, or concern with sustainability, environmental policy, and the dairy industry.

Institutional actors included individuals from regional councils, Waikato University and Crown Research Institutes (CRIs). From the dairy industry, three subgroups were interviewed: Fonterra as representative of the manufacturing/supply chain arm of the dairy industry; DairyNZ whose focus is on R & D for all farmers in the industry; and, Federated Farmers which is the most visible national advocacy group for farmers. While there are many community/environmental and farming groups focused on sustainability, my

investigation concentrated on those community/environment groups such as Forest & Bird and Fish & Game which were influential in refocusing the public agenda, and which continue to demonstrate a strong commitment to ensuring a sustainable dairy industry. The table below summarises the participant groups and criteria for selection.

Table 3: Interview Selection Criteria

Actors	Stakeholder Groups	Role or Focus
Government Actors (1)	Regional Councils	Policy analysis; Resource management; Pollution abatement; Dairy support; Environmental science; Elected officials;
Government Actors (2)	University/Crown Research Institutes	Resource management & planning; Environmental science; Research & Development
Dairy Industry	Fonterra DairyNZ Federated Farmers Farmers	Manufacturing and supply chain; Sustainability policy; Science and Technology; Farmer advocacy; Farm consultants
Community/ environment NGOs	Fish & Game Forest & Bird Nonaligned Other environment groups	Representatives; Individuals

Procedures for Interviews

Selected participants were contacted by email and an attached information sheet about the research (see Appendix II, A). The interviews were undertaken between November 2011 and May 2012. Once participants had agreed to be interviewed, a time was set up for an interview in a place of their choice. This arrangement required travelling to either their place of work (including a cow shed) or in some instances their home. Several chose to be interviewed at the University of Waikato.

Because of the small pool of interview participants and their guarantee of anonymity, when citing them in the research I identify them as being from one of following four categories:

1. Regional Council (RC)
2. Dairy Industry (DI)
3. Community/Environment NGOs (CE)
4. Scientist (S)

Each participant was assigned a number. Therefore, the citation in text would, for example, be as follows: CE5 or RC2 or S9.

The Interview Goals

Fourteen stakeholder interviews were undertaken across the stakeholder groups. The interviews were semistructured. A schedule of questions which acted as an interview guide was prepared. The questions were developed around some key sustainability themes. The questions were framed in such a way as to elicit responses that would provide answers to key questions with regard to what normative and institutional preferences framed the interviewee's values, views, and rationales with regard to integrating sustainability into resource management goals.

Although the key themes were addressed by each interviewee, their ideas did not always flow in a linear fashion. The interviewees could digress, offer their own critique, offer additional information, or present what they viewed as of greatest concern (Berg & Lune, 2012). For each interview, the questions were reviewed, and reframed in such a way as to ensure they "reflected awareness that individuals understand the world in varying ways" (Berg & Lune, 2012, p. 113). Also important was adjusting the questions to gather information that reflected the actor's expertise in a particular area (i.e., science, policy, dairy industry, community) (see Appendix II, D for a sample of the questions drawn on).

The outcome of the interviews was that I gained a core understanding of the different views, values, and institutional preferences of these representative groups with regard to sustainability and sustainability's place in the dairy industry.

Analysis of Data

Each interview was fully transcribed, and the views and themes that emerged were summarised. The similarities and differences being presented by the different interviewees were evaluated and analysed against the discourse analytic framework. An example of this process can be found in Appendix II, E. The interviews were undertaken as an important component of the process of generating Q-statements for the Q-sort survey that came directly from the

expressed views of the people being studied, as well as to inform the broader research questions of the research.

As per Q-methodology, the next procedure of the research was to analyse the data from the interviews, and incorporate this into the concourse of existing opinions derived from the broader document analysis. It is from this concourse that the final Q-sort statements for the survey were selected.

I next describe what Q-methodology entails, and why it is an important complementary method for this research. I outline the iterative processes carried out to develop the Q-sort survey statements, and outline the procedures undertaken to carry out the online Q-sort survey. The results of the Q-survey are presented in Chapter 9**.**

Q-Methodology

For a critical researcher, finding methods that can incorporate a diversity of views is important. Participatory processes are viewed within many sustainability discourses as a means to constrain the dominance of institutional discourse and market priorities (see Dryzek, 1997; Dryzek , 2010), and allow those who live with the consequences of environmental risks to be included in determining whether they are acceptable or not (Barry & Proops, 1999; Beck, 1995). By incorporating Q-methodology as a research tool, the opportunity to demonstrate the shared values and concerns of stakeholders, rather than only oppositional voices and accounts, becomes possible (Barry & Proops, 1999).
Research questions that suit Q-methodology are those that have many potentially complex and socially contested answers, and are focused on understanding different meanings, understandings, and viewpoints (Stenner & Stainton-Rogers, 2004). Q-methodology is, therefore, useful when the goal is to understand and describe these different viewpoints. Q-methodology as a method is particularly useful when an issue is highly contested, and there is conflict such as debate over sustainability, and, specifically, over the role of the dairy industry in such a debate.

Q-methodology is not like other surveys which seek to understand statistical patterns across traits such as age, class, or gender. The focus of a Q-sort is to

reveal the patterns of discourse *shared* across individuals (Watts & Stenner, 2005). To enable these patterns of discourse to be seen, the Q-sort requires participants to select statements that they most agree or disagree with, and place them on a quasi-normal distribution scale (for this survey from -4 to +4). There are limits to how many statements can be placed on each point of the scale. It is, therefore, a forced pyramid sort. From the sorts, the discovery of patterns among and across participants becomes possible because the sorting process requires that those surveyed must decide their choices after having compared it with all the other available alternative statements (Watts & Stenner, 2005). The participant's statement selection, therefore, makes sense only in the context of reactions to every statement in the Q-set (Dryzek & Berejikian, 1993, p. 50). It is thus a self-referencing decision-making procedure in which respondents must make subjective value judgments according to what they perceive the most important combination of concerns to be (Webler, Danielson, & Tuler, 2009).

Through the subsequent cluster analysis of the Q-sorts undertaken, a numerical evaluation and comparison of human subjectivity was enabled (Watts & Stenner, 2005a). The response of an individual to the survey acts as the variable, and the clusters produced through the sorting process represent the groupings of people with similar patterns of response (Webler, et al., 2009). It is from this pattern of response that it is possible to determine the shared ways of thinking (views) of the participants, and then analyse what discourses are being drawn on.
I next outline the procedures undertaken to develop the statements for the research.

Development of Concourse

The first stage for creating a Q-sort survey is the gathering together into a concourse of all relevant material on the topic under consideration. The concourse represents the sum of what can be thought or said about the issue, event, or phenomenon being investigated. It is from the concourse that the statements are selected.

The concourse was developed for this research through a systematic search of primary and secondary documents such as media reports, rural newspapers, and policy documents, and also through stakeholder interviews. It comprises the

existing opinions and arguments from the public, policy makers, organisations, professionals, scientists within the order of discourse of sustainability and the dairy industry.

A Q-sort requires the distillation of this knowledge into a few statements that synthesise the information while trying to maintain the essential message and range of views of the different stakeholder groups. Many of the Q-sort statements were generated from the interviews. As a result, views from the dairy industry, regional council staff, scientists, and community groups are represented in the Q-sort. The interviews were constructed to elicit stakeholder's response to the key elements of the discourse analytic framework also, which means that the statements also directly incorporate the range of views with regard the key elements of the framework. I next present the processes employed to reach the final selection of statements.

Selection of Statements

The second stage for a Q-study is the selection of statements (Q-sample) from the concourse. The selection process was very time intensive and went through several iterations. Q-statements must accurately represent the concourse. Furthermore, the statements need to be short sentences that are easy to read and understand, and the Q-statements need to be interpreted in the context of all the other statements (Webler, et al., 2009, p. 9).

An initial 400 statements were selected from the concourse as a good representative sample of the existing opinion statements on the research topic. For this initial selection, the discourse analytic framework provided the interpretive lens through which to select the statements. A structured rather than unstructured Q-set was required in order to have the statements link explicitly to the theoretical questions being asked of the research. The aim of this first selection process was that the statements were reflective of, and derived from, well-informed people's expressions of their individual opinion or viewpoint (Webler, et al., 2009). The first selection was then reduced to around 200 statements

Application of Theoretical Model to Statement Selection

An important part of Q-methodology's rigour is that there remains some distancing of the researcher's interpretation and bias from the choice of

statements. To help in this regard, a 4x4 matrix developed by Dryzek and Berejikian as a political discourse heuristic was applied to the statements (Dryzek & Berejikian, 1993). This matrix acted as both a further filtering device, and an independent method for choosing statements (Barry & Proops, 1999).

The matrix consists of four key elements of political discourse, and four types of claims made in political arguments (see Tables 4 and 5 below).

Table 4: Four Key Elements of Political Discourse

Four Key Elements of Political Discourse

1. **Ontology --** a set of entities is recognised as existing (i.e classes by marxists);
2. **Agency --**a degree of agency is assigned to these entities,some entities can act, others are acted upon
3. **Motives --** some motives will be recongised, others denied (i.e. material self interest or civic value)
4. **Natural/unatural relationships --** there are natural and

Source: Dryzek & Berejikian (1993)

Table 5: Types of Claims Made in Political Arguments

Types of Claims made in Political Arguments

1. **Definitive --** concerning the meaning of terms
2. **Designative --** concerning questions of fact
3. **Evaluative --** concerning the worth of something that does or could

Source: Dryzek & Berejikian, 1993

The first iteration was to apply this framework to the 200 statements that had been selected. Each statement was identified as being a combination of an element of political discourse and type of claim (see Table 6 below).

Table 6: Concourse Matrix

Type of Claim	**Element of Political Discourse**			
	Ontology	**Agency**	**Motive**	**Natural/unnatural**
Definitive				
Designative				
Evaluative				
Advocative				

Source: Dryzek & Berejikian, 1993; Barry & Proops, 1999

An example of the coding process drawing on the matrix is presented in Table 7 below. Here we see statements that were selected as Ontology/Definitive and Ontology/Designative as presented by different stakeholders.

Table 7: Example of Coding Process using Matrix

Type of Claim	Statement
Ontological/Definitive Statements	Consumers are more confident that all products are now produced more sustainably and so they do not need to pay a premium for organic products.
	I think we need more science to verify whether nitrates are a problem.
	Nitrogen is a growth enhancer, and it can't even be proved that it is causing water degradation.
	The biggest problem for the Waikato River is the dams not the dairy farmers.
Ontological/Designative Statements	Simpler farm systems are better; you can ramp them up and capture good times and drive out a whole heap of costs and manage risk in bad times.
	Farmers are black and white sort of people. Give them information and they will change.
	There are only a few rivers in NZ where nitrogen management is important.
	It is irrational to think you can increase farming intensity indefinitely.

The second iteration was to reduce the number of statements to 100 statements. These statements also needed to represent the different elements of the discourse analytic framework. The use of the matrix guided the selection of the statements, thus limiting how many of each type of statements could be selected. The statement selection was further guided by my supervisory team, who spent time with me to ensure that the statements selected were representative of the concourse, and informed by the 4x4 concourse matrix and the discourse analytic framework.

A final 46 quintessential statements were chosen for the Q-sort statements. These statements are presented in Appendix III, A.

Procedures Undertaken for Online Q-sort Survey

Selection of Participants

Q-sorts do not require a large number of respondents; what is important is that all the discursive views of different stakeholder groups are represented (Dryzek & Niemeyer, 2008). The aim of the selection of participants is, therefore, to have people who are representative of the different viewpoints, opinions, and discourses, and, in this case, participants who are "theoretically relevant to the problem under consideration" (VanExcel & deGraaf, 2005, p. 6). The participants approached to undertake the survey were thus a nonrandomly selected structured sample of people from across the spectrum of stakeholder groups.

In all 100 participants were initially selected and they were contacted by email and given information on the survey and the opportunity to participate (see Appendix III, B and C). The survey was on line for 6 weeks, and during this time as a result of my assessment of who had carried out the survey there was some controlled snowballing[9]. The survey was resent twice to those who had not responded and, at the close of the survey 41 Q-sorts had been undertaken. Although the individual Q-sorts were anonymous, I could track the self-selected identification labels of the Q-sorters (i.e., policy, science, community, industry). This information enabled me to target those individuals and groups with a lower response rate. At the close of the survey, the range of participants who had undertaken the Q-sorts was representative, in my view, of the existing opinions represented in the concourse (VanExcel & deGraaf, 2005).

Carrying out the Q-sort

To undertake the Q-sort, each respondent was asked to sort the 46 statements. The first instruction was that the statements should be sorted according to how strongly the participants agreed or disagreed with each statement across a nine-point scale from -4 to +4. The selection of -4, for example, meant they most disagreed with this statement and +4 indicated that they most agreed with the statement. The goal is for the participants to sort the statements according to their beliefs and understandings of the issue or concern (Webler, et al., 2009).

For Q-sorts, the convention is that the statements be sorted into a quasi-normal distribution, which means that the second instruction for the Q-sorters was that there were limits as to how many statements could be placed on each point on the

scale. This process forces the Q-sorters to make decisions on which statements they most strongly agree or disagree with. Table 8 below shows the distribution of the ranking for the Q-sort.

Table 8: Distribution for Statement Rankings

Scale score	**-4**	**-3**	**2**	**-1**	**0**	**+1**	**+2**	**+3**	**+4**
No. of statements	3	4	5	7	8	7	5	4	3

It is this forced sort of the participant's preferences across the statements which provide the means to compare all the Q-sorts and examine the different views between and among the participants. It is through the subsequent use of cluster analysis that the subjectivities about sustainability and the dairy industry emerge for analysis (Barry & Proops, 1999; VanExcel & deGraaf, 2005).

Along with some general demographic information, the Q-sort survey also provided the space for all the participants to elaborate on why they selected their particular configurations, particularly the ones at the extreme ends of the continuum (VanExcel & deGraaf, 2005). This feedback helped clarify the different Q-sorters' discourse preferences and helped in the subsequent analysis. Appendix III, D has some screen shots from the online survey which show the process undertaken. Chapter nine presents the analysis of the data generated from the Q-sort survey

The Q-sort was a means to extend the research to incorporate more actors to participate in the research. It provided a check and balance to see whether the discourses of sustainability as understood within scholarship is informing the discourses of key actors and stakeholders. It also provides a feedback loop for "the researched" to offer their own experiences, "accounts or discourses" about the discourse domain of sustainability (Barry & Proops, 1999, p. 339).

Human Research Ethics

Approval for conducting the interviews and survey was obtained from the Faculty of Arts and Social Sciences' Human Research Ethics Committee. In addition, the interviews were conducted under the guidelines of the University of Waikato's

human research ethics guidelines. These meant that I would work respectfully with the participants and fairly represent them in the final thesis.

For all interviews informed consent was obtained. The consent forms outlined the rights of the participants, and made clear that the research had ethical clearance from the University of Waikato. The consent forms were signed by the interviewees and me at the beginning of the interviews.

The participants were guaranteed anonymity in the research. The interviewees agreed to the interviews being recorded on a digital voice recorder and the data from the interviews being used in the research. The interviews typically took between 1 and 2 hours; they were subsequently fully transcribed. The transcripts and the original recordings are held by me in a personal archive. Appendix III collates all the documents used during the interview process.

My overview of the methods that have been drawn on in order to carry out the case study is now complete. The next chapter is the first of two substantive chapters of my analysis that provide a historical backdrop to the politics of land use change in New Zealand. I start in Chapter 4 with the colonisation/pioneering era, and the conflicting normative and institutional sustainability goals of two communities: Pākehā and Māori, and the subsequent development of dairying as central for New Zealand's economic stability in the pioneering era.

NB. Footnotes for this chapter at end of

Chapter 4
Just land

Key to New Zealand identity is land, it lies at the heart of who New Zealanders are, and has shaped our ideologies of who we think we are (Steven, 1989, p. 30).

Introduction

The focus of this thesis is on understanding the implications of dominant discourses for sustainability outcomes. As previously stated, sustainability from a systems perspective can be seen as a "strategically deployable shifter" (Kirsch, 2009, p. 5). Therefore, what has been desired to be sustained from an anthropocentric perspective has had different ideologically-driven discursive meanings in different eras. In order to make sense of the environmental practices, policies, and discourses that underpin the contested terrain of contemporary sustainability politics, and to understand the sustainability challenges in New Zealand, it is important to understand where it all started.

Bawden (1991) identifies the successive but overlapping eras of land management change as: pioneering, production, productivity, and ecological or sustainability phases (Bawden, 1991). In New Zealand, the production and productivity eras were conflated, and can be determined as the productivist era. The intention of Chapters 4 and 5 is to examine the historical norms, values, and institutional practices that were formative in establishing attitudes to the land and land use in New Zealand across the pioneering and productivist eras. This analysis demonstrates how political rationalities (discourses), and technologies (strategies, procedures, and techniques) (Larner, 1997) that evolved since the signing of the Treaty of Waitangi in 1840 normatively established and materially sculpted the natural environment in a productivist mould. Chapter 4 focuses on the pioneering phase of the British settlement of New Zealand. It evaluates the earliest history of British colonisation of New Zealand, the takeover of land, and its consequent impact on Māori. The central question being asked is: How did historical

institutional processes, socio/cultural norms, values, and discourse of successive governments disenfranchise Māori, support dairy industry growth, and shape dominant attitudes to land use and the environment?

The analysis illuminates how the conflicting worldviews and approach to the environment and land use we see today were established early, and flow on into contemporary environmental policy problem definitions. Drawing on the discourse analytic framework (see Chapter 2), I evaluate the normative values, democratic processes, institutional mechanisms, and approach to the environment which shaped the colonising/pioneering era. Taken together, these elements demonstrate how power was exercised discursively in order to establish new social relations and practices which redefined the relationships, knowledge, and beliefs about land and land use in New Zealand. These marginalised the Māori approach to land use and the environment, and established the dominance of the Pākehā worldview and approach to land use.

The longer view enables this research to demonstrate the influence of political discourse. While it demonstrates how the colonising goals were ironed out to serve the interests of the growth of a new colony, it also demonstrates why Māori are legitimate Treaty 'partners', and, of right, should be at the table in contemporary environmental policy debates.

Māori-Crown Relationship in the Pioneering Era

The pioneering era in New Zealand is evaluated here as being the period from the signing of the Treaty of Waitangi up to the 1930s. Established in this era were the institutions, legislation, and policy through which a new settler society colonised New Zealand. The dairy industry has been fundamental to the development of New Zealand society, and has long been viewed as the 'backbone' of the economy (Plunket, 1970). This process, however, required the alienation of Māori from their land and the undermining of their economy in order to enable this dominance.

As historians have chronicled, the first 100 years or so of European presence in New Zealand were marked by relatively peaceful and mutually beneficial relationships (Salmond, 1997). Yet from the start it was clear that Māori and

Pākehā had fundamentally distinct worldviews on land and the environment. These conflicting worldviews are evident in the journals of the eighteenth century European explorers who paved the way for the colonisation of New Zealand.

James Cook and Joseph Banks, in their 1769 expedition to New Zealand, quickly saw the potential of New Zealand as a possible source of resources (Forbis, 1974; Phillips, 2000), and a site for colonial expansion. The following excerpts from Cook's *Journal* reveal their enthusiasm for the abundant resources of the land:

> Indeed in every respect the properest place we have yet seen for establishing a Colony.…The Noble timber, of which there is such an abundance, would furnish plenty of materials either for building defences, houses or Vessels. The River would furnish plenty of Fish, and the Soil make ample returns of any European Vegetables sown in it….Swamps which might doubtless easily be drained, and sufficiently evinced the richness of their soils by the great size of the plants that grew upon them, and more particularly of the timber trees which were the streightest, cleanest, and I may say the largest I have ever seen. (Joseph Banks, 1769 in Beaglehole, 1968 cited in McAloon, 2002, p.53)

> It was the opinion of everybody on board that all sorts of European grain fruits and plants would thrive here. In short was this country settled by an industrus people they would very soon be supply'd not only with the necessarys but many of the luxuries of life. (James Cook 1769, in Beaglehole, 1968 cited in McAloon, 2002, p. 53)

The land and swamps surrounding the Waihou *awa* (river) on the Hauraki Plains that Cook and Banks designated for potential use to serve a future colony were already a productive space sustaining a rich food resource for Hauraki *iwi* (tribe). Archaeological evidence suggests that at this time the area was intensively settled with 145 occupation sites recorded, some seasonal but with many established villages and *pā* (fortified village) sites (Phillips, 2000). The Hauraki *iwi* of the region had in place an active and structured land use relationship which served multiple *hapū* (subtribes). The concept of *ahi ka* which is the retaining of right to land through regular reoccupation was practised, with "concepts such as outright ownership and fixed boundaries alien to Māori land use practices" (Phillips, 2000, p. 51).

The different perceptions and worldviews of Māori and Pākehā land use values are evident in Bank's and Cook's comments. For Cook and Banks, survival depended on drainage and extraction from the swamp; for Māori, the wetland

regions were already a holistic and intact food basket which supported their survival.

The outcome of the subsequent colonising encounter in this region can be found in the Hauraki Claim to the Treaty of Waitangi Tribunal (Wai 100) which demonstrates that Hauraki *iwi* were left with only two and half per cent of their original lands. This land was taken over by Pākehā first for gold, and subsequently, through the Hauraki Plains Act 1908 which facilitated the draining of the delta wetlands, for the development of dairy farms (Tukukino, n.d.). After Cook's visit in 1769, Māori had interacted positively with the European newcomers. They had adopted new crops and technologies and successfully traded potatoes, pork, wheat, milk, and other staples with traders and settlers (Salmond, 1991, 1997). By 1830, they had become entrepreneurs in their own right. They entered joint ventures with whaling captains, and flax and timber merchants. Some Chiefs also acquired their own trading schooners (Petrie, 2002; Ward, 1999).

Between 1840 and 1860, Māori continued to establish successful farming enterprises "organised along tribal lines" (O'Malley, Stirling, & Penetito, 2010, p. 78). Wheat was a major staple for the European diet and Māori facilitated this need by growing, processing, and selling it locally and exporting it to Australia[10]. In the Waikato, for example, between 1840 and 1850 around 50 water-powered flour mills were built, and Māori became the major supplier of wheat to Auckland, Sydney, and California (Barber, 1978; Te Ara, 2013a; Ward, 1999). The fluidity of Māori society, the traditional patterns of communal ownership with cooperative labour performed through *ohu* (working bees) by the whole community framed around the laws of hospitality and *mana* (prestige/spiritual power), enabled them to successfully take advantage of their land to supply food, be in a position to collectively build the flour mills, and purchase ships (Petrie, 2002).

Māori had successfully integrated agricultural enterprises into their society. Their success was underpinned by their significant land holdings, and they had a ready market in both supplying early settlers and the demand for produce in Australia. A report by Attorney General Swanson in 1857 is a good example of their success

as farmers and traders. It stated that the tribes of Mataatua and Tuwharetoa with an estimated 8,000 people:

> … have upwards of 3,000 acres in wheat, 3,000 acres in potatoes, nearly 2,000 acres in maize and upwards of 1,000 acres in kumara … they owned nearly 2,000 horses, 200 head of cattle, 5,000 pigs, four water mills, 96 ploughs, 43 coasting vessels averaging nearly 20 tons each, upwards of 900 canoes, and supplied 46,000 bushels of wheat to European traders that year. (in Petrie, 2002, p. 17)

However, by 1831, the Chiefs of New Zealand had become concerned at the lawlessness of settlers. They petitioned King William, and called on the British Crown to take some responsibility for its subjects (O'Malley, et al., 2010, p. 27). The Crown responded and provided the resources to control the impact of some of their more unruly subjects, and the problems they were imposing on Māori society (O'Malley, et al., 2010; Steven, 1989).

The British Crown at this time was said to be wary of emulating some of the worst aspects of their previous colonisation enterprises which had seen the destruction of indigenous communities (O'Malley, et al., 2010). Nevertheless, the Crown also recognised that New Zealand was a rich resource ready for exploitation (O'Malley, et al., 2010; Steven, 1989), and eventually it sought to formally annex New Zealand as a British Colony. Reasons for doing so included the fact that the French had shown interest in establishing a colony in Akaroa, and the formation of The New Zealand Company (Te Ara, 2013d).

The New Zealand Company comprised private British investor land speculators, led by William Wakefield, who were committed to the systematic colonisation of New Zealand. In 1839, the first Wakefield emigrants who were due to arrive in New Zealand assumed they had purchased land. The fear of massive land speculation increasing disorder and unrest because of the arrival of the unregulated settlers led, in 1839, to the British Crown developing the Treaty of Waitangi (O'Malley, et al., 2010). Between 1839 and 1843, the Wakefield schemes brought 57 ships and 8,600 emigrants to settlements in Christchurch, Nelson, Dunedin, and Wellington (Te Ara, 2010a). As well as a town section, Wakefield settlers had assumed that they had purchased 100 country acres (about 40ha) (Burns, 1989).

For Māori, signing the Treaty of Waitangi in 1840 was seen as a continuing of the alliance they had sought with the British Crown. Their understanding was that it would be a partnership agreement, with mutual benefits and reciprocal obligations. In return for Māori recognition of the British Crown and ceding governance (*kawanatanga*) to the Queen over the administration and law of New Zealand, Māori would retain their *rangatiratanga* (chieftainship/sovereignty) over their own affairs (Petrie, 2002). The Treaty would see a shared authority between Māori and the Crown established, with the Crown's role being to maintain security and order. It was an agreement made in good faith between two sovereign peoples (Kelsey, 1989). For Māori, the Treaty guaranteed them continued possession of their lands, forests, and fisheries and other *taonga* (treasures) (Ward, 1999): "their authority, customs and laws would remain intact, but British governance would maintain law and order and ward off French [and other] interests" (Ruru, 2004, p. 118).

At the time of the signing of the Treaty at Waitangi there were only approximately 2000 European settlers living in New Zealand and the Māori population was estimated at over 150,000 (Pool, 1991). Māori were very aware of the impacts that European expansionism could have on their society, and had sought some certainty and protection through the Treaty (O'Malley, et al., 2010).

To avert the growing land speculation, the Treaty included Crown preemption rights over the sale of Māori land. The Treaty established that the Chiefs would yield to the Crown the exclusive right of preemption over such lands as Māori might wish to alienate (sell). As a result, the Crown was the only legal entity permitted to purchase Māori land. However, under the Treaty this could only be lands surplus to Māori needs. The Treaty put the New Zealand Company in a very difficult position. It did not have enough land to satisfy the arriving settlers, and the preemption rights meant they could no longer legally sell the land they claimed they owned.

In keeping with their cultural understanding of land, for Māori Chiefs, the rights ceded to the Crown were "*Tuku Whenua*" rights, that is, rights of land for use and occupation (Ward, 1999, pp. 73-75), while the Crown assumed they had gained

the right to transfer title from common law title to freehold title. Stokes (2002) states that this was not explained to Māori adequately and that:

> Under British law the Crown [had] assumed title to all lands and resources. In this legal fiction the title was vested in the Crown, but subject to rights guaranteed in Article 2, this replaced the concept of a communally held Māori ancestral estate …. [it] was a tenurial revolution that was not initially comprehended by Māori. (Stokes, 2002, p. 46)

Subsequently, as settlers demanded more land, the different understandings of land tenure and land use between Māori and Europeans came into conflict. This saw Treaty guarantees quickly undermined, ignored, or watered down as a wave of new emigrants with the expectation of a new life arrived in New Zealand. The Crown recognised that to "sustain" and grow the economy, and build stability for the new colony, absolute control of land was essential (Ward, 1999).

Rather than an agreement made in good faith between two sovereign peoples (Kelsey, 1989), what the Treaty enabled was a deliberate organised movement to settle the country, and to occupy lands permanently. From the Crown's point of view, without this control there would have been severe restrictions on its ability to control the location of future European settlement, and to promote colonisation as it hoped to do through using the profits from the sale of Māori land (Loveridge in Belich, 2009; Holdom, 1998). The ultimate goal was that through emigration and settlement the natural environment would be transformed "as far as possible … in conformity with European aims and standards" (Firth, 1959, p. 446).

Immigration schemes, new diseases, and loss of land all contributed to further undermining Māori society. By 1856, the Māori population had dropped to an estimated 56,000 with the Pākehā population reaching 59,000 (Pool, 1991). Māori, who had been the major suppliers of food for new settlers as well as the major contributors to government custom revenue and exports (O'Malley, et al., 2010, pp. 78-79), were becoming increasingly marginalised.

The new settler government established the means by which to further support the growing colony's need for land, and serve the self-interest and utilitarian goals of the colony through marginalising Māori. This end was accomplished though the democratic processes established by the government through legislation as well as military means.

For example, the Constitution Act (1852) established voting rights for the new General Assembly. It stated that only those males who held lands according to individual tenure, and who could read and write English could vote. This measure disenfranchised virtually all Māori communal land owners[11], and ensured that any Parliament established would be representative only of propertied Pākehā. Ward (1999) states:

> The remorseless acquisition of Māori land was not accidental, it was not simply the result of well-intended policies that went wrong but … a concentrated effort by Crown officials and settler governments taking and affording themselves every means by which to further alienate Māori from their land. (Ward, 1999, p. 168)

Subsequently, Māori tried to exert collective pan-tribal control over their land through such means as the *Kingitanga* movement (Ward, 2009). The *Kingitanga* movement was a substantial attempt by Māori leaders to establish a separate, autonomous political authority to ensure no more of their land was taken. The *Kingitanga* movement and other movements were:

> A consequence of the effective exclusion of Māori from formal political participation during the 1850s and 1860s and was driven by Māori understanding of their political rights under the Treaty of Waitangi, and those seemingly granted under Section 71 of the New Zealand Constitution Act. (New Zealand Government, 2003, p. 6)

But when land sales slowed, or stopped, due to Māori resistance, the Crown used both military and legislative means to further undermine tribal control in order to extinguish customary title and secure the freehold (Belich, 1986; Boast & Hill, 2009; Orange, 1987; Ward, 1999).

The insatiable demands for land by new settlers were pitched against Māori unwillingness to sell, and in 1860 this dichotomy led to the 'Land Wars' For the Māori of the Waikato and Waipa "it was a war born of desperation, fought to retain the land that was their heritage and their trust for future generations" (Barber, 1978, p. 16):

> There was nothing romantic about the advance of redcoats and militia into lands where Māori farmers had tilled the soil, built flour mills, and from where they carried on a thriving trade with Auckland ….The Māori people were driven out so fiercely that even as late as 1886 only thirty-one had dared to return. (Barber, 1978, p. preface xii)

The subsequent alienation and land confiscation in some of the best agricultural districts in the next decade largely destroyed the Māori economy (Boast & Hill, 2009; O'Malley, et al., 2010; Petrie, 2002; Steven, 1989; Ward, 1999, 2009).

Petrie succinctly summarises the outcome:

> Wheat crops and flourmills, once considered signs of civilisation and loyalty, were now gleefully destroyed by government troops as a further punishment for alleged rebellion, a total of 1,610, 718 acres was finally confiscated in the Māori wheat growing and flourmill owning areas of Waikato, Taranaki, Tauranga and Opotiki under the New Zealand Settlement Act of 1863. (Petrie, 2002, p. 19)

Laws such as the subsequent "Suppression of Rebellion Act" (1863)' provided the legal means for further confiscation of land from "rebellious tribes" (Belich, 2009; Gilling, 2009). Likewise, the "New Zealand Settlement Act" (1863)' and subsequent 1864, 1866, and 1875 Amendments further eroded Māori control. The Settlement Act's preamble states "the best protection and security of well-disposed inhabitants is by introducing sufficient number of settlers to protect themselves and to preserve peace in the colony".

The combination of these two Acts enabled rapid expansion of the colony (Oliver, 1991; Ward, 2009). Under the Suppression of Rebellion Act (1863), in payment for military service, militia settler/soldiers were given land in buffer zones on confiscated land (Barber, 1978; Belich, 2009). A Sergeant was given a town section and 80 acres; a Corporal a town section and 60 acres, a Private a town section and 50 acres. The military thus became frontier farmers. They were supplied with army rations for 1 year while they broke in the swamp and bush. Their wives and families were lodged in barracks at Otahuhu and Howick, and given daily rations of meat, bread, tea, sugar, and milk (Barber, 1978, p. 31). The Waikato region was seen as particularly strategic to growing the agricultural economy because, as Māori had demonstrated, it was highly productive. It subsequently became, and remains, the dominant dairy farming region in New Zealand.

To support the entrenchment of settlers in this region, the 1864 "Auckland Provincial Special Waikato Immigration Scheme" gave free passage with various inducements such as 1 town acre and 10 suburban acres to 3000 emigrants (of

good character and health) from England, Scotland, Ireland, and South Africa (Morris, 1965). That land was the inducement to emigrate can be seen from this 1865 article from a British newspaper. It stated:

> The Colony of New Zealand possesses advantages as a field for the industry and enterprise of the immigrant in most respects to be surpassed, and in a few not to be equalled in any other country. Its singularly beautiful climate and its fertile soil are of course its peculiar characteristics. It also affords vast resources undeveloped which would yield him an abundant return. (McGregor, 1988, p. 5)

In all, the "Land Wars" divested Māori of over 3 million acres, but subsequent means of land alienation were equally insidious (Ward, 1999):

> Most of the Māori land was … acquired in the 1890's … despite the determined and vociferous opposition of Kotahitanga, Kingitanga and Māori MPs …. The penultimate grab of farmable Māori land ensured that most first class land had passed from Māori hands by 1900. (Brooking, 1992, p. 78) [12]

By 1900, the Colonial government and new settlers had transferred ownership of almost 95 per cent of the North Island (New Zealand Government, 2003). By 1930, Māori were left with only about 4 million acres which was less than six per cent of the original 66 million acres (See Table below).

Two of the dominant means by which Māori land was subsequently alienated were through the requisition of land for Public Works (Marr, 1997), and the application of the term "wasteland" to Māori land (Holdom, 1998). Justification of the wasteland sleight of hand was that the Treaty had guaranteed possession only of that land which Māori owned and occupied for their *kainga* (Māori village or settlement) and cultivations. The rest of the land, the bulk of New Zealand's 66 million acres, which from this ideological viewpoint Māori did not occupy or did not cultivate, was considered waste or wild land, or the Crown demesne (Waitangi Tribunal, 2010, p. 7).

Wetlands which were for Māori the richest and most productive food resource (*mahinga kai*), and essential to their survival and to the sustainability of their economy, came under constant attack and were deemed wastelands. Land drainage schemes in these areas were legislated by government as "public purpose works" in order to further serve "the huge demand for fertile flat land for dairy farms" (Park, 2001, p. 31). The following table, Table 9, shows the extent of the

land losses for Māori. (See also Ward, 1999 for maps showing the extent of land loss)

The influx of immigrants meant that by 1890 the European population had reached over 500,000, with the Māori population reduced to 45,000 (Pool, 1991). Ward states that for Māori the colonisation process had profound impacts. Their societal structures were damaged almost beyond repair. The land grab laws worked against controlled forward planning and divided communities against themselves. Under constant pressure, Māori economic aspirations shrank (Ward, 1999, pp. 169-170).

Table 9: Māori Land Ownership1840-1975

Year	Māori land
Pre 1840	66 million acres
1852	34 million acres
1891	11 million acres
1920	4,787 million acres
1938	4,028 million acres
1975	2 million acres

Source: twm.co.nz/TR-violn.html

This marginalisation continued unabated until the Treaty of Waitangi Act 1975. For example, the "Town and Country Planning Act" (1953) stopped Māori being able to build homes on *papa kainga* land (Māori tribal land), and the Māori Affairs Act (1953) perpetuated the policy that if Māori land was not occupied or being used, then it was declared wasteland and could be taken by the government (Marr, 1997).

Conflicting Worldviews: Implication

In summary, the pioneering phase for Māori as sovereign partners in the evolving transformation of Aotearoa to New Zealand collided with European ideologies and colonists' needs. The greatest need was the attainment of land to support individual immigrant needs, and in the longer term, the growth and economic stability of the colony. These needs resulted in the erosion of Māori society.

The Māori holistic environmental world view contrasted ideologically and materially with the European/western view. For Māori, ownership of property "was a foreign concept …. Land, water, forest and fisheries were a communal

and/or tribal right …. Resources did not belong to man, man had user rights" (Marsden, 1992, p. 18). In contrast, the European view was that progress required private ownership of land. The traditional Māori world placed central importance on *whakapapa* (genealogy) and the personification of the natural world. For Māori, "myths and legends form the central system on which their holistic view of the universe is based" (Marsden, 1992, p. 3). As in many cultures, they were used as a body of knowledge and a summary form by which to symbolise, support, or sanction particular behaviours or customary practices. The world is seen as a unified whole, where all elements are genealogically connected.

This holistic worldview contributed to the development and practice of a unique environmental ethic. This ethic did not require preservation, but sustainable use. This ethic viewed "humans as kaitiaki (guardians) of the surrounding environment. To be kaitiaki meant looking after one's own blood and bones– literally. One's whanaunga (family relations) and tupuna (ancestors) include the plants and animals, rocks and trees" (Ruru, 2004, p. 115). In contrast to this holistic approach, the colonising attitude to nature and the environment was anthropocentric and utilitarian, with nature and humans being separate. Nature was seen as a free good, and there were no environmental limits. Land was seen as being required for the calculated self-interest of individuals, and equity was not a consideration.

The political processes of these two cultures also clashed. Māori society was framed by a communal tribal system, whereas the settler government established a representative democracy with strong central government oversight which purposively alienated communal land owners. Through subsequent legislative and military means, the colonising values and worldview were reinforced and enforced. The colonial ends justified the means.

Within only 15 years from the signing of the Treaty of Waitangi, there were fewer Māori than European settlers, and Māori had lost most of their land. The history of New Zealand during the pioneer phase is what Ward (1999) calls one of "legal rapacity", in which eventually "a colonising empire and its people relieved an indigenous people of almost all their territory" (Ward, 1999, p. 167).

The development of the dairy industry was crucial to this transformation, and the next section turns to an analysis of the growth of the dairy industry. The development of grass-based farming systems set in train a commodity-based productivist agricultural model which, over time, "remade the landscape of New Zealand" (Pawson, 2010, p. 2). In Appendix V, a selection of the various legislative means through which Māori were alienated from their land is presented.

Land Acquisition and the Establishment of Farming Systems

Institutional Mechanisms

After the signing of the Treaty of Waitangi in 1840, the government acted initially as a land broker and facilitated the removal of land from Māori legislatively. The rapid increase of the settler population saw a growing need for dairy produce for the local market. The government responded by creating facilitation policies focused on rapid clearance of the bush in order to expand dairy production capacity (Yerex, 1989). For example, in 1870, Premier Vogel funded a provincial and national road and rail building scheme focused on opening up vast tracts of land. In exchange for working for minimal wages, new settlers were offered the possibility of buying bush blocks for a small deposit if they helped to build new infrastructure such as roads and bridges. The work also included clearing forests and draining swamps (Yerex, 1989, p. 32).

Strong government oversight directed land use policy. Land policy was framed around enabling the growth of the colony through the development of small, close settlements based on the family farm. The family farm was organised around the principle of one main worker. Land allocated needed to be sufficient for a man to support his family. The focus on small farms was driven by John McKenzie, the land Minister in the Seddon Liberal government (1892-1906). McKenzie had an abiding hatred of the landlord system of land ownership of Britain, and was a strong advocate for small farmers. As the number of small farmers increased, so did their political strength which saw a country quota introduced for elections in 1881where 75 rural votes was equal to 100 town votes. Some form of differential weighting of votes remained in place till 1945 (Atkinson, 2003).

While the original dairy enterprises' function was to supply the growing towns and settlements, the availability of refrigerated ships from the1880s allowed an early export industry to emerge. Until 1890, this trade was mostly to Australia, but Britain eventually became the major market.[13] Refrigeration and the development of the export market made the one-man farm a viable proposition (Plunket, 1970, p. 12).

The focus of successive governments was on growing the industry and expanding the dairy export trade. Institutional support, for example, saw the government establish the Canterbury Agricultural College at Lincoln in 1881, a Department of Agriculture in 1892, and Massey University in 1927.

A Dairy Division was also developed within the Department of Agriculture. The goal of this division was to employ people "from advanced dairying countries such as Denmark, Canada and USA" (Yerex, 1989, p. 51). The government subsequently funded factory inspectors, and facilitated extension services from agricultural institutions on to farms. The Department of Agriculture provided classes for factory managers, and dairy farmers, and employed a Chief Dairy Expert from 1889 (Newport, 1977).

The government also enacted legislation to shape and regulate the industry. The Dairy Industry Acts of 1892, 1894 and 1908 were central to establishing a uniform approach. The 1892 Act introduced regulation which determined the criteria through which to guarantee the purity of milk used in the manufacture of butter and cheese. The 1894 Act introduced a milk grading system which established payment for milk based on an assessment of its productive characteristics. The Babcock butter fat test emerged as the method by which to determine the payment for milk. The Act also made the registration of dairy farms compulsory. This gave the government the power to inspect dairy farms and factory premises in order to ensure quality control of export produce (Ward, 1975a, p. 13).

Low interest loan schemes such as the 'Advances to Settlers Act' (1894) made provision for settlers to buy land from the government (Consedine & Consedine, 2001; Newport, 1977; Philpott, 1937; Yerex, 1989), and the 1908 Dairy Industry

Act made loans available from the state for the development of cooperative dairy factories. The loans could be used for the purpose of acquiring land, erecting buildings, and the buying of machinery. Legislation also enabled further wetland drainage schemes and forestry clearance in order to make more land available to support the industry's growth.

In summary, the key feature of the pioneering era is the close relationship that rapidly developed between the dairy industry and the government in order to develop a modern industrialised and specialised export-focused industry. To support this goal, the government funded research institutions, and put in place laws through which to support the development of a standardised industry. Government and the emergent dairy industry sought to solve the social and political problems of sustaining the colony through dairying.

The Pioneering Dairy Industry

The emergent dairy industry grew out of small, tight community networks built out of necessity. Dairy farming had not been the background of the majority of immigrants (Yerex, 1989). For many new settlers, farming was the only means to ensure their economic survival. The first priority of early settlers was the clearing and burning of bush in order to turn it into pasture (Warr, 1988). There developed a strong 'we are all in it together' attitude as families and communities struggled for survival. From this hardship, an ethic of community cooperation evolved which eventuated in support for cooperative management (McMeekan, 1964).

Cooperative Management

With government support, cooperative factories owned by the dairy farmers of different districts became the dominant structure for the industry. The cooperative approach meant farmers could collectively export their product and share the collective returns of their labour. Pooling resources gave the dairy communities first, the capital to guarantee loans in order to build factories, and second, more control over the production and, eventually, the marketing of their product. The minimum supply justifying the establishment of a butter or cheese factory in order for it to be economic was 800 cows for a butter making factory, and 600 cows for a cheese factory, with the potential for increased supply (Newport, 1977; Stephens & Clark, 1970). The view of farmers was that "by owning the factory they could

get the profit margin for themselves [cut out the middle man], and hopefully control the marketing of their produce" (Yerex, 1989, p. 68).

Under the cooperative structure, elected representatives were charged with deciding industry structure, policy, and direction. Elected representatives were controlled by their shareholders (the farmers) and were required to be supplying shareholders themselves. Cooperatives were also developed for the supply side of the industry. For example, cooperatives were established to produce and supply superphosphate and other chemicals to farmers, and mutual farm insurance companies were also established (Te Ara, 2011).

A key person in the development of the cooperative approach was the first government-appointed Chief Dairy Expert, John Sawer, who arrived from Scotland in 1889. Sawer was a strong advocate of the cooperative approach and regional dairy associations. He supported dairy factory managers' conferences and oversaw the establishment of the *Dairyman Journal* as a means for discussion, sharing of problems, and dissemination of information amongst isolated dairy districts (Philpott, 1937; Ward, 1975a).

By 1899, there were more than 400 separate dairy cooperatives operating their own local factories throughout the country (Philpott, 1937). A National Dairy Association and South Island Dairy Association were also established. These organisations were subsumed into the New Zealand Dairy Control Board in 1924 when it became the central organising group for the industry (Duncan, 1933). The Board had statutory powers and consisted of two government members, nine representatives of suppliers to dairy factories, and one member representing merchant and proprietary interests. Its role was to control and supervise the export and sale of butter and cheese. The Board had the power to exercise either limited or absolute control over the export of dairy produce. Funding for the Board came from levies on butter and cheese exports. The Board's role was oversight of shipping, insurance, and advertising. Part of the levy was matched by a government grant in order to support research at different research institutions. The goal was to improve the quality of dairy produce, and "the economics of manufacture and factory and farm practices" (Duncan, 1933, pp. 14-15). In 1935,

the name changed to the New Zealand Dairy Board. The Dairy Board worked to ensure the industry's success.

Another important strand of the cooperative approach was the joining together of different branches of regional farmers' unions into a national organisation in 1902. The unions were the advocacy body for farmers. A resolution document that came out of the 1902 conference stated:

> Although the New Zealand Farmers Union is in no sense a political organisation, yet no body of men, such as are farmers, can ignore the fact that they have an intimate necessity of watching politics to see that their interests are safeguarded. (New Zealand Farmers Union, 1902, p. 10)

It further states that "while they do not seek to meddle with politics unless it directly affects them, the fact is that they are the biggest taxpayers in New Zealand" which gives them "the right to keep a close eye on the government's borrowing, which is at their expense". In their opinion, "the greatest safeguards should be taken to ensure proper expenditure … and a constant attention to the doings of Members of Parliament." They reminded members that "their strength lies in their numbers, and they can be a great force in guiding the politics of 'our' country" (New Zealand Farmers Union, 1902, p. 10).

Another key role of the Farmers Union was information distribution which was first done through the *New Zealand Dairyman.* In 1906, the union founded its own paper, the *Farmers' Union Advocate*. The current *Straight Furrow* is a descendant from this first paper. In 1945, the union joined together with the sheep industry and formed Federated Farmers, a body that continues today to be an important lobby group for farmers.

In summary, the conjunction of the various dairy industry groups, the Dairy Products Marketing Board, and the individual cooperatives enabled a strong collective voice for the industry, and national representation of the dairy industry's concerns at the government level (Yerex, 1989). The export focus determined also that a specialised, industrialised, and uniform approach to dairy farming and dairy manufacturing was supported (Ward, 1975a).

Practical Science and Extension

The pioneering era also saw the emergence of a symbiotic alliance between farmers, extension workers, and scientific researchers in government institutions. There was an industry and government focus on increasing productivity through the application of science across all farm systems. Because the industry was not bound by established customs, people were more ready to adopt new technologies. For example, by 1920, 50 per cent of herds were machine milked (Philpott, 1937; Ward, 1975a).

Guides such as *The Science of Dairying: A Text Book for the Use of Secondary and Technical Schools* (Penlington, 1948 fist published in 1915) became a bible which provided a practical understanding of the science of dairying, and the application of science to dairying as required on the early farms. Farming had become a scientific enterprise.

Once the Babcock test for butter fat became the means of payment for milk, the focus shifted to finding the best breed of cow for the production of butter fat (Penlington, 1948, p. 8). Practical science turned to analysing which breed was the most productive and why. The economic value of increased productivity was quickly established:

> Everything which helps to increase the size of the monthly cheques is of importance to the dairy-farmer. If he is a factory-supplier and is paid for the butter fat which his milk contains, he will use every available means of making the yield of fat from his herd as large as possible. Not only should he pay attention to the health and proper feeding of his stock, but he should take care that his herd contains no cows whose yield of milk does not pay for their keep and leave a fair profit as well. (Penlington, 1948, p. 152)

To ensure this utilitarian and production-focused ethos was sustained across the industry, herd testing associations were established. Subsequently, record keeping became an important element of dairying. Herd testing enabled a calculation of both fat-percentage and quantity of milk which enabled the year's yield of milk and butter fat to be calculated. This mechanism enabled each farmer to objectively ascertain the value and utility of each cow. Herd improvement became an essential component for the industry, and breeding for the best hereditary characteristics was established as a norm. The benefits of butter fat testing of dairy herds were seen as follows:

> First, the farmer can ascertain with certainty the cows which are maintaining their production. Second, replacements in the dairy herd can be made from stock of proved producing quality. Third, interest in the production figures is stimulated, and comparisons with the figures of the previous year will indicate the progress which will certainly be made and fourth, the farmer can register calves from his high producing cows under the calf marking scheme. (Duncan, 1933, p. 18)

From 1921 onwards, a group system of testing was established with a subsidy from government. The legacy of this system is that information on herd improvement has been gathered and stored in New Zealand since 1908 (Livestock Improvement Corporation, 2009). Success was demonstrated by increased production, with solutions for success derived from science and the development of new technologies. The focus was on practical science for production goals.

In the pioneering era, the goal was to sustain the economy through a national development project that required the wholesale transformation of the natural environment. In the last section, I present some of the institutional means and normative values which supported the reconstruction of the landscape in order to facilitate the growth of the dairy industry.

Approach to the Environment

> *For along the paddock, and down the gully,*
> *Over the multitudinous ridges,*
> *Through valley and spur,*
> *Fire has been*!
> *Ay, the Fire went through and the Bush has departed,*
> *The green Bush departed, green clearing is not yet come,*
> *'Tis a silent, skeleton world;*
> *Dead, and not yet re-born,*
> *Made, unmade, and scarcely as yet in the making;*
> *Ruins, forlorn, and blank.*
> *(Blanch Baughn (1860) in Curnow, 1960, p. 104)*

> *Damp and dripping forests, exhaling pestilent vapours from rank and rotten vegetation … swamps unproductive …. undesirable to the European aesthetic – messy and without order* (Charles Hursthouse, 1857).

Settler farmers were confronted with a whole new set of circumstances in New Zealand. In order to develop their farms, trees needed to be cut and burned, and the land seeded in order for it to support cattle (Yerex, 1989). This destruction of the indigenous environment by land users, supported by legislation, was aimed at the development of a productive grass monoculture which could sustain the

economy of a burgeoning settler community (Valentine, et al., 2007). The Forest Act (1874) did try to address the rapid depletion of forest cover, but it failed, and the period between 1874 and 1894 saw the most rapid tree clearing in New Zealand's history.

> By 1920 the natural forests had been reduced from 14.3 to 9.5 million hectares, and farm numbers had reached more than 80,000. (Valentine, et al., 2007, p. 312)

There was no time to think about the implications of clear felling native trees or the loss of soil and ecology. What followed was catastrophic for the indigenous environment, and more rapidly done than anywhere else in the world (Swaffield & O'Connor, 1986).

Concerns with nature conservation, or environmental limits, were limited to building a sense of nationhood and national identity through protection of iconic scenery. This end was achieved through the setting aside of designated national park zones. Unless areas were designated for scenic tourism, or as character-building recreational areas, they were deemed worthless. The first designated national park was established in Tongariro in 1894, and the 1903 Scenery Preservation Act legislated for the setting aside of more land for national parks. However, the bulk of these areas were established on land that had been already set aside as native reserves for Māori (Park, 2001).

The 1910 amendment to the Scenery Preservation Act enabled the Public Works Act to be used to acquire land compulsorily in order to preserve the indigenous flora and fauna, but it also prohibited any human use of scenic reserves (Marr, 1997). Māori had already under the 1907 Animal Protection Act been prohibited from customary trapping or snaring of native game in these areas, and the amended Act reduced further their ability to live on their lands in any traditional way. By 1920, 525 scenic reserves had been established in New Zealand (Park, 2001). The parks functioned as iconic landscapes rather than as lived environments integrated with land use. Consequently, "land users generally saw themselves, and their use of land, as separate from, or in contest with land use for nature conservation" (Swaffield & O'Connor, 1986, p. 4).

Other legislation, such as the "Bush and Swamp Act" (1903), reinforced this utilitarian and reductive view of the environment. For example, under the Act, farmers were given relief from rates and rent if they took up this "inferior" bush and swampland. The 1908 "Swamp Drainage Act" provided government support for further swamp drainage schemes, and "put in place the legal mechanisms by which Māori swampland could be compulsorily acquired" (Park, 2001, p. 20). The legislation did not allow Māori any recourse if drainage affected their *mahinga kai* (Park, 2001). On the Hauraki Plains, 5,200 acres (2104 hectares) were drained and burnt ready for the ballot. A local newspaper reported these actions as:

> The splendid results of turning useless swamp into rich farmland … making a wilderness carry a prosperous population and produce ever increasing wealth (quoted in Park, 2001, p. 20).

A particular perception of progress, through growth in production on the family farm, was established and deviation from this norm was not tenable.

The prescience of the view and attitude of Joseph Banks and James Cook presented in the opening quotes of this chapter resound through time in the goals of these Acts, and also within the 1913 Royal Commission on Forestry. For example, in 1913 the demand for land by the dairy industry culminated in a Royal Commission on Forestry. The Commission report stated that the kahikatea which was the dominant wetland tree was central to the country's interests, because the soil of white pine (kahikatea) swamps when drained and the trees removed was the richest land for agriculture. The finding of the Commission was that:

> No forest land which is suitable for farm lands, except if it is required for a scenic or climatic reserve should be permitted to remain under forest if it can be occupied and resided upon …. Since no land is more suitable for occupation than that of the white-pine (kahikatea) swamps, when drained, their value in this regard is a strong plea in favour of the removal of the trees forthwith. (Park, 2001, p. 21)

The kahikatea plantations had already been extensively reduced, as they had been used as to make butter boxes and cheese crates for export of dairy product (Philpott, 1937). The Forestry Act consolidated the demise of the kahikatea and other indigenous forests and through this brought about the extinction of many of the native birds and other flora and fauna in these areas[14]. A reductive view of the environment which supported the destruction of flora and fauna was established in

law. Through legislation, environmental destruction was facilitated in order to enable a landscape dominated by grass.

The success of the dairy enterprise was linked to grass being able to grown for 10 months of the year as compared to 5 in Europe. Low cost production was viewed as essential due to the added cost of the distance from New Zealand to export markets. The long season and full grass production were seen as the dairy farmers' competitive advantage. As a consequence, annual production per acre could far exceed that of other countries, and there was less necessity for the traditional English farming approach, where land was left fallow and alternative forage feed was grown

However, although the climate and other conditions were favourable, the soils were found in some areas to have low levels of natural fertility, and were thus less productive than anticipated. As a result, "the myth that little more than bare hands, courage and modest capital had started to unwind" (New Zealand Heritage, 1973, p. 215). A solution to the lack of fertility was sought in science.

To facilitate the "grasslands revolution"(as it was subsequently dubbed by the scientists who oversaw it) (Brooking, Hodge, & Wood, 2002), a suitable source of fertiliser was needed and this turned out to be superphosphate (SPP)[15] (Group One, 2011). The acquisition of Nauru Island in 1919 as a "spoil" of World War One provided a ready supply of phosphate, while the environmental destruction of Nauru was ignored (Brooking, et al., 2002, p. 172). Between 1900 and 1925, fertiliser use increased from 25,000 tonnes to 400,000 tonnes per year. That this approach was successful was verified through the rapid production increases on static land areas (Brooking, et al., 2002; Hopkins & Wilson, 2006).

The second major problem that the government sought to solve was the preponderance of weeds. The introduction of the "Noxious Weeds Act" 1908 meant that occupiers of land were required to keep under control particular noxious weeds and seeds as outlined in the schedules of the Act by cutting them down to stop them flowering. Failure to do so resulted in fines. The continued differentiation between Māori and Pākehā is demonstrated in that, while the law applied to both, if Māori failed to comply, the Governor General had the right to

compulsorily take their land and lease it out to pay costs incurred (Noxious Weeds Act, 1908, Sect, 12.2).

There were differences of opinion between government departments as to how the environment should be managed. For example, in the 1930s the Department of Scientific and Industrial Research (DSIR)[16] had identified "the severity and extent of soil erosion", and recommended that some of the more remote and erosion prone land areas should be removed from farming through regulation. Nevertheless, the Department of Agriculture was reluctant to accept their assessment, and was committed to "improving productivity by ushering in an era of more intensive agriculture" (Roche, 2002, p. 193).[17] The Department of Agriculture supported the view that a voluntary approach was the best way to address soil conservation, and that there should be an emphasis on "education, promotion, and demonstration of soil conservation techniques rather than direct regulation of land use" (Roche, 2002, p. 195). The view was that the dairy industry was too important to the economy, and that government should not dictate what private owners did on their land (Roche, 2002). This thinking established that a voluntary approach rather than a regulatory response would be supported. That a voluntary approach is the best means by which to deal with environmental risks of agricultural production has remained embedded in the institutional culture of government and its relationship with the agriculture sector over many decades.

The attitude to land in this era is well summed up by Arthur Morton, a Taranaki dairy farmer, in his comments on the changes in the Waikato between 1900 and 1913. He stated:

> A few years ago it was common to look upon the lands of the Waikato as comparatively useless. I remember on my first visit to Te Aroha … one went most of the way through swamps or through ti-tree [*manuka*], whereas on almost all those places where there was ti-tree there are now smiling farms, grass paddocks, well-built dwellings, substantial sheds and first class herds. The lands are being brought under cultivation. (Morton in Ward, 1975a, p. 29)

He effectively summarises the pioneering attitude to the environment as the need to conquer and tame wild nature. In order for land to have any value, it had to be turned into richly productive agricultural land; and in order to reach its potential,

the land needed to be "broken in" and "cultivated fields [meant] a civilised nation" (Bell, 1996, p. 36). The approach to the environment was that the environment equated to the farm – the environment was the farm and the environment could be managed through scientific research. The land was shaped by an anthropocentric and utilitarian view of nature. Nature should serve human ends. The environment was there to be mastered in order to serve the self-interest of individuals, and self-interest would benefit the burgeoning nation. Once "conquered" and "tamed", the New Zealand environment was viewed in terms of its productive characteristics, which included an equable climate with plenty of rainfall and sunshine (McMeekan, 1964). Table 10 below presents some of the elements established as the normative values and institutional practices of government and the dairy industry in the pioneering era. Many of these elements still shape the relationship between the industry and government today, and, therefore, remain influential elements in contemporary sustainability and land-use politics.

Table 10: Influence of Pioneering Discourse

Influence of pioneering discourse on contemporary discourse
It was established that:
Government would legislate and subsidise the dairy industries to ensure their success as the "backbone" of the economy;
A reductive and utilitarian approach to the environment was acceptable, and the holistic worldview of Māori was invalid;
There would be supportive government-funded institutions to solve dairy industry production problems;
The application of fertiliser and chemicals was essential to successful land use practices;
Nature could be captured in iconic scenic reserves;
Low cost, specialised commodity production was necessary due to distance to markets;
A cooperative approach best served the interests of the dairy farming community;
A voluntary approach was acceptable to rectify environmental problems of agriculture practices on the environment;
The state's role was to resolve conflict among competing interests rather than to ensure wise use of resources;
Economic sustainability came before ecological sustainability.

In summary, the development and application of fertilisers and the quest for appropriate pesticides and herbicides to control weed problems on land became established as essential to land use practice in the pioneering era. The apparent success of chemical farming determined that this approach to farming practice became hegemonic. An ad hoc approach to agricultural risks was established. Furthermore, as new problems arose they were dealt with on a case-by-case-basis. Agricultural problems were technical problems best left to experts to solve.

Conclusion

During the pioneering era, the New Zealand settler identity was shaped by the land. The ideology was that there was a need to transform the land into a "Britain of the South" (Parks 1995 in Swaffield, 2008). The pioneering era saw the creation of legislation, policy, government institutions, and industry systems through which to facilitate an economy based on grass (Brooking, et al., 2002). Problems were best solved through scientific and technological advancement. The indigenous environment and Māori were seen as a hindrance to the growing rural economy, and legislation aided the further reduction in forest and swamp ecosystems and the taking of Māori land. A philosophy that "the landscape [should be] valued for its biological productivity as a material resource" (Swaffield, 2008, p. 4) was set in place. To ensure this vision, a network of government-funded science and technology institutions emerged to enable the practical application of science to the dairy industry.

If assessed against the discourse framework, what emerged from the pioneering era was a blueprint of the technological discourse (see Table 11). Central to the pioneering era was the development of a reductive, technologically focused approach to land. The focus was on enhanced production through the application of new knowledge generated from state-supported institutions. Technocentric decision-making was normalised. With expert support, a utilitarian approach was applied to the emerging farm environment. Dairy cooperatives led to industrialised factory systems focused on the production of a uniform product (butter and cheese) for an export market. The maintenance of standards for the industry on the farm, and in the factory, was enacted through government legislation. This approach guaranteed a standardised dairy product designed for the British market.

It was a hierarchical approach with experts being the dominant organising force. The determination of risks was shaped by experts through scientific, objective decision-making. Any environmental landscape or sociocultural values outside of the emergent productivist ideology were marginalised, and the Māori holistic worldview and knowledge about land and land use were all but eradicated. The dairy industry became to be viewed as "the backbone" necessary to sustain the New Zealand economy through commodity production for the British Empire.

Table 11: Dominant Discourse of the Pioneering Era

Pioneering Era Government & Dairy Industry	**Technological Discourse**
Normative Values	Economisation of the environment –nature a free good, no environmental limits; Technical solutions to social and political problems; Anthropocentric – separation of nature and humans; Utilitarian – action stems from calculated self-interest; Reductionist social world constructed from component parts Social, cultural and nonanthropocentric values, particularly those of Māori, undermined.
Institutional Mechanisms	Established legislation and policy which reinforced utilitarian and reductive view of the environment; Regulation ensured that no constraints on continued economic growth of the emergent agricultural industry; Transparent regulation that outlines responsibilities and rules; Specialisation; Hierarchical, less democracy and more expertise and specialised organisations; Key relationship between politicians, officials, scientists, and industry.
Approach to environmental risk	Environmental risks technical problems; Environmental risks dealt with in an ad hoc manner on a case-by-case basis; The environment serves economic imperatives; Concerns with nature conservation limited to building a sense of nationhood and national identity through protection of iconic scenery in designated national park zones; In order for land to have any value, it had to be turned into richly productive agricultural land; the land needed to be 'broken in'; cultivated fields meant a civilised nation.

This section concludes my assessment of the pioneering era discourse. I next turn in Chapter 5 to the productivist era and offer an assessment of the normative values and institutional mechanisms that shaped and consolidated a productivist approach to land use.

Chapter 5

Productive Land

From 1920 to 1960 faith ran high in the limitless possibilities of science and technology to resolve humanity's problems …. Agricultural scientists who held considerable power and influence in New Zealand over this period, shared this optimistic faith in man's capacity to tame and improve upon nature (Brooking, et al., 2002, p. 174).

Introduction

In the postpioneering era, from the 1930s onwards, productivism emerged as a cohesive, dominant discourse that shaped and entrenched institutionally a productivist approach to land use for the dairy industry. The primary focus of government and the dairy industry was to cement the mechanisms through which a technologically driven and productivist approach to land management could be sustained. The key questions being asked in this chapter are: How was the productivist approach to land use and the environment institutionally sustained during the productivist and hyperproductivist era? What were the implications of this approach for environmental sustainability? And, what discourses emerged to challenge the hegemony of productivism?

The chapter addresses these questions by beginning with an overview of productivism as a discourse. It then examines how the productivist discourse has shaped agricultural policy and dairy industry practice in New Zealand. The first phase of productivism started in the 1930s and continued until the 1980s. The second phase emerges out of the neoliberal political reconfiguration of the New Zealand state from 1984 and continues today.

Productivism

Productivism is described as "an intensive, industrially driven and expansionist agriculture, with state support, based primarily on output and increased productivity" (Wilson, 2001, p. 78). It is characterised by the central hegemonic position of agriculture in rural society and, therefore, gave great security to agricultural actors and institutions (Ward, 1993; Wilson, 2001). Agriculture, from a productivist stance, is seen as having the greatest claim on the use of rural land,

and farmers are the best protectors and "stewards" of the countryside. This is evident in the following quote. It is a:

> … conservative vision, respectful of private property and traditional agrarian institutions, with the main threat coming from urban and industrial development ….The rural [is] defined in terms of agricultural production. (Wilson, 2001, p. 79)

Productivism ideologically is marked by a deep faith in the limitless possibilities of science and technology to resolve humanity's problems. Scientific knowledge for agriculture is seen as a public good. The main purpose is to improve the material conditions of mankind (Mokyr, 2004, pp. 24-26). It is a technological discourse that sits within the positivistic philosophical tradition, the roots of which are bound tightly to reductionist science. Reductionist science seeks to simplify complexity through the use of experimental research, predicated on the assumption that "as our knowledge about the world increases, so does our ability to control it" (Sandström, 2002, p. 23). Productivism views sustained technological progress as the primary engine of growth, and the best means by which to increase economic efficiency. This discourse has framed institutional and agro-practice, and driven productivity growth globally for 150 years (Bawden, 1991).

As an approach, it became further entrenched globally as increased production became the aim of rural policy of international organisations such as the World Bank and the UNDP after World War II (Jay, 2004a, 2007; Wilson, 2001). The justification for this approach was that food security was essential (Wilson, 2001). It was necessary to "feed the world", and only a productivist approach could curb the possibility of a global food supply crisis. Quantity of production, not quality, was the imperative (Rosin, 2013).

A productivist food regime, therefore, is characterised by mass production of standardised agricultural commodities and the expansion of world food trade for a capitalist market (Rosin, 2013). It is an anthropocentric and utilitarian discourse with economic values taking preeminence over ecological values, with the primary goal being to sustain continuous growth. It is supported by technologically-oriented administration systems, managed by experts and policy

elites. Nature is commoditised, and seen as a free good, and environmental problems are externalised (Wilson, 2001).

Productivism, therefore, is an approach to farming that is subject to industrial modes of production. Through a network of state and industry institutions, research and development is focused on process innovation to maximise food production for the global market. The focus of agriculture Ministries and other state agencies (including research and development and financial institutions) is to facilitate the continual expansion of the agricultural sector in order to support an intensive food regime (Jay, 2004b).

The primary goal of productivism is to sustain and increase levels of production (Wilson, 2001). The application of expert knowledge via agricultural education and extension leads to the internalisation of a "productivist" ethic by the farming population, and farm organisations become focused on building economic efficiency goals into farming practices through intensification, specialisation, and concentration. To support productivism, governments introduced interventionist and subsidised regulatory and policy regimes which aimed to: first, protect local agriculture from flux in the global economy; second, enhance regional food security and self-sufficiency; and, third, maximise local primary production (Mackay, Perkins, & Espiner, 2009, p. 3).

The next section illustrates how the government and the dairy industry together cemented a productivist approach to agricultural production and land use in New Zealand. It outlines the various means by which this approach was made hegemonic through laws and the development of a close R & D extension relationship between government and the industry, and it explores the implications of productivism for the environment.

Entrenching Productivism in New Zealand

The depression of the 1930s placed huge economic pressure on the New Zealand farming community (Bassett, 1969; Newport, 1977). Even with the production gains that had been made during the pioneering era, many farmers were desperate. For example, between 1928 and 1935 dairy exports had increased by 133 per cent, but with only a 16 per cent increase in revenue which meant that "many farmers

on paper were hopelessly bankrupt" (Sinclair, 1946, p. 9). A 1934 report to the Dairy Industry Commission reiterated the importance of the dairy industry to the economy, and concluded that if the dairy farmers went under the nation would soon follow (Ward, 1975, p. 89).

Institutional support for the dairy industry was confirmed with the 1935 Labour Government putting in place a guaranteed price scheme for dairy farmers. This would give farmers a predetermined price for butter fat, and the government would have responsibility for marketing dairy products. It was supported by farmers as it gave stability and security to the industry. The Products Marketing Act (1936) affirmed government support for the industry. The Act states:

> It is considered essential and in the public interest that producers of primary products should, as far as possible, be protected from the effects of fluctuations in market prices (Preamble) …. It is necessary to help farmers by fixing prices because of the necessity … of maintaining the stability and efficiency of the dairy industry. (Part II, 20(a))

This is a quintessential productivist discursive statement. Farmers needed to be protected from fluctuations in the market, because sustaining farmers was in everyone's interest.

Alongside price guarantees, other policies introduced by successive governments to protect and subsidise the industry included: an exclusive rural bank with low interest loans: farm subsidies for fertiliser, pesticides and farm equipment; and, protectionist policies such as the establishment of tariffs by which to further shield local primary production from global competition (Mackay, et al., 2009; Newport, 1977; Ward, 1975).

Farm management became increasingly linked to and integrated with international market requirements. Milk factories became closely aligned with global food distribution systems which were focused on bulk commodity production, with products fitting within international regulatory requirements (Jay, 2007, pp. 268-269). To support this standardisation, legislation was introduced which reinforced and reemphasised the health and safety of farm and factory processes. For example, the Dairy Regulation Acts continually upgraded the standards required for the operation of milking machines and equipment, and the criteria for milking

sheds, yards, and factories (Newport, 1977). A guaranteed price for dairy products remained in place until 1961 (Yerex, 1989).

Another example of institutional support for a productivist approach is demonstrated in the government's response to the general downturn in prices for commodities globally, and the oil shock in the 1970s (Gouin, Jean, & Fairweather, 1994). The government reacted to this crisis by reaffirming support for the dairy industry. Further protectionist policies were put in place to buffer the industry (Gouin, et al., 1994; Kesting, Courvisanos, & Wells, 2010). Policies included the 1976 Livestock Incentive Scheme (LIS), which provided low interest loans and tax relief, the goal being to increase stock units; and, the 1978 Land Development Encouragement Loans (LDEL), which offered low interest loans and development expenses for farmers to turn "unimproved land" into permanent pasture (Gouin, et al., 1994, p. 21). In 1978, a guaranteed price on dairy products was also reintroduced as a means of guaranteeing farmers' incomes.

The suite of policies enacted by government emulates a productivist approach to agriculture. The focus was to ensure that, through government policy, sustained production would be guaranteed and farmers would be protected. The culmination of these policies was that by 1985 subsidies to the agriculture sector had "reached close to 40 per cent of the budget deficit" (Gouin, et al., 1994, p. 15).

The Productivist Dairy Industry

From the 1930s, with the guaranteed price for dairy produce, and with marketing taken out of the industry's hands, the industry turned to building efficiencies in an integrated manner between farm and factory systems (Mackay, et al., 2009; Ward, 1975). The costs of building new factories and the introduction of new technologies such as bigger milk tankers to pick up milk saw further amalgamation of cooperatives. New factories were designed to enable the bulk production of specific products (e.g., milk powder, cheese). Success for the industry was measured by milk payout, and the industry's view was that achieving economies of scale was the best means by which to enable the maintenance of New Zealand's low cost production, and return better milk payout to farmers. Success in world markets, therefore, required amalgamation of cooperatives, intensification of farm systems, and specialisation in products (Ward, 1975).

In 1961, control of marketing was returned to the Dairy Board. The Board's awareness of the growing uncertainty of the guaranteed British market due to Britain's entry into the European Economic Community (EEC) (Ward, 1975a, p. 193; Yerex, 1989) saw the Board's focus turn to identifying new markets. Markets were identified in the United States, Canada, Japan, and Asia, and new products such as casein and milk powder were developed to fit these new markets.

Whereas in 1954 only 3 per cent of dairy products had been sold to countries outside Britain, by the end of the 1960s, 22 per cent of dairy products were sold in almost 70 countries (Ward, 1975b). The range and ratio of products being produced had changed, and milk powder production had more than doubled. The economic insecurity generated through loss of historical markets shifted the shape of the industry (through the Board) towards acting as a multinational company. The direction and vision for the industry were to expand and become a dominant actor in the globalising food network, by being responsive to different customers, and different market needs (Gray & Le-Heron, 2010; Oman, 1996).

By 1980, the Dairy Board had established joint ventures and had 19 subsidiaries and associated companies around the world. In 1990, there were 40 subsidiaries and, by 1995, there were 80 (DCANZ Dairy Companies Association NZ, 2013 n.d.). In addition, by 1980, in line with the view that an economy of scale required fewer cooperatives, further amalgamations had seen dairy cooperatives drop from the 100 in 1960 to 20.

In summary, the dairy industry values and goals demonstrate the internalisation of a 'productivist' ethic by the farming population and farm organisations. The focus of the industry was to build economic efficiencies through intensification, specialisation, and concentration. The approach taken by the dairy industry exemplifies the key elements of productivism with economy of scale, specialisation, and intensification as the overarching elements that shaped dairy industry systems.

Another major element of the productivist discourse is that governments should support the agricultural sector through development and maintenance of a network of publicly funded science and research institutions. I next evaluate how this

element was institutionally supported through what has been dubbed 'the grasslands revolution' (Brooking, et al., 2002).

Practical Science and Extension: The Grasslands Revolution

> I want to thank science for making available to farmers some 243 chemical fertilisers and herbicides rather than the handful that were present in the1920s. (Smallfield, 1970)

A leading scientist from this era stated that the biggest contribution to productivist farming was the development of large and efficient research stations such as Ruakura[18] which dealt with the practical problems of primary production (McMeekan, 1964). This research station in Hamilton, together with research in the Department of Agriculture, Massey and Lincoln Agricultural Colleges, the Department of Scientific and Industrial Research (DSIR), and the Dairy Research Institute provided a network of institutions (under the rubric of public good science) funded by government and farmers' levies. Their collective goal was focused on building and refining production processes on farm and within factory systems (Smallfield, 1970). The focus of research was on improvement in pasture and cow productivity to sustain increased production. The goal of research institutes was to build what has been dubbed the 'grasslands approach' across all family farms and farming systems (Brooking, et al., 2002; McMeekan, 1964).

The aim was to maximise milk production and milk payout for farmers through application of more intensive farming techniques, increased mechanisation and specialised labour (Dann, 2002; Jay, 2007, p. 268). Bruce Levy, who headed the Grasslands Division within the DSIR, came to be touted as the evangelist of grassland faming (Galbreath, 1998). He believed that land fertility needed to be maintained through the topdressing of pasture with superphosphate and other minerals to sustain productivity, the goal being to have "every possible hectare of New Zealand covered in high producing pasture" (Brooking, et al., 2002, p. 171).

Plant breeding research under his guidance focused on finding the most vigorous and persistent clover and rye grass strains best suited to producing the most successful sward (combination of grasses) for New Zealand conditions. Uniformity was key (Levy, 1970). However:

> The ryegrass-clover pasture system [which was developed] was based on the extravagant use of phosphate to manure the clover, which then fixed

> nitrogen, which then in turn became available to the ryegrass (Galbreath, 1998, p. 74).

This approach meant that understanding the soil or the farm as a holistic system was unnecessary; all that was required was the application of fertiliser to facilitate continued growth in production.

To support the grasslands approach, research focused on individual components not connected systems. Animals, fertilisers, and biological and chemical pest control science were all separate strands of scientific research. Farm management systems also came under scrutiny (Riddet, 1957). The belief in science as the solution had been reinforced early in New Zealand with the demonstrable success of the application of minerals such as cobalt and superphosphate on marginal land subsequently being successfully put into pasture (Brooking, et al., 2002, p. 170; Lord Bledisloe, 1932; Pohlen, 1957; Rigg, 1945; Smallfield, 1970). The focus on fertiliser, particularly superphosphate, to build production saw fertiliser usage increase from 400,000 tonnes in 1920 to nearly 2 million tonnes by1966, and lime usage rising by nearly a million tons over this same period (Smallfield, 1970, p. 135). By 1985, 3 million tonnes of superphosphate were being used annually to support production. This tonnage represented 2 per cent of the total world production (Winder, 2009).

Chemical science for insect and weed control was another key strand of science in support of the grasslands approach. Once chemical insecticides such as DDT were found to be effective for weed and insect control, they came to be thought of as the "final solution to insect pest problems, with DDT being regarded to insect pest problems like the atom bomb, as a marvel of modern science" (Galbreath, 1998, p. 96). A chemical farming approach was thus established, with a symbiotic relationship between grass and the application of fertiliser and herbicides linked intrinsically to farm practice. This approach was seen as the only means by which pasture yields could be sustained and production goals met (McMeekan, 1964).

Another major strand of scientific research was the continued focus on the most 'productive' cow. The goal was to drive butter fat production rates higher across the national dairy herd through herd selection and culling of less productive

animals (Livestock Improvement Corporation, 2009). Productivity on farm was closely aligned with operating efficiency, measured in terms of "average milksolid/milk fat per hectare, the average milksolid/milkfat per cow, and average cows per hectare" (Conforte, Garnevska, Kilgour, Locke, & Scrimgeour, 2008, p. 9). Subsidised national animal management through herd testing, and later an artificial breeding service, was established. Record keeping which demonstrated the production of herds became part of the everyday processes of farmers, and the guide that demonstrated a farmer's success (Jay, 2004b, 2007).

The grasslands approach was made hegemonic through a combination of scientific research and development and a farm community ready to accept scientific expertise and explanations and put into practice the offered solutions. This productivist ethic was reinforced by government institutions, industry leaders, rural newspapers, farm field days, agricultural advisors, and support services that together were all influential in the everyday information that the dairy farmer drew on and which together enabled what type of new knowledge would be disseminated into the industry (Callaghan, 1957; McMeekan, 1964).

The statistical tables in 'Dairy Industry at a Glance' (New Zealand Dairy Board, 1974) give a good overview of the trajectory of changes in this first productivist phase, and demonstrate the increase in efficiencies, intensification, and specialisation across farm systems. In brief: there are fewer and larger farms; double the number of cows being milked per farm; and, a transition in dairy cow herds from Jersey to Friesian in order to get higher butter fat yields per cow. Between the 1930s and the 1970s, the number of cows in the national herd nearly doubled from 1.5 million to over 2.8 million cows.

In more recent research (Jay, 2007), farmers were asked what made a good farmer. There was agreement that farmers came under stress if their milk production dropped. One stated:

> I think high production seems to be the main one really. It's like running a race. It's the fastest gets the prize; the farmer that produces the most milk is the most successful farmer … and where does profit come into it? …Well profit is just what you get out of it (Jay, 2007, p. 270).

Table 12 shows the trajectory of production changes of the dairy industry over the first 70 years of growth.

Table 12: Production Changes 1910-1980

Year	Average herd size	Average butter-fat/cow at pail per lb./[kg]	Number herds	Total cows/milk	Cooperatives
1910	28.2	139 [63]	19,995	634,000	400
1920	18.7	174 [78]	43,980	890,000	
1930	23.5	241 [109]	60,745	1,479,000	
1940	26.1	255 [115]	63,300	1,759,000	
1950	33.4	256 [116]	53,300	1,898,000	168
1960	48.8	283 [128]	36,700	1,919,000	100
1970	100	284 [128.5]	21,900	2,079,000	
1980	126	332 [151]	16,907	2,045,000	20

Source: (DairyNZ, 2012; Ward, 1975a)

The accelerated intensification of dairy farming had significant implications for the environment, as discussed in the next section.

Approach to the Environment

> *Most of the environmental damage from industrial agriculture is invisible, there is nothing left to see (Park, 2002).*

Productivism is characterised by agriculture holding a central hegemonic position in rural society, and having the greatest claim on the use of rural land (Wilson, 2001). In this ideology, rural land is productive land, and this view determined what land *should* be used for, and what approach to the environment would be supported. Viewed from this perspective, healthy land was productive land covered in pasture (Rosin, 2013). In New Zealand, this position was taken to an extreme, and by 1970, 51 per cent of New Zealand's surface was grassland. In comparison, the world average is 37 per cent (Bewley, 1970; Brooking, et al., 2002).

A hypermodernist approach characterised agricultural problem-solving in New Zealand (Winder, 2009). The specialist nature of research programmes focused on emergent problems which were affecting production. This focus saw, for example, weed control problems linked with the development of effective new chemicals (Galbreath, 1998; Isern, 2002). This approach was reinforced by laws

such as the 1950 Noxious Weeds Act which required land users to clear noxious weeds from their land (Smallfield, 1970). For example, in the 1950s the use of the herbicide 245T was used to remove gorse which was a major problem. The view was that "if insects and diseases were not controlled, the peoples of the world would starve" (Smallfield, 1970, p. 130), and also that it was not possible to successfully farm without the use of fertiliser and chemicals.

Another emergent problem was the loss of soil. The Department of Agriculture continued the response that had been established in the pioneering era. Soil conservation became part of its farm extension programme. The Department believed that, through education and financial incentives, soil conservation techniques would be adopted, and that there was no need to regulate. Subsidies were made available for those who chose to address soil conservation concerns. In some areas, soil erosion problems were taken up enthusiastically with good results, while in others the problem was largely ignored [19] (McCaskill, 1973; Roche, 2002). As in the pioneering era, the view that attending to environmental problems, such as soil conservation, reduction in erosion, and maintenance of biodiversity on private land, should be voluntary and a personal choice continued to be common (Jay, 2003). According to Brooking et al., the "heterodoxy of this era was that flooding had nothing to do with soil erosion", and that bush clearance and overgrazing were not damaging the land and causing flooding (Brooking, et al., 2002).

Drainage and irrigation schemes are responsible for the disappearance of 85 per cent of New Zealand's wetlands in the last 150 years. A 1982 report estimated that 90 per cent of New Zealand's peatlands and wetlands had been drained in order to facilitate the growth of the pastoral and horticultural components of the economy in New Zealand (Park, 2001, p. 22). Such schemes have brought about the disappearance of most of New Zealand's indigenous wildlife from inhabited parts of the country, and, in many areas, transformation of the landscape has been so complete that little but vestiges of the original now remain (Dann, 2002; Park, 2001, 2002).

In summary, the grasslands approach to farming was framed by a utilitarian and reductive approach to the environment. The land was viewed as a means to increase growth in agricultural production. Externalities, if thought of at all, were

not a concern, and a voluntary approach to solving environmental problems incurred by productivism was supported by government. Growth was the goal, and it was maintained through the increased use of fertilisers, pesticides, and herbicides, and also the drainage of wetlands. Complexity was ignored, and as one problem resolved itself and another became apparent, scientists, within their specialised areas, applied themselves to solving them and imposing this knowledge onto farm landscapes through their active advice to famers (Brooking, et al., 2002; Galbreath, 1998).

The combined outcome of all of the above elements has been that the countryside under productivism radically changed the landscape into a monoculture, devoid of indigenous flora and fauna. Land under productivism became little more than a factory, an industrial space, with little need to understand its ecological capacities (Dann, 2002). It reflects the long held ideological view in New Zealand that "allocates land to either preservation or production" (Moller et al., 2008, p. 253). From this viewpoint, biodiversity and conservation values were seen as being provided for inside national and regional parks, and protection of indigenous flora and fauna was not a concern of farmers or rural landscapes (Jay, 2004b).
The productivist era continued the trajectory of land use established in the pioneering era with agriculture dominating the economy. The guaranteed markets in Britain had enabled a pattern of land use intensification, underpinned by agricultural science focused on increasing the volume of milk produced with no penalties for any negative environmental consequences. The hegemony of increasing production became a moral imperative linked to first, feeding the empire, and subsequently, feeding the world. Government policy assisted the development and intensification of farming systems, and sustaining dairy industry growth became further aligned with the economic growth goals of successive governments. Overall, the dominant discourse cemented the dairy industry as the "backbone" of the economy. Table 13 demonstrates some of the norms and practices which helped to consolidate a productivist ideology within institutional and dairy industry discourse in the productivist era.

Table 13: Consolidation of Productivism

Consolidation
Government would legislate and subsidise the dairy industry to ensure its success as the 'backbone' of the economy; The environment could be discounted in the interest of sustained exploitation to serve economic goals; There would be supportive government-funded institutions to solve dairy industry production problems; The application of fertiliser and chemicals was essential to successful land use practices for the grasslands approach; Low-cost commodity production was necessary due to the dairy industry needing to maintain its global competitive advantage; A cooperative approach best served the interests of the dairy farming community; A voluntary approach was acceptable to rectify environmental problems of agriculture practices on the environment; The role of state was to resolve conflict among competing interests rather than ensuing wise use of resources.

When assessed against the discourse framework, the first productivist phase continued the trajectory of a technological discursive approach reflecting a utilitarian and reductive approach to land and land use. There was strong state support to maintain growth, with both input and output subsidies provided. The government's role was to buttress the industry against the ebbs and flows of the international market. The realisation of the goal of ever increasing bulk exports of dairy products was premised on the externalisation of environmental costs. The dominant discourse was that the country's economic stability required economic sustainability of the dairy industry at any cost.

The environmental consequences of productivism including overgrazing, soil erosion, loss of native flora and fauna, and pollution of water resources through the application of fertiliser and chemicals were ignored. The environment was viewed as a free good, and the externalities of the industry, including the impacts on Māori values and the environment, remained invisible. Table 14 positions this first productivist phase within the discourse framework.

Table 14: Dominant Discourse Productivist Era

First Productivist Era Government and Dairy Industry	**Technological Discourse**
Normative Values	Economisation of the environment – nature a free good no environmental limits; Technical solutions to social and political problems; Unlimited economic growth through technological innovation; Anthropocentric – nature and humans separate; Utilitarian – action stems from calculated self-interest.
Institutional Mechanisms	Strong central government oversight; Tariffs to protect industry from global competition; Institutional support for the dairy industry consolidated through guaranteed price scheme and increased subsidy of dairy farmers' services; Transparent regulation that outlines responsibilities and rules; Specialisation; Cost-benefit analysis that accepts environmental risks are necessary to facilitate increased production; Key relationship is between politicians, officials, scientists and industry.
Approach to Environmental Risk	Technical solutions to social and political problems; Consolidation of productivism through technological expertise; Amelioration, and react and cure; Risks dealt with in an ad hoc, case-by-case manner as environmental problems arose for the agricultural sector; Primary risk is risk to individual self-interest; Externalisation of environmental costs – the ends justifies the means.

I next turn to the second phase of productivism which emerged in the 1980s in conjunction with and in reaction to the impacts of the neoliberal economic restructuring of New Zealand. I call this phase hyperproductivism because it was characterised by the dairy industry leaders' responding to the loss of state subsidies by putting greater emphasis on productivist principles. Particularly important was the need to scale up the volume of production through the intensification of farming systems and enabling an economy of scale through the further consolidation of cooperatives. The view was that, to succeed in the unsubsidised environment, the industry needed commercial superiority in world markets to counter global competition and falling commodity prices.

The next section starts with a brief overview of the discourse of neoliberalism. It then outlines how the shift in government discourse reconfigured the state-dairy industry relationship, and concludes with an assessment of the effects of hyper-productivism on the environment.

Hyperproductivism: 1984 to the Present

Neoliberal Discourse

> *Neo-liberalism creates the possibility of a potentially unlimited form of non-state intervention as a mode of government, one which is more pervasive for its subtlety and lack of visible institutional definition (Dean, 1994, p. 104).*

Neoliberalism is based on a set of ideological assumptions which inform the state-society-economy relationship that differs from Keynesianism. The defining difference is that neoliberalism has a preference for a minimalist state, and sees market competition as the major organising principle for society. Neoliberalism is, therefore, a form of governmental rationality which views a reasonable state as one which is self-limiting, with market and market-like arrangements preferred. A neoliberal state establishes a relationship between the state and civil society that is in opposition to the social democratic welfare state – the Keynesian state (Peters & Fitzsimons, 1999). The ideological belief is that the private sector is more efficient than government in delivering goods and services, and that the economy is better run by the private, not the public, sector (Larner, 1997; Peters, 1999). The state's minimal role should be to create and preserve an institutional framework where private property rights, free markets, and free trade (locally and globally) can flourish (Dryzek, 1997). Neoliberal policy preferences are for a reduction in the size of government, deregulation, and privatisation of government services. Neoliberalism supports policies for free trade of goods and services internationally, and free movement of capital (Kelsey, 1995).

The goal of neoliberalism in New Zealand, therefore, was to move from a welfare (Keynesian) state to a competition state. The competition state views the invisible hand of the market as being the most efficient means by which to allocate all physical, natural, and financial resources (George, 1999; Larner, 1997, 2000). In New Zealand, it was framed by "New Public Management" with a focus on

deregulation, state fiscal austerity, corporatisation, and privatisation of the public sector (Boston, Martin, Pallot, & Walsh, 1996).

There continues to be much criticism of the neoliberalisation of the New Zealand state, and the damage that this shift has caused in New Zealand society. For example, Peters and Fitzsimons (1999) view the ideology of New Public Management managerialism as based on "the impoverished notion that societies are nothing more than the sum of the decisions and transactions that are made by the management of organisations" (p. 33). Similar critiques were levelled by several other scholars (see for example, Boston, et al., 1996; Galbreath, 1998; Harvey, 2005; Kelsey, 1995; Larner, 1997, 2000; Peters, 2001).

As will be demonstrated below, the neoliberal policy goals of central government saw the removal of state subsidies to the agricultural sector. Their removal saw the dairy industry respond through a growth trajectory which in economic terms has been highly successful. Nonetheless, as the industry expanded, the effect was a concomitant growth in the pollution effects on the environment, particularly fresh water. This growth trajectory ignored the cumulative ecological sustainability problems of its economic success. This situation was facilitated by the weak environmental policy instruments institutionalised by central government. These included: market solutions to environmental problems; the devolution of environmental management and responsibility to the regional level; the marketisation and privatisation of agricultural research and development which established environmental problems as short-term, private, market problems; and, management of individual dairy farmers' effects rather than the industry's cumulative impacts (Barnett & Pauling, 2005).

The Structural Adjustment of the Dairy Industry

The focus of this section is specifically on how neoliberalism affected the agricultural sector and reshaped the dairy industry. I call this second productivist phase hyperproductivism because of the singular focus on rapid growth and the intensification of farming systems which led to the New Zealand dairy industry's becoming the largest global exporter and a global leader in the dairy commodities market (Cocklin, Dibden, & Mautner, 2006).

In 1984, when the Fourth Labour Government was elected, there was a global economic downturn and the country had a large budget deficit (Gouin, et al., 1994) resulting in a view amongst state and business actors that the economy was in crisis. At this time, there was an institutional and intellectual web of support for economic liberalisation in New Zealand (Kelsey, 1995). In order to restore conditions of economic stability, in a radical departure from past practices, the Labour government initiated a neoliberal policy response. In what could be viewed as an opening of a policy window (Kingdon, 1995), the economic "crisis" was used by Treasury and supporters of neoliberalism within the Labour caucus and subsequent governments to implement a market-oriented reform package (Kelsey, 1995; Kingdon, 1995; Peck & Tickell, 2002).

This response is illustrative of the neoliberal view whereby protectionist policies and subsidies were seen as perverse, uncompetitive, inefficient, and in need of change (Kelsey, 1995). The goal of government was to remove from the system market distortions caused by state subsidies, to maximize the role of the market, and to minimise the interventionist role of the state. This goal meant that farmers too should become fully exposed to competition in the global marketplace (Jay, 2007, p. 269; Smith & Montgomery, 2004). As it was estimated that 33 per cent of farm income was subsidised by government at this time, the agriculture sector became a primary target of government efficiency reforms (Gouin, et al., 1994; Larner, 1997).

Within 12 months virtually all state financial assistance was removed from the agriculture sector (Rudd, 1990; Smith & Montgomery, 2004). This support included production subsidies for fertiliser and other inputs, as well as funding for drought relief, floods, and other natural, weather disasters. Tax concessions and the availability of low interest loans from the Rural Bank for farmers and agriculture marketing boards was also stopped (Gouin, et al., 1994, p. 28).

Given that global agricultural commodity prices were seen as likely to remain low, and that the overall trend in milk prices was downward (Cameron & Bell, 2008)[20], Prime Minister David Lange declared that the agricultural sector was a sunset industry (Smith & Montgomery, 2004). The future for sustaining New

Zealand's economic health at this time was seen to lie in the 'knowledge economy', defined as:

> … one in which the generation and the exploitation of knowledge has come to play the predominant part in the creation of wealth. It is not simply about pushing back the frontiers of knowledge; it is also about the more effective use and exploitation of all types of knowledge in all manner of activity. (Peters, 2001, p. 7)

In line with neoliberal thinking, the second major change wrought by the government's restructuring was the disestablishment or reduction of the public good science alliance between agricultural research institutes and the agricultural sector. The privatisation agenda saw the introduction of the State Owned Enterprises Act (SOE) (1986). The SOE Act changed the fundamental nature of the relationship between farmers and science researchers. Under the Act, the government established 10 Crown Research Institutes (CRIs) which needed to be run as commercial entities along private sector lines. The government's view was that, unless there was an identified market failure, the government:

> … should not be funding or subsidising research of direct commercial value, which should instead be paid for by the beneficiary or user (Galbreath, 1998, p. 249).

In line with this ideology, the Treasury economists at the time stated that scientists were a vested interest group pursing their own self-interest. The view was that there should be commercial discipline framing scientific research (Galbreath, 1998, p. 250). Funding for most long-term blue-sky science research projects was stopped, and the little funding that was allocated was only available through competitive tender, and/or for short-term projects (Galbreath, 1998). CRIs were also expected to charge their customers (i.e., farmers) in order to recover costs (Chopra, 2011). Galbreath states:

> By 1989 scientists felt they had had more reviews than a repertory company.… It was marked by what one observer called a mutually incomprehensible dialogue between scientists who did not understand economics, and economists who did not understand science (Galbreath, 1998, p. 250).

The outcome was that government-supported research for the agricultural sector was much reduced, and other advisory services were no longer available to farmers, or would only be available through a user pays, or cost recovery model. From a public expenditure level of more than $1 billion in 1984-85, the amount the New Zealand budget assigned to the agricultural sector dropped to less than

$200 million by 1992/93 (Gouin, 2006, p. 2). This radical change in policy saw the dismantling of the network of research institutions that had framed the state-industry relationship since the pioneering era. These institutions had supported income security for the dairy industry and the New Zealand economy for 80 years (Kesting, et al., 2010).

The statutory role of the Dairy Board was initially unchanged. However, the government, in line with its competition ideology, wanted the Dairy Board abolished and its monopoly marketing role stopped. There was also a preference for the cooperative structure to be altered or dismantled (Nayga & Mtong, 1994; Willis, 2001). Through further amalgamation by the late 1990s only four cooperatives were left, and the Dairy Board remained in place until the introduction of the Dairy Industry Restructuring Act 2001 (DIRA). The Act enabled Fonterra to be formed from the merger of the two largest cooperatives, the NZ Dairy Group and Kiwi Cooperative Dairies NZ. In the new deregulated environment, both cooperative and proprietary companies could now buy milk, and produce and export their own product from New Zealand.

Through this process Fonterra came to represent 95 per cent of New Zealand's dairy farmers, and it took on the role of oversight for the complete supply chain of its cooperative members (farm, manufacturing, and marketing). Through Fonterra, the industry maintained its dominant leverage over the marketing of its products, and the cooperative model which has always been viewed as the industry's strength remained intact (Gouin, 2006; Willis, 2001).

The levy funded component for dairy industry research, which had been overseen by the Dairy Board, was reconfigured first into Dexcel, and, subsequently, became DairyNZ (DairyNZ, 2009a).

The next sections outline what this remodelling of the dairy industry has meant for changing land-use practices, and for the environment.

Dairy Farm Growth and Intensification

The changes introduced by the government had immediate effects on the agricultural sector. Land prices initially fell by 60 per cent and fertiliser use declined by 50 per cent. The biggest impact was in the sheep sector, with sheep

numbers falling from 70 million in 1983 to 40 million by 2004 (Gouin, et al., 1994).

Barnett and Pauling (2005) state that one negative environmental effect of free market reforms is that they can result in increased production to offset reforms, particularly for commodities in which a country may have a competitive advantage. Alongside such change there is resistance to environmental regulation as it adds to production costs and reduces competitive advantage in the global market. This response is evident in what happened in New Zealand "where the new market system failed to incorporate environmental values into pricing systems" (Winder, 2009, p. 189).

The converging forces of the unsubsidised and deregulated environment in addition to the Dairy Board's and, subsequently, Fonterra's own anxieties to sustain new markets prior to and overlapping the neoliberal changes saw industry leaders put greater emphasis on productivist principles, particularly intensification, consolidation, and specialisation (Le Heron 1993 and Moran et al.,1993 in Evans, Morris, & Winter, 2001; Yerex, 1989). The industry leaders' view was that, in order to compete successfully in the international arena and to counter the increased costs of the unsubsidised environment, they needed to scale up the volume of production. The industry needed commercial superiority in world markets, and increased production would be the means by which to counter global competition and falling commodity prices (Conforte, et al., 2008; Jay, 2007; Yerex, 1989).

In the first dairy industry strategy document, productivity improvement was viewed as the highest priority. A target was set at 4 per cent growth per year (Dairy Insight, 2006). The industry was well situated to grow in that there was a growing international market for New Zealand dairy products, and there was already in place "an efficient internal structure and a well-established international marketing operation" (Barnett & Pauling, 2005, p. 277).

Post1984, farmers responded in their traditionally pragmatic fashion (Walford, 2003). Dairying was seen as more profitable compared to sheep, beef, and forestry, and this perception led to large conversions into dairying in the Waikato

and other regions including the South Island. For many, this switch was seen as the only rational economic decision they could make if they wanted to continue farming. The cost of conversion saw a different mix of ownership. There was shift away from the tradition family farm to more family corporates and part-share and equity partnerships investing in dairying (Cameron, et al., 2008). The cost of conversion favoured investment in larger scale farms and labour specialisation (Evans, 2004). By 2012, only 65 per cent of farms were still traditional owner-operated and 35 per cent were part-share or equity partnerships (DairyNZ, 2013a).

Around 283,700 ha (587,369 acres) of land were converted to dairy between 1996 and 2008. The price of land in the North Island was a major driver for the exponential expansion and new dairy developments in areas of the South Island and also onto land which would previously have been seen as marginal for dairy farming in the North and South Island. Canterbury has had the highest conversion rate at 122,500 ha (301,000 acres). This is an increase of 170 per cent. The projections are that by 2020 another 370,000 ha (921,000 acres) will be added to the dairy estate (Morgan & Simmons, 2014).

The industry now consists of many varieties of farming models with different sizes and approaches– with varying levels of complexity depending on the levels of intensification – from traditional grass fed smaller farms, through to pad farms with most feed brought in, and a range of mixed models in between (Cameron, et al., 2008). Overall, however, there has been a continued shift to bigger farms with larger herds. This change is particularly evident in the way in which the industry has grown in the South Island. The South Island growth is also being controversially sustained through the greater irrigation of pasture to support production.[21]

Through these changes, the Fonterra cooperative became New Zealand's largest company, and the leading corporate in the global dairy trade world. It is the largest processor of raw milk in New Zealand, and the world's largest exporter of dairy products (DairyNZ, 2013a). In 2009, Fonterra had a turnover of $18 billion, generated a quarter of New Zealand's export earnings, and contributed upwards of 7 per cent of New Zealand's GDP (Coriolus Consultants, 2010).

Further, contrary to the government's initial 1984 view that the economy would be less reliant on the agricultural sector, the following statements by the current Minister for Primary Industries, Nathan Guy demonstrate that the industry's role and place have come full circle. It is again in the "national interest" that the dairy industry be supported as the backbone of the economy, he stated:

> The latest outlook from the Ministry for Primary Industries suggests primary sector revenue will grow annually by more than seven per cent for the next four years. As a Government we want to do even better than that and have set an ambitious goal of doubling primary sector exports by 2025 (Guy, 2013b).

Table 15 demonstrates the changes in the industry between 1980 and 2012. There are now over 6 million cows in the national herd; the South Island now accounts for 37 per cent of dairy industry production; and, both farm size and herd size have increased, with the average herd size rising from 126 in 1980 to 343 in 2012. The outcome of this focus on increased production has seen processed milk volume increase from 5 million litres in 1980 to over 19 million litres in 2012 (DairyNZ, 2012).

Table 15: Structural Change in NZ Dairy Industry

Statistic	1980	1990	2000	2010	2012
Milk Processed (million litres)	5,868	7,077	12,925	17,339	19,129
Average Herd Size	126	159	251	376	343
Total Cows (million)	2.0	2.4	3.6	4.5	6.2
Hectares in Production	996,000	1,023	1,404	1,638	1,638
Average Cows per Hectare	2.07	2.35	2.62	2.81	2.83
Number of Herds	16,089	14,595	13,892	11,735	11,798
Cow Numbers North Island					62%
Cow Numbers South Island					37.1%

Source: (DairyNZ, 2012; Statistics New Zealand, 2012).

Marketisation of Science

With the reduction in public good research, and the loss of the extension relationship between scientists, farmers and the broader industry, the industry in the first instance became more inward looking (Yerex, 1989). Many scientists who had been working on agricultural problems across the spectrum of agricultural science were made redundant or differently configured into new CRIs (Galbreath, 1998).

Public research money became a contestable fund, focused on short-term goals. A long-term view was not seen as necessary. The view was that farmers would come to the scientists with a problem that they would solve (Galbreath, 1998). Grass science was not as fashionable, and preferences and development of new knowledge, for example, around GE agricultural products that could potentially see New Zealand leading the agricultural knowledge economy were institutionally supported (Wright & Kurian, 2010).

Although the dairy industry and its associated cooperatives, such as fertiliser cooperatives, herd breeding cooperatives, and the industry good body DairyNZ (levy funded R & D organisation), managed to keep their cohesiveness, the checks and balances and mutual support established over a century between the agricultural sector and science was for the most part dissolved. In addition, many of the farm advisory services became private enterprises focused on single issues (i.e., effluent systems, irrigation systems). I now turn to an evaluation of what these changes meant for the environment.

Approach to the Environment

Post-1984, for those who had borrowed heavily to convert to dairying or amalgamate farm land, the focus was on increased production to pay down debt. The most intensive approach to farming required higher stocking rates, more fertiliser application – particularly nitrogen and urea – and a greater reliance on off-farm sourced inputs such as palm kernel alongside grass as extra feed.[22] Compared to the traditional grass fed farming approach, this approach constitutes a higher input cost system. The economic goal of the most intensive farms is maximum pasture production in order that the cows produce at their peak milk production for longer and at a higher rate (Cameron & Bell, 2008).

The outcome of this more intensive hyperproductive farming model meant that between 1992 and 2002 there was an 800 per cent increase in synthetic fertiliser use on dairy farms nationally. This increase equates to an average increase of 162 per cent per hectare across New Zealand (PCE, 2004, 2013b). There was no incentive for farmers to voluntarily improve their environmental performance if it had a negative impact on economic bottom lines. The ideology was that increased production was seen by the dairy industry as the best means by which to 'sustain' and build security for dairy farmers and the industry into the future (Cameron & Bell, 2008; Rosin, 2013).

It has been the increased intensification of farm systems combined with exponential growth that has caused the growing concern about the cumulative impacts on the environment (PCE, 2004, 2013b). It is the nonpoint-source discharges from fertiliser, faecal matter, urine, and sediment which comprise 85-90 per cent of waste from dairy farms which have been identified as causing the major environmental impacts of dairy farming to water (Barnett & Pauling, 2005; PCE, 2012, 2013b). In this hyperproductivist phase there was only a weak regulatory focus on improving point-source dairy farming problems (such as improving effluent systems). This weakness meant that regional planning processes enabled farmers and the broader industry to elide from considering any collective environmental responsibility for the effects of nonpoint diffuse pollution.

The result of the post-1984 political reforms was that there was no longer a strong formal R& D link between the state and the agricultural sector, and only indirect links between the regional councils and local environmental practice. Consequently, what emerged from the neoliberal change was a disconnection between the possible problems of intensive agriculture, and their impacts on the environment, which, once demonstrated, had no concrete means to resolve them. Farmers became more reliant on information from within the industry. Yet, this information was often partial and dispersed among different organisations, and still predominantly production focused.

An older farmer, who has been proactive for many years in building a stronger awareness of environmental concerns and the need for more sustainable dairy farming stated:

> In both eras, pre-and-post1984, land use intensification has led to horrific results for the environment. Under subsidised schemes land that should never have been converted was because the wrong signals were given. Land owners were paid to do it, and we are still paying for that today …. The same problems have continued and have been amplified because of the intensification goals of the post-84 era with horrific impacts on the environment. (As cited in Cameron et al., 2008)

This comment captures the heart of the problem with productivism in New Zealand. As an approach to land and land use, it has always been ideologically detached from its local environmental impacts. The "nature" of industrial productivist agriculture is that water and land are commodified, and there was a disconnect from the consequences of cumulative effects of the externalities of individual farmers on their local and regional eco-systems (Jay, 2007). The economic imperatives of government, farmers, and the industry have thus overridden any concern for the environment.

In summary, the changes since 1984 have been historically significant. The symbiotic relationship between government and industry was broken. The combination of the loss of traditional markets in Britain and the loss of domestic subsidies saw a hyperproductive response. The single focus was to build security and competitive advantage through increasing how much milk was produced.

Reflected here are the key elements of the technological discourse. Normatively, this took the form of a utilitarian, anthropocentric, and reductive approach where the focus was continued growth through the economisation of the environment, with nature seen as a free good, and the ignoring of environmental limits. Also supported was the calculated self-interest of individual farmers, and the broader dairy industry's growth goals. The industry's economic ends justified the means, and the primary goal was to enhance economic bottom lines. This hyperproductive response was framed by instrumental rationality in such a way that there was no need to evaluate the social or cultural context of dairy farming, or consider nature other than as a means through which to sustain inputs in order to support the output of continuous growth. From this viewpoint, waste is

acceptable if there is no profit to be gained by preventing it. The pursuit of economic growth unchecked by environmental considerations has seen the acceleration of environmental problems, particularly fresh water decline. Table 16 below positions the hyperproductive discourse against the analytical framework.

Table 16: Key Elements Hyperproductivist Discourse

Hyperproductivist Era	Technological Discourse
Normative Values	Economisation of the environment – nature a free good, denies existence of environmental limits; Market solutions to social and political problems; Unlimited economic growth through technological innovation; Anthropocentric – nature and humans separate; Utilitarian – action stems from calculated self-interest.
Institutional Mechanisms	Minimalist State; Neo-liberalism Transparent regulation that outlines responsibilities and rules; User pays cost recovery model for government services; Cost benefit analysis – there is acceptable environmental risk; Market driven; Key relationship between politicians, officials, scientists, and industry;
Industry	Specilisation; Intensification; Globalisation; Economisation of the environment; Growth is necessary for economic security.
Approach to the Environment	Utlitarian appproach to the envionment; Environment serves economic goals of industry: Impacts on the environment can be ignored.

Building Environmental Awareness

The final section of this chapter covers the emergence of two discourses that ran parallel with productivism but which have subsequently become interwoven within contemporary environmental policy to challenge the dominant productivist approach to land use. The first was the groundswell of conservation and sustainability concerns locally and internationally, and the second was the

reemergence of the Māori worldview into dominant institutional discourse. I discuss each of these below.

Shifting Public Discourse

Since the 1960s, community conservation concerns in New Zealand have focused public attention on how the environment was being undermined by development, with much of this development being supported or carried out by government. The issue which propelled national public concern at this time was the proposal by government to raise Lake Manapouri by 30 metres to increase power generation for an aluminium smelter. This campaign, which ran from the mid-1960s till 1972, is viewed as New Zealand's first nationwide environmental movement (Wheen, 2002) and succeeded in its goal to stop the level of the lake being raised. The campaign also saw the establishment of a Nature Conservation Council, an Environmental Council, and the Parliamentary Commissioner for the Environment (Wheen, 2002). The Commissioner's role was to oversee procedures for environmental impact assessments which would from then on be required for all government works likely to have significant environmental effects on the conservation estate (Wheen, 2002, p. 265).

Another decisive moment came in 1971 in response to the government's putting out a tender for the cutting of native beech forests on the West Coast of the South Island. The goal was to replace them with pine forests. The Beech Forest Action Committee drew up the Maruia Declaration as a public petition. The petition when presented to Parliament had collected over 340,000 signatures (Environmental Defence Society, 2013; Ministry of Primary Industries, 2012). Subsequent campaigns saw the introduction of the Westcoast Forest Accord (Ecologic, 2013) which helped preserve wide areas of native forests.

The third issue that gained community momentum during the 1970s was the possibility of mining occurring again on the Coromandel Peninsula. The concern was the pollution effects from arsenic and other chemicals on very fragile Coromandel environments. It was through the Coromandel Watchdog lobbying that Schedule 4 land became off limits for mining within the Crowns Minerals Act (1991) (Coromandel Watchdog, 2010). [23] A fourth important moment during this era was the establishment of the 'Values' party in 1972. The Values party is

regarded as being the first, national, green political party globally whose blueprint promoted a respectful relationship with nature, with the party's manifesto calling for an ecological sustainability society (Steward, 1997).

Together these movements increased community awareness of environmental degradation, and provided the momentum for a community consensus on the need to protect the conservation estate. They demonstrated a growing resistance to development at the cost of the environment, particularly development by the New Zealand state (McCarthy & Prudham, 2004).

At the same time that conservation concerns were emerging in New Zealand, the impacts of industrialisation on the environment and questions regarding policy and management of the environment nationally and globally were emerging (Caldwell, 1972; Goldsmith, Allen, Allaby, Davoll, & Lawrence, 1972; Meadows, et al., 1972; Torgerson, 1990). These concerns were subsequently voiced at the international level through a suite of UN conferences, beginning with the UN conference on the Human Environment held in Stockholm 1972 (United Nations Environment Programme, 1972). New Zealand's protests can be seen as part of the growing local and international awareness of the need to include environmental values into institutional practices of governments and industry. This shift in thinking saw a new conservation and sustainability ethic emerge, and linkages made between the cost of prosperity and the risks of industrialisation to people and the environment (Beck, 1992; Dryzek, 1997).

Redress for Māori

While the conservation protests were manifesting themselves in New Zealand, Māori were still seeking acknowledgment and redress for how they had been unjustly treated by the state since the signing of the Treaty of Waitangi. The subsequent outcomes of this continued Māori protest have changed how policy and implementation processes for the environment are evolving in New Zealand.

The persistence of Māori in seeking legal redress, and the right to have their concerns taken seriously led to a *hikoi* (land march) on Parliament from the Far North in 1975, led by a Northland *kuia* (female elder), Whina Cooper, under the banner "Not one more Acre of Land". The march presented a petition signed by

60,000 people which called for no further alienation (sale) of Māori land. The 1975 land march and other land occupations such as that at Bastion Point and the 1978 Raglan (Whāingaroa) golf course occupation [24] were catalysts for political change (O'Malley, et al., 2010; Te Ara, 2010b).

For Māori, this momentum resulted in the emergence of the Treaty of Waitangi Act (1975). The Act established the Treaty of Waitangi Tribunal (Treaty of Waitangi Act 1975, Sec. 4.1). The Preamble to this Act made clear that the Treaty was no longer to be treated as a simple nullity (Norman, 2007). The Act states that "if the Tribunal finds that any claim submitted to it can demonstrate *iwi* or *hapū* have been prejudicially affected by Crown action or regulation, it can with regard to all the circumstances of the case, recommend to the Crown that action be taken to compensate for, or remove the prejudice, or to prevent other persons from being similarly affected in the future" (Ministry for the Environment, 1997 Sect 6.1-6.3). Subsequently, in 1989 the Fourth Labour Government adopted some key Principles which shape how the Crown should Act with regard to the Treaty of Waitangi (see Appendix IV).

The Tribunal has been viewed as a reinsertion of Māori identity into Pākehā history and consciousness (Oliver, 1991, p. 9). The Tribunal provided a process through which an acknowledgement of wrongdoing by the state could be presented, as well as a positive means of addressing Māori grievances. The establishment of the Tribunal accepted that governments since 1840 had:

> Taken actions that had resulted in the alienation of Māori land, waters and other resources from their owners generally without proper consent or compensation. (New Zealand History NetOnline, n.p.)

The shift in Treaty of Waitangi policy can be seen as an exemplar of how "policies are dynamic, pluralistic, complex and projections of intentions [and] or explanations of past events" (Wagenaar, 2011, p. 289). Oliver (1991) points to what have been called "The Planning Claims" (which were the first claims heard by the Waitangi Tribunal between 1978-1988) as a catalyst in the transformation of resource management in New Zealand. They were dubbed The Planning Claims because they all involved the consequences of what Māori viewed as poor or inadequate planning leading to unacceptable impacts on water and their

customary fishing rights (Oliver, 1991, p. 11). Examples of these claims are presented in Appendix VII.

Oliver states that the Tribunal's findings with regard to these claims:

> Came to be of great importance and prominence and were held in great esteem by the growing conservationist mood of the country …. [They] spoke for angry conservationists as well as for aggrieved Māori … [but] findings on land ownership claims, by contrast, were never received by Pākehā with such applause. (Oliver, 1991, p. 11)

Māori concerns being addressed through the Tribunal drew attention to the impacts of industrial development including pastoral farming on the environment, particularly on water. The claims challenged land use policy, and the taken-for-granted acceptability of externalities of industry being able to contaminate land and water (Norman, 2007; Oliver, 1991). The subsequent Treaty settlements with *iwi* and *hapū*, and the incorporation of Treaty of Waitangi Principles into environment (and other) legislation has given "legislative recognition of the set of relationships expressed in the Treaty" (Palmer, 2002, p. 209).

Through the Treaty settlement process and comanagement agreements such as the Waikato River Settlement (2010) and the Lake Taupō Accord (Environment Waikato, 2003), *iwi*, regional councils, and government are forging new partnerships and understanding on how to manage the environment together through different eyes. While including Māori values has been no more than a rhetorical acknowledgment with little substance at times (Kurian & Wright, 2012), to have the Māori worldview reinstated symbolically and materially as part of the fabric of society after 150 years of the monocultural western lens has been a seismic shift in New Zealand political discourse (Durie, 1998; Palmer, 2001).

In summary, in New Zealand from the 1960s onwards, growing international, local, and Māori concerns emerged which challenged in different ways the privileging of development at the expense of the environment. The concern was that economic systems must now start to be balanced within the Earth's carrying capacity, that environmental risks were political, and ideological, and required social, cultural, and ethical values to be considered. There was an acknowledgment of the interdependence of humans with nature, and the intrinsic

value of nature. Communities sought change, and the legitimacy of nonscientific knowledge, and nonhierarchical governance structures. From these new concerns a suite of environmental legislation and policy has emerged. Together they have informed the values that have underpinned environmental policy in New Zealand. As discourses, therefore, they have been influential in causing a rupture in the taken-for-granted common sense approach to land use in New Zealand, and were influential alongside, and in contradiction to neoliberalism, in driving political and institutional change into natural resource politics. Table 17 below summarises the key elements of the shift in community, Māori, and international discourse that emerged in this era.

Table 17: Emergent Sustainability Discourse

Parallel Discourse	**Emergent Sustainability Discourse**
Normative Values	Acknowledgment of interdependence of economy and ecology; Economic growth constrained by wise use of resources to meet present and future needs; Strong participation through local and global civil society networks; Anticipatory environmental policy-making.
Institutional Approach	Integrated environmental management that addresses social; environmental, and economic aspects of development; Process and outcome both critical;
Approach to Environmental Risks	Environmental risks are political and ideological and require sociocultural and ethical consideration; Expert risk assessment must be balanced with community risk perception; Consideration of Maori holistic values; Local knowledge important.

Conclusion

Although, "government tends to construe environmental impacts as matters of current or future management, which are not linked to a historical legacy" (Winder, 2009, p. 188), Chapters 4 and 5 have demonstrated a different story. The sustained exploitation of public natural resources into resources for growing the private wealth of the dairy industry has been facilitated through legislation and state funded programmes across both the pioneering and productivist eras (Hean, 2002).

Chapters 4 and 5 have demonstrated that a productivist approach to land use was central to the development of the colonial enterprise, and a productivist approach to land use has subsequently continued to be supported into the late twentieth century in order to sustain the economy of New Zealand. While one element of productivism (direct state support) was reduced in 1984, for the dairy industry productivism has remained *the* dominant discursive approach to land use.

From the 1960s on, the emergent discourses of both conservationists and Māori started to challenge the hegemony of the productivist approach. These discourses contested the instrumental and reductive view of land being tied narrowly to economic growth, and have presented an alternative holistic view that ecological protection and sociocultural values needed to be accounted for in government legislation and policy for the environment. In different ways, they have questioned the view that the rural landscape should be the ground for only unlimited primary production, and forged a path towards the inclusion of nonmaterial sustainability values into institutional environmental policy discourse (Jay, 2004a; Swaffield, 2008).

Having concluded the analysis of the historical discourse, I next turn to analysing how the shifting understandings of sustainability discourse that have shaped both institutional and dairy industry discourse and societal expectations of acceptable land use practice. In Chapter 6, through an analysis of the RMA (1991), I address how the sustainability discourse has informed and changed government institutional discourse.

---

[6] An "order of discourse" is the network of social practices that surround or inform a discourse (Threadgold, 2003).
[7] The sustainability problematique being the aggregation of all environmental issues both extant and future (Bartlett, Kurian, & Malik, 1995).
[8] These organisations have undergone name changes and the data drawn on from these agencies has been cited according to what was used at the time.
[9] Some of the snowballing came from suggestions from participants who had undertaken the Q-sort who knew people they thought could contribute. These suggestions were managed so as not to skew the participants and have one discourse group to heavily represented.
[10] That Māori were enterprising can be seen in Ruatara, a northern *Rangatira* (Tribal leader), sowing and harvesting the first crop of wheat in New Zealand in 1813 for export to Sydney (Te Ara, 2010).
[11] The 1867 Maori Representative Act did establish separate Māori parliamentary seats as a means of addressing the discrimination against Māori and facilitating some Māori representation (See New Zealand Government 2003 for the history of the establishment of these seats). Of note is that between 1893 and 1975 persons of more than half Māori descent were not allowed to vote in a

European Electorate seat, and conversely those of less than half Māori descent were only able to vote in a European electorate (New Zealand Government, 2003).

[12] *Kotahitanga* (Māori Parliament) brought together various Māori movements with a focus on legal validation and retention of Māori land http://www.teara.govt.nz/en/kotahitanga-unity-movements/page-3.

[13] As a percentage of New Zealand's total exports, butter and cheese went from one per cent in 1861, to three and half per cent in 1884, and was seven and half per cent by 1892 (Ward, 1975).

[14] In the 8 years between 1909 and 1917 the remains of kahikatea forests were reduced by 63 per cent (Philpott, 1937). Because of the dairy industry's requirements 'there was a renewed frenzy to fell and mill these primordial giants, including along the Waihou River' (Philpott, 1937, p. 347).

[15] Superphosphate is ground phosphate rock combined with concentrated sulphuric acid. It was first produced in New Zealand in 1899 (Group One, 2011). The League of Nations made Britain, Australia and New Zealand trustees over Nauru after the First World War, and phosphate mining started from 1919 (Te Ara, 2011).

[16] The government established the DSIR in 1926. The main goal was to find scientific solutions for the agricultural sector. Different research institutes were established within the DSIR which were partly funded by each primary industry. A Dairy Research Institute was established as one component of the DSIR. Levy payments from farmers contributed to this research http://www.teara.govt.nz/en/agricultural-and-horticultural-research/page-3.

[17] The history of agricultural and pastoral science in New Zealand is infused with strong personalities and an on-going struggle for control over the terrain between different institutions such as the DSIR and Department of Agriculture (Galbreath, 1998).

[18] Ruakura research stations were part of the network of publicly funded agricultural institutions. The focus of research was on developing the most productive management systems on dairy farms (Te Ara, 2013b).

[19] See LW McCaskill (1973) *Hold this Land: A History of Soil Conservation in New Zealand* for a comprehensive overview of soil conservation policy and practice in New Zealand.

[20] From1973 to 1991 the overall trend in milk prices had been downward. In 1973 the milk price had been $6.50 per. kilogram of milk solids. In the 1990/91 season this had dropped to $3.34. The period between 1992 to 2007 saw the milk price remain between $4 and $5 (Cameron & Bell, 2008, p. 5).

[21] Due to climatic conditions 65 per cent of irrigated agriculture is in the Canterbury Region. Irrigated agriculture is more intensive, and can lead to greater water degradation (Green Party, 2011). The current government is supportive of increased irrigated agriculture, and has put in place resources by which to develop water storage through the "Irrigation Acceleration Fund" (Ministry of Primary Industries, 2013).

[22] The use of palm kernel has been controversial. It is a good example of how environmental problems can be diffused due to the global reach of the industry. Much of palm kernel is sourced from areas that have been planted on areas of cut down indigenous forests. Some areas of palm kernel plantations are on the last remnant forests for the almost extinct Orangatang. And as yet there is no guaranteed tracking of the supply source for palm oil. Another concern has been biosecurity in that there has been a lack of rigour in testing of the palm kernel for possible contaminants which could cause a serious biosecurity breaches in New Zealand (Orangatang Foundation, 2013) http://www.orangutan.org.au/palm-oil.

[23] Protecting the conservation estate from mining resonates still with the New Zealand public. This was demonstrated in the protest which occurred in 2010 when the National-led Government proposed to allow mining on7000 hectares of Schedule 4 land. Schedule 4 land is on conservation land and has special protection from minerals related activity under the Crown Minerals Act (1991)(Coromandel Watchdog, 2010). Concern for mining is also being expressed with the recent flotilla, and community protest at the government giving deep sea exploration permits to Anadarko (and changing legislation to curb sea protest by restricting how close boats can go) to explore off the New Zealand coast. The known potential of environmental impacts of such deep soil drilling if things go wrong (as seen in the Gulf of Mexico) is seen too high an environmental risk by a broad coalition of the New Zealand public (Oil Free Wellington, 2014).

[24] Bastion Point was taken for public works by the government in 1882. In 1941 the land was deemed no longer required by the government and Ngāti Whātua (the Paramount Tribe in this area) had been trying since then to have the land returned to them. In 1977 a peaceful occupation which lasted for 507 days was started. It was finally ended on the 25th May 1978, when 800 police and the New Zealand army were used to forcibly remove the occupiers and destroy the temporary buildings including vegetable gardens and a meeting house, which were constructed to accommodate the living during the protest. Two hundred and twenty two protesters were arrested. The occupation, and use of force to end it played a part in highlighting injustices against Māori,

and the occupation was a major landmark in the history of Māori protest'. The protest in Raglan was linked to disputed land which had been taken during WWII to use as a military airfield, and was subsequently not given back at the end of the war to its Māori owners, and instead was turned into a golf course (Te Ara, 2013a).

Chapter 6
Sustainability within New Zealand Environmental Legislation

Introduction

The suite of legislative reforms that emerged in the mid-1980s refocused the state's relationship with the environment. This legislative realignment included the Conservation Act (1987) and the Environment Act (1986). While the Conservation Act was focused solely on the conservation estate (and hence outside the purview of this thesis), the Environment Act established two key environmental policy institutions: the Ministry for Environment (MfE), and the Parliamentary Commissioner for the Environment (PCE), and established the values which would underpin the institutional mechanisms through which the future sustainable management of productive land would be pursued. In order to achieve these goals, the Resource Management Act (RMA, 1991) was enacted. The Act has been consistently described as world leading for bringing together 70 pieces of legislation into one central integrated framework for environmental planning, based on the incorporation of the principle of sustainability and public participation (de-Wit, 2014; Freeman, 2004).

Legislation embodies the dominant discourses of society and thereby shapes society and informs wider processes within society. It can set a new policy direction or respond to a policy concern. Therefore, the discourse that frames legislation can determine the boundaries for those institutional actions that are deemed legally permissible or not, and determine what, or who, is included or excluded. This chapter offers a critical discourse analysis of contemporary environmental policy, practice, and processes with a specific focus on the RMA (1991). Critical Discourse Analysis (CDA) views power as being exercised discursively. From this perspective, apparently benign social processes established institutionally within legislative texts can conceal ideology and legitimise power differentials in society. This result is enabled through institutions having the capacity to hegemonically maintain or change what can be thought of as "common sense" (Fairclough, 1992). Evidence of this power differential can be found in clarifying what discourse influences the norms, values, and implementation mechanisms established in legislation, and with what

implications. The focus of this chapter is to make visible how the RMA (1991) established the structural possibilities for sustainability, and thus influenced environmental management and ecological sustainability in New Zealand. It does so by addressing the following questions: Which sustainability discourse frames the RMA (1991)? How have the normative values and institutional mechanisms established in the RMA influenced the management of the environment, and determined ecological sustainability outcomes?

The RMA established a new order of discourse (Fairclough, 2003) which articulated a new set of social practices[25] for sustainable management of the environment, including new values and implementation mechanisms. To understand these changes, the chapter proceeds as follows. The first section offers an assessment of the normative values of the RMA, followed in the second and third sections by an evaluation of the different roles and practices established for central and regional government through the RMA. The assessment of regional council processes draws on stakeholder interviews. To demonstrate the influence of legislative changes on what can be thought of as 'common sense', the chapter concludes with an assessment of the changes currently being made to the RMA through the *Fresh Start for Fresh Water* package.

Normative Values of the RMA

The Resource Management Act states:

> The purpose of this Act is to promote the sustainable management of natural and physical resources. (Part 2, Sec 5, (1))

This purpose suggests a predominant focus on environmental sustainability in order to enable the use and development of natural and physical resources. The overarching emphasis here appears to be looking after the environment, and developing the managerial means by which to restrict actions that could be harmful to it, as a necessary prerequisite to its continued use and development for economic growth.

However, the definition of sustainable management in the Act goes beyond ecological sustainability imperatives. Whereas ecological sustainability requires the need to establish ecological boundaries and carrying capacity through objective scientific means (Van-Zeijl-Rozema, et al., 2008) "in order to control

economic effects on the bio-physical environment" (Grundy, 2000, p. 70), "sustainable management" in the legislation encapsulates much more than this. Under the Act 'sustainable management' requires:

> Managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while
> (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
> (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
> (c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment. (Part 2 (2))

The definition demonstrates the way in which sustainable management was established in the Act required attention to more than sustaining just the physical environment. Sustainable management here may be seen as being premised on a more inclusive understanding requiring attention to social, economic, and cultural sustenance or wellbeing. This perspective requires that quality of life issues must be ascertained in order to realise sustainability (Van-Zeijl-Rozema, et al., 2008). It demonstrates the much broader, inclusive discourse of sustainable development. Given this discursive position, sustainable management should include the ecological appraisal of the impacts of development on the environment, community appraisal of environmental risks, and attention to cultural values.

The sociocultural holistic mandate is also supported in how "environment" is defined in the Act. The environment includes:

> (a) Ecosystems and their constituent parts, including people and communities; and
> (b) All natural and physical resources; and
> (c) Amenity values; and
> (d) The social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) or which are affected by those matters. (Part 1, Sec 2)

The legislation conceptualises the environment holistically as a sociocultural system establishing in law that cultural values, ecological values, and economic values all have standing, and, therefore, need to be addressed by those charged with sustainable management of the environment. The legislation establishes

normatively that sustainable development should guide actions undertaken by resource managers.

Other examples within the legislation of this broader sustainable development mandate include under "Matters of National Importance" (Part 2, Sec 6)) – "All persons exercising functions and powers need to recognise and provide for the preservation, protection and maintenance of the concrete physical characteristics of the environment" (Part 2, Sec a-d), including

> (e) The relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other *taonga* [treasured thing, whether tangible or intangible]and
> (g) The protection of recognised [Māori] customary activities. (Part 2, Sec 6))

The Māori perception of water is explained by Memon (2000) as follows:

> Water is considered to possess a life force (*mauri*) and have a spirit (*wairua*) in relation to the quality and use of that water. Water is viewed as a *taonga* (treasure) bequeathed by ancestors for the life-sustaining use of their descendants. Descendants are charged with stewardship *rangatiratanga* and *kaitiakitanga* on behalf of future generations. Therefore any discharges to water may have serious effect on the *mauri* of the water, and affect their role as *kaitiaki* (guardians). (Memon, 2000, pp. 236-237).[26]

The recognition and provision of Māori relationship with water implies that a holistic approach, rather than water being viewed only as natural capital, is also supported normatively.

Part 2, Sec 8 states that, the "Principles of the Treaty of Waitangi" must be taken into account. Tipa and Nelson (2008) suggest that by including the recognition of and provision for a Māori worldview, the legislation demonstrates an "explicit recognition and provision for cultural values in statutory planning processes" (p. 317). For example, the use of the term *kaitiakitanga* and the reference to *tikanga* Māori implies that resource managers in participation with Māori must:[27]

> Protect the integrity of resources so that they are passed down in a healthy condition to future generations, thus ensuring the continuity of cultural practice. This requires [a] focus on long-term environmental results. Results sought are likely to include healthy ecosystems with robust mauri[28] that are able to sustain cultural uses. (Roberts (2002) in Tipa & Nelson, 2008, p. 318).

The legislation thus normatively incorporates the three pillars of sustainable development. The environmental pillar through the way the legislation requires that sustainability of natural and physical resources must be upheld by safeguarding the life supporting capacity of air and water, implying that ecosystems have intrinsic value which must be protected; the sociocultural pillar which recognises all values of community with regard to the quality of the environment including *kaitiakitanga* and the ethic of stewardship must be considered; and, the economic pillar through making clear the possibility of the efficient use of natural and physical resources based on the assumption that benefits can be derived from their use and development if done in a sustainable way. All three pillars have standing, and, therefore, need to be addressed by those who are charged with sustainable management of the environment. The Act established the norm that the sustainable management of natural and physical resources requires a broad understanding of economic, sociocultural, and environmental well-being.

The incorporation of these broader dimensions reveals an acceptance of the political and ideological dimensions of environmental risks. Environmental management is more than just technical decision-making, and decision-making for the environment should be informed by community risk perceptions.

Overall, by looking at these examples one can infer that, normatively, a balancing of the three interlinked pillars encapsulated in the sustainable development discourse was established under the Act. Given this inference, one would assume that institutional practices established under the Acts would facilitate the incorporation of these broader sustainable development elements. However, as I demonstrate in the next sections, while the core values were evident within the RMA, this commitment to sustainable development was not translated into institutional mechanisms that would allow their implementation.

Institutional Mechanisms of the RMA

The RMA legitimated particular roles and practices for the institutions and actors charged with enacting it. In doing so, it established an ambiguous relationship between national and regional government. In the first section, the central

government's role and practices established in the RMA are examined, followed by an examination of regional government's roles and practices.

Central Government

Through the Environment Act (1986) two key central government institutions were established, namely, the Parliamentary Commissioner for the Environment (PCE), and the Ministry for the Environment (MfE). The PCE's role was to audit environmental outcomes, and be an advocate for the environment. The PCE was to hold the government of the day to account for its environmental policies, as well as the public sector's environmental management processes. While the PCE has no power to make rules, or reverse decisions, it can investigate controversial environmental issues, and recommend solutions to government (Environment Act, 1986, Sec, 16, 1-3).

The Ministry for the Environment was the second institution established. Its role was described within its empowering legislation as being to provide information and services, promote environmental policies, education, and effective public participation in planning (Environment Act, Part2, Sec, 31).

The Ministry was also expected to advise on:

> Procedures for assessment and monitoring of environmental impacts (Environment Act, Part 2, Sec, 31, (c) (ii));
>
> Pollution control and co-ordination of the management of pollutants in the environment (Environment Act, Part2, Sec, 31, c (iv); and
>
> Resolve conflict in relation to policies and proposals which may affect the environment (Environment Act, Part2, Sec, 31 (d)).

The function of the Ministry was, therefore, to have oversight of environmental management systems, laws, and regulations and provide guidance on national direction. The Ministry's role was to be a policy-making, monitoring, educative, and advisory body promoting environmental best practice including effective public participation in environmental planning.

With the introduction of the RMA in 1991, responsibility for operational matters and the implementation of policy was devolved to regional and local levels of government. The Ministry's role established through the RMA was not to have

oversight of the management of daily operational management; this would be a regional and local government planning matter. Through this separation of power, the principle signalled in the RMA that central government needed to act in an integrated and comprehensive manner was removed. The Ministry did, however, have policy instruments which it could draw on if it wanted greater control and national influence over regional planning through the development of National Policy Statements and National Environmental Standards for environmental problems deemed "matters of national significance" (RMA, Part5, Sec, 45 (1)).

Criteria for determining the need for National Policy Statements and National Environmental Standards included ecological sustainability, international obligations, conservation and heritage values, a strong precautionary approach towards new technologies, and Treaty of Waitangi issues (RMA, Part 5, Sec,45 (1 a-e)). If introduced, these National Policy Statements and National Environmental Standards were required to be applied across all regions and integrated into all regional plans in the same way (RMA, Part 5, Sec, 43 (2)). The Ministry, however, has chosen to use this mechanism only sparingly, with only one National Policy Statement for Freshwater being introduced in 2011. The implications of this response are assessed later in this analysis.

In the next section, the trajectory of policy responses from central government actors with regard to land and water degradation since the enactment of the RMA is presented. The MfE in accordance with its role of policy development has focused on the formulation of initiatives and strategies, while the PCE has been an active critic of government policy and practices. Because of the separation of power, however, and the hands-off approach of central government, a regulatory vacuum has been established. This vacuum has undermined the comprehensive approach to sustainable development that was provided for in the RMA and has coincided with a period of environmental decline.

Central Government Policy Reports and Responses

In 1994, the Ministry for the Environment released the *Environment 2010 Strategy*. The Strategy identified nine serious environmental issues including the need for better management of biodiversity and land and water resources. It notes that "there are significant risks to water quality and quantity from unsustainable

land use" (Ministry for the Environment, 1997, p. n.p.). In the supporting 1995 document, *Investing in Our Future*, the Ministry again stated that water pollution was an urgent concern "requiring the development of standards and bottom line policies for water quality and quantity, the protection of public health, recreational and cultural needs" (Bührs & Bartlett, 1997, p. 92). The document noted that there would be tension between the goals of economic growth and protection of the environment, but that "clear boundaries (environmental bottom lines) needed to be set" (Bührs & Bartlett, 1997, p. 90).

A related government concern was the outcomes of an evaluation undertaken by the Ministry for Environment (2001) of the importance of the 'clean and green' image to the New Zealand economy. This study found that if there were to be a perception of New Zealand's environment as being degraded, consumer demand for dairy products would fall by 54 per cent (Ministry for the Environment, 2001).

The 2002 report by the PCE, *Creating our Future: Sustainable Development in New Zealand* (PCE, 2002), pointed to the fact that while New Zealand had made positive initiatives towards the promotion of sustainability through the RMA, there had been a tendency to focus only on natural resource management, which ironically resulted in a shift away from the broader holistic concepts of sustainable development. The MfE subsequently produced the *Sustainable Development for New Zealand: Programme of Action* (Ministry for the Environment, 2003c). Along with a focus on broader sustainable development goals, this report positioned water quality as one of the key issues needing to be addressed. The document states that the programme of action seeks to achieve the following outcomes:

> • Freshwater is allocated and used in a sustainable, efficient and equitable way
> • Freshwater quality is maintained to meet all appropriate needs
> • Water bodies with nationally significant natural, social or cultural heritage values are protected. (Ministry for the Environment, 2003c, p. 13)

In a related report by the MfE, the *Sustainable Water Programme of Action* (2003), the goal of developing a nationally 'consistent' approach to managing freshwater resources was reemphasised (Ministry for the Environment, 2004b).

The PCE in 2004 continued to voice concern about water degradation and negative environmental impacts from the intensification of agriculture, particularly dairying (PCE, 2004). The MfE also identified the lack of a comprehensive and integrated policy as a problem. In *The Effects of Rural Land on Water Quality Report* (2004), it took the same view as the PCE, stating that a major contributor to undesirable water quality was diffuse discharges from land as a result of intensive agriculture, and that solving diffuse pollution problems would need a much closer alignment between regional and central government and industry stakeholders (Ministry for the Environment, 2004b, p. 20).

The OECD (2006) report pointed to the Ministry's failure to carry out its role of assessing and monitoring environmental impacts (RMA, Sec,31, (c) (ii)), and it called for the Ministry to take formal responsibility for the development of a national environmental reporting programme. This call led to the release in 2007 of *Environment New Zealand 2007*, a report based on 22 national environmental indicators (Ministry for the Environment, 2007, 2009c). The report provided an overview of the impacts of the intensification of land use by the dairy industry and acknowledged that these were contributing to water decline (Ministry for the Environment, 2007). The report stated:

> Intensive farming (with high animal stocking rates and increased use of fertilisers) can have detrimental effects on groundwater and surface water quality …. Intensification of agricultural activity can also increase greenhouse gas emissions from animals. (Ministry for the Environment, 2007)

In a later report, *How Clean is New Zealand? Measuring and Reporting on the Health of our Environment*, the PCE again drew attention to the continued, woeful state of environmental monitoring in New Zealand and the need for change (PCE, 2010).

In summary, the reports and strategies produced by MfE and the PCE demonstrate that since the RMA was enacted these central government actors have been drawing attention the negative impacts of much of New Zealand's land use on water, and recognising these as a policy problem. These actors have also drawn attention to the fact that there has been a reluctance to put in place national standards, take responsibility for comprehensive national monitoring of

environmental effects, or develop guidelines for regional and local government to take action.

Strategies for dealing with the "problem of water" have continued to be produced. For example, in 2006, there was the *Fresh Water for the Future Strategy* (Ministry for the Environment, 2006b), followed by the *New Start for Freshwater* (Ministry for the Environment, 2009a, 2009b) which was followed by the *Fresh Start for Fresh Water Strategy* released in 2011 (Ministry for the Environment, 2011a). I will return to how the *Fresh Start for Fresh Water Strategy* is reshaping sustainability goals and actions in the last section of this chapter. I next turn to an examination of the role and practices established for regional council actors under the RMA.

Regional Councils and the RMA

As already stated, the RMA established a separation of the roles of central government and regional councils, and in this section I examine how this institutional arrangement influenced the management of the environment and informed regional council processes. The examination will involve a review of the formal requirements established for regional councils under the Act; an outline of criticisms by stakeholders, which draws attention to the way the effects-based approach has led to worse rather than better ecological sustainability outcomes; an analysis of resource consent processes, in order to clarify the strength or weakness of participatory practices; and, finally, an assessment of the most recent government response to water decline, the *Fresh Start for Fresh Water Strategy*.

The RMA established a decentralised approach for resource management. It established 12 regional councils, each region being defined by water catchment areas. The Act brought all land use activities (excluding mining) under the control of regional councils, including the responsibilities for managing water, soil, air, coasts, natural hazards, hazardous waste discharge of contaminants, and land transport (Jackson & Dixon, 2007).

This separation of power and decentralisation of implementation to regional councils are an outcome of the discursive struggle at the time of the introduction of the RMA. On the one hand, decentralisation was justified because less

government and a deregulated approach to land use were seen as more efficient (the neoliberal view) (Coombes, 2003). On the other hand, the RMA represented a deliberate shift on the part of New Zealand away from economic advancement at any cost towards long-term economic and environmental sustainability (the sustainable development view). Sir Geoffrey Palmer, a former Prime Minister who was part of the Labour government which designed the RMA, states that in his view "the conceptual basis for the approach to sustainable management adopted in the RMA was the Brundtland Report" (Palmer, 2013, p. 11).

The Brundtland Report had emphasised decentralisation processes as a means of offering local communities and actors a voice. It was understood as providing a means by which to facilitate greater participation, improved accountability, and through this establish an adaptive management approach with feedback loops from regions to central government (Wright & Kurian, 2010). These elements are articulated in the normative values that frame the RMA.

However, although there was a transfer of functions from national to local institutions (an administrative decentralisation), councils were not granted substantive decision-making power or the requisite transfer of revenue from central government. There was also no tangible mechanism through which to link together central and regional government. Regional councils were required to fulfil their mandate through the development of rules and standards that were to be established in regional planning processes, and funding was to come through rates or user-pays systems (RMA Part 4, Sec, 24(h). Analysis of the first plans suggests that central government failed to ensure local government had the capacity to implement the RMA, which meant that collectively there were many internal inconsistences in objectives, policies, and methods (Ericksen, J Crawford, Berke, & Dixon, 2001; Erickson, 2003). Instead of providing institutional support for an integrated approach between central and regional government, the central government was 'absolved' of responsibility through these arrangements, and the individuating or self-help mentality of neoliberalism which required less government and more user pays models was reinforced (Batterbury & Fernando, 2006; Ribot, Agrawal, & Larson, 2006). That is, the view that market mechanisms will "guide self-interested individuals towards the desired goal or

behaviour, and generate more environmentally responsible resource use" (Bührs & Bartlett, 1993, p. 109) was promoted.

Effects-Based Management

Regional plans provided the overarching framework for how regions would give effect to the Act. Regional plans were to be the basis for the policies, rules, and methods to achieve integrated management of the natural and physical resources of regions for a period of 10 years (Part 4, Sec, 30 (1 (a)). A holistic whole-of-country approach was deemed as unnecessary and, instead, a catchment-based approach was established.

The planning approach was also changed under the RMA. A spatial or zoning approach to planning was excluded. With the movement away from a spatial or zoning approach, plans had "minimal scope for strategic intervention to influence the ecological outcomes of market processes, or the spatial location of competing activities" (Coombes, 2003, p. 201). What was required was that plans be developed by establishing performance standards to manage the individual effects of externalities on the environment, rather than a comprehensive oversight and use of spatial and strategic planning interventions (Coombes, 2003; Gleeson & Grundy, 1997). That is, regional plans were required to establish environmental standards framed around environmental effects-based criteria which outlined permitted or prohibited activities, enforcement criteria, and penalties for breaches. This approach is reflective of the ecological modernisation discourse which viewed environmental risks as technical problems requiring environmental management systems which outline rules and responsibilities. At the time of the introduction of the Act, the then environment Minster stated that:

> The Bill provides us with a framework to establish objectives by a biophysical bottom line that must not be compromised. Provided that these objectives are met what people get up to is their own affair, (Upton, 1991, p. 2016)

Forward strategic planning could be thus left out in regional plans (Freeman, 2004, p. 311). Regional plans were required to develop policies and methods that would be anticipatory. They needed to ascertain actual and potential effects of the use, development, and protection of land (RMA Part 4, Sec, 30 (1(b)). Plans were also to be preventative and contribute to the conservation of soils, the maintenance and enhancement of the quality of water on both land and coast, the

conservation of water, and the maintenance and enhancement of ecosystems in water bodies and coastal waters (RMA Part 4, Sec, 30, (1(c)). Regional plans would also establish the means by which to control the "taking, use, damming, and diversion of water" (RMA Part 4, Sec, 30 (1(d)), and the "discharge of contaminants into, or onto land, air or water and discharges of water into water" (RMA Part 4, Sec, 30 (1(d)).

It was assumed that through the promotion of higher environmental standards in plans and rules, individual development impacts (effects, externalities) could be sustainably managed. This position reflects the assumption of ecological modernisation that, through the setting of basic minimum standards, and with enforcement criteria for breaches, industry would self-regulate and be propelled to innovate in order to find more sustainable solutions (Gouldson & Murphy, 1998).

From this perspective, planners need only to adopt precise environmental standards (environmental bottom lines) and leave market forces to create the best and most efficient use of resources (Upton in PCE, 2013a, p. 5). Ecological modernisation approaches to solving environmental problems assume that through an economisation of the environment, environmental considerations can be made calculable and, therefore, environmental risks can be managed. Regional planning processes thus reflect an ecological modernisation approach to environmental risks. The focus of plans was to manage individual, adverse effects, and if an individual was working within the rules and addressing the point-source pollution effects of their land use established within a regional plan, then what they were doing on their land was deemed sustainable.

The outcome of this effects-based approach was that cumulative impacts remained unaccounted for and these have led to increased water quality decline. These impacts are linked specifically to dairy industry growth and intensification which, under this effects-based planning system, have not been constrained. In the next section I draw on interviews undertaken with key stakeholders as part of the analysis of the institutional mechanisms established with regional planning processes. This data enables the identification of the way the sustainability discourse was translated into ecological outcomes.

Problems with Effects-Based Management and the Planning System

The assumption of sustainable development is that national governments should establish a system through which a country can review the whole system, as well as its parts. It must be able to consider together the well-being of social, ecological, and economic subsystems, and through standardising measurements develop the capacity for comparison across the country. It is through the development of national monitoring, and national indicators, that trends can be determined, and goals, indicators, and frameworks can be adjusted from feedback. It is, therefore, an adaptive and integrated response to environmental management in which the process and outcomes are both important. In order to support the institutional capacity to maintain these elements, funding is necessary. It is through attention to these elements that an adaptive, responsive, and holistic approach for sustainable development can be realised (Hardi & Zdan, 1997; Lundqvist, 2004).

That the effects-based approach has not established a system through which the whole system, as well as its parts, could be assessed together was expressed in the analogy 'death by a thousand cuts' which was used by many interview respondents to describe their concern with the current environmental outcomes produced by the RMA. The result of this failure to account for cumulative impacts has led to environmental problem escalation.

The assumption of an effects-based management approach was that regional council planning requirements should be a technological and scientific enterprise which focused on managing individual externalities. Once these were determined, then development should be allowed anywhere, as long as the effects did not transgress scientifically determined thresholds (Kirk, Morgan, Single, & Fahey, 1999). From this perspective, "it is possible to develop precise natural static environmental standards free from political and value considerations". It also assumes that "it is feasible to examine all possible options in a particular planning situation though a technical measurement" (Perkins & Thorns, 2001, p. 642). A scientist emphasised that this approach is:

> … premised on the view if everyone sticks to the rules then sustainability should happen. The assumption is that scientists can determined what is sustainable and that compliance with the rules is all that is necessary for sustainability. This assumes that all risks are known (S2).

A regional council planner stated that "this approach led to the view that problems could be solved by only looking at individual components; this has proved not to be the case" (RC14).

The effects-based approach can be seen to reflect the traditional technological approach to policy-making which assumes:

> … that knowledge can be free of the shackles of context, its validity floating freely above time and space …. This is the basis of a positivist ontology, the idea that the world is a knowable place and, through knowledge, we can solve its problems. (Brand & Karvonen, 2007, p. 23)

In reference to this context, respondents drew attention to the way the sociocultural pillar of sustainability had not been given equal weight or consideration in assessing environmental risks. A regional planner stated, "when we undertake assessments of environmental risks, social impact assessment has not been part of the process of regional planning" (RC12), and another planner stated "ecological sustainability has been our primary focus. The goal was to develop rules in in order to enable consistency in compliance" (RC14). Sociocultural values, which require assessing competing environmental perceptions, did not fit easily into a technical assessment of environmental risks, which indicates that the more pluralistic and inclusive problem-solving approach of sustainable development has not easily been accommodated in the effects-based management approach.

For sustainable development, monitoring feedback and evaluation, and appropriate ecological indicators are necessary. Consequently, national indicators and national monitoring are necessary instruments for sustainable development. However, in the separation of central government and regional council roles, national monitoring and national indicators were not initially established. Instead, what was required was that every region developed its own indicators and monitoring criteria. This approach has meant that different councils established regional environmental indices, and regional environmental monitoring criteria, which, in turn, has meant that different councils could be measuring environmental impacts in different ways. Without national oversight, there has been no concrete means through which to compare the extent of environmental

problems nationally. This lack of capacity to 'measure to manage' was identified as a missing link by many of the regional council staff interviewed. Their overarching concern was that this omission had enabled the extent of environmental degradation to remain hidden.

Other problems identified with the regional planning system included the deficiency in evaluation and evaluative tools, budgetary constraints, the constraints of the overall planning system, and bias of elected officials. One planner stated, "the focus was on either policy development or implementation, which meant that there had been very little evaluation undertaken of policy outcomes, or the effectiveness of the process undertaken" (RC12). The lack of support for evaluation is indicative again that the effects-based approach has not easily supported a feedback loop.

Having the institutional capacity and budgetary allocation for implementation is viewed as a key requirement for sustainable development (Lundqvist, 2004), but budgetary constraints were identified as a major concern at the regional level.

The primary means of funding regional councils was through rates and user pays systems, but as one policy analyst pointed out "the number of people in a region did not determine the complexity of the different environmental problems that may need to be addressed" (RC 9). The lack of funding, therefore, impacted on the ability of council staff to do their job effectively due to the resources available. One planner noted that often planning teams were small but that they had complex and multifaceted problems to deal with (RC12).

The setting of budgets was also a political matter, and regional council staff pointed to the way that the economic rationalist, 'rates reduction' ideology had gained purchase. In this view the focus is on material self-interest and the need to cut perverse costs from bureaucracies. Some regions were found to focus more on how much consumers (taxpayers) are expected to pay in the setting of budgets rather than on responsible environmental citizenship (Dryzek, 1997). One example was the reduction in budgets for community driven initiatives such as the planting of riparian areas on wetlands, rivers, and lakes. This cost-cutting had

impacted on the ability of communities and farmers to access funding for riparian planting.

Yet another evaluative flaw in the regional planning system that was identified was the inability to make rapid change because the planning framework was so slow. Even when problems were identified, the regional planning process meant that it could take years for change to be put in place. A regional council policy analyst stated:

> This shows up the stark difference between central government and regional councils in this regard. If a problem is identified by central government, changes can go through under urgency but, in regional councils, although a problem has been identified, it can take years for change to be integrated into plans. (RC7)

"Variations" are the major mechanism though which to change plans, but plan changes often took a long time to be cemented in place, even if the reasons for changes were well understood. This was often a result of litigious debate during the linked Environment Court process. One of the respondents who worked as a planner stated that:

> … the final outcome of this is that variations often have been watered down to serve developers or farming interests; and in the process they have either undermined what scientific evidence had demonstrated was required for ecological sustainability, or made the process of implementing the changes almost unworkable. (RC12)

This point indicates that policy decisions may have less to do with scientific proof, or management of effects, than with questions of which side wins (Freudenburg, Gramling, & Davidson, 2008; Freudenburg, William, & Young, 1999; Wynne, 1982, 2000). This concern reflects that:

> … in cases where science is … brought together with political and economic realities in the context of regulations, the most important factors, practically speaking, may have … [more to do with] the ability of politically skilled actors to construct and maintain the belief that science should mean absolute certainty—and that in the absence of 'scientific certainty' no regulations should be put in place (Freudenburg, et al., 2008, p. 10).

Concern was also expressed that a disproportionate number of elected officials on regional councils were aligned with the agricultural sector, and at times this situation had seen economic growth supported at the expense of the environment.

Several interviewees stated that at times this imbalance had made it difficult to get changes made. A respondent familiar with environmental planning processes emphasised this particular aspect and stated:

> Even when staff had identified there was an environmental problem, half of the councillors are from the farming sector, and half of the councillors could have neighbours who could be impacted by change. There could be clear evidence that there may need to be a regulation or a rule change, but the response would be 'oooh hand brake time' – this is too important; it is economic development and could be worth millions to the economy or the district. (RC10)[29]

These concerns indicate that while the presumption of the RMA is that a scientific risk assessment should determine environmental risks and inform what actions can be undertaken by developers, market actors, and farmers, in practice, political interference can stop the consideration of environmental concerns if they impact on economic goals. Over time, trying to achieve this balance had got harder, with "councils now being required to weigh much more carefully the costs of environmental rule changes on businesses" (RC11).

Here we see demonstrated a collision between the ecological modernisation imperatives of the effects-based management approach and a technological discursive approach to environmental problem-solving which supports economic growth over ecological values if they impact on market bottom lines. From this latter viewpoint, environment policy must first assess what is best for business (Harvey, 1996; O'Riordan, 1999).

These comments recognise that the dairy sector particularly is a critical component of the New Zealand economy, and that there has been a general political view that increased compliance should be a last resort for the industry (Brodnax, 2006). They also demonstrate how contradictions in planning systems are ironed out politically "in accord with the interests and projects of domination" (Wagenaar, 2011, p. 166).

In the next section, the way that regional planning processes have informed dairy industry practices is evaluated, and the views of stakeholders on their effectiveness are presented.

Regional Planning and Dairy Farming

Regional councils determined their own rules for dairy farming in their regions. As a result, dairy farming could be maintained as a permitted activity or changed to a discretionary activity. A permitted activity does not require resource consent, while a discretionary activity does. Most regions established dairy farming as a permitted activity, with a permitted activity standard established in each region's Regional Plan. An example of the Permitted Activity Conditions established for the Waikato Regional Council can be found in Appendix VIII.

In some regions, however, farming was made a discretionary activity. A regional planner stated that this decision had been positive for the region;

> It enabled us to establish a standard which gave fixed criteria for farmers to work to. This has meant that they were more likely to invest in better effluent systems, for example, as they had more certainty. The resource consent will state if you have this system you can use it for the next 20 years. It also made compliance officers' work much easier. (RC 12)

However, in general, the dominant approach, in line with the effects-based discourse, was the development of permitted activity standards for dairying. The focus was on addressing point-source pollution on individual farms to stop direct discharges to water. Rules, therefore, were developed to address stock in water bodies and the effects of dairy shed effluent on water. A planner, however, pointed to how important the first plan rules were. He stated that for years they had tried through education and dialogue with the industry to build environmental awareness in order to change farming systems, but that these had done little to get farmers to change (RC11). In his view:

> Effluent would now still be getting directed straight into streams, and farmers would be saying there is no problem if enforcement through rules for effluent had not been implemented. (RC11)

The requirements for farmers in the effects-based planning approach, therefore, were to improve existing systems, to make them more compliant, or introduce new systems on farms which would better accommodate the rules required for the point-source pollution effects. The assumption of the effects-based approach was that if everyone fixed their individual systems, more sustainable land use would occur. This approach was, however, seen as inadequate for dealing substantively with farm pollution, as illustrated in the comments by the planning officer quoted below.

> What must be remembered with this approach is that the effluent system is only 10 per cent of the total outputs of all those cows standing around. Regulated was only the cow shed system. What remained out of view, and unaccounted for, was the other 90 per cent of effluent and other pollution being produced on farms. (RC 4)

All respondents recognised that the effects-based approach was inadequate when it came to taking account of the cumulative impacts of all faming systems and dairy industry growth, as the comments below indicate. The aspatial approach to planning did not influence individual landowners' choices with regard to land use, land management practices, or land use change. It is the combination of the cumulative impacts of dairy industry growth and intensification which is now well understood as having caused increased environmental decline.

> If farmers were working within the permitted activity rules, we could not stop farm conversions or intensification on farms, even though we could see that together they were causing more degraded water. (Planner RC9).

> Ecological systems are complex and the logic of the effects-based approach as a land use planning system could not incorporate the complexity of ecological systems. This had meant that cumulative impacts could not be managed adequately. (Scientist S6).

Another regional planner summarised the issue thus:

> How can you have a system that is set up to take the effluent of 500 cows and then you put 2000 into that shed or system; of course, there is going to be a problem. You go from 1-2 cows per hectare to 5-6; you add in all the extra fertiliser and other inputs … it was a recipe for disaster in terms of the environmental impacts. (RC4)

The diffuse pollution effects which emerged from the substantive increase in dairy cow numbers, increased fertiliser use, and the bigger area being converted to dairy farming (which was supported as part of the productivist growth goals of the broader industry) remained outside the purview of regional council staff's consideration under the effects-based management approach.

All respondents who worked as planners recognised that underfunding had stopped them from effectively carrying out their two roles of achieving compliance and educating farmers. For example, in some regions there had been a farm visit to every farm every year; in others, only a selection of farms were

visited, unless there was an obvious noncompliance issue. Effectively policing noncompliance of farmers not working within permitted activity standards were also constrained by funding. For example, under the RMA, an Environment Court prosecution has to be made within 6 months, or dropped, which meant that choices had to be made about which cases of noncompliance would go to Court, and only the worst cases were selected. As a result, "noncompliance issues could appear to be not as bad as they were" (RC4). These types of examples exemplify how different practices in different councils were constrained by funding.

In summary, the assumption of effects-based management is that establishing rules which all land users must uphold will lead to ecological sustainability. In practice, however, this approach failed to take account of the cumulative impacts, or stop unrestrained dairy industry growth. Other problems that have emerged are: that the regionalisation of environmental management has been constrained by lack of funding, which has limited the environmental capacity of regional councils, and the possibility of an effective feedback loop; that the lack of strong national leadership or national instruments has meant that an integrated and comprehensive approach to the environment has not been established; that technological decision-making does not require consideration of wider sociocultural values; and, that political interference can undermine the balance sought between economic and environmental concerns. The result has been the loss of the holistic, value driven, bottom-up approach encapsulated in the normative values that framed the RMA. The institutional mechanisms established for regional councils have undercut a sustainable development approach to the management of the environment.

I turn next to an evaluation of resource consent processes. Resource consents are the mechanism established within the RMA where new and potentially controversial sustainability issues arise, are managed, and are open to being contested. From a sustainable development point of view, resource consent processes would require the public(s) who are potentially affected to have a concrete role in the decision-making process; however, as the next section demonstrates, this has not been the case.

Participatory Processes and Resource Consents

Resource consents are required for any activities that might affect the environment, or are not allowed as of right (permitted) by the RMA, or by a rule in a regional or district plan (Ministry for the Environment, 2006a). As the Consent Authority, councils both issue and manage resource consents. Thus, councils determine the amount of public scrutiny a resource consent application receives. There are three types of resource consent, namely, nonnotified, limited - notification, and public notification. Notification allows for public submissions, while nonnotification effectively removes this facility. There is also, through the Environment Court, a further procedure available to contest the merits of the resource consent decision. A High Court Judicial Review can also be called for. This is limited to an enquiry into the process that a local council has used to determine a decision, not the merits of a resource consent decision (RMA, Sec, 95).

There are different classifications of activities requiring different types of resource consent: (1) a 'permitted activity' is allowed without a consent; (2) a 'controlled activity' requires a consent but with conditions set; (3) a 'discretionary activity' may be denied a consent or a consent may be given with conditions; (4) a 'non-complying activity' is outside a plan but a consent may be granted if the effects are minor; and, (5) a 'prohibited activity' requires a plan change reclassification in order to be permitted to proceed (RMA, 1991 Sec 77).

Nonnotified Resource Consents

Under the RMA, a Consent Authority is not required to notify the application if it is satisfied that the activity will have a minor effect. This consent is decided on by regional council staff. The dominant concern in determining minor effects is the ability of planners to ascertain whether the application will impact on the ecological sustainability of an area or areas within a region where an 'affected person' lives (Ministry for the Environment, 2011b). In general, there is only a limited degree of public scrutiny of resource consent applications. For example, of the 36,000 applications received in 2011, 94 per cent were nonnotified and made under delegated authority by local authority officers (Oram, 2013b).[30] If, however, a decision is made to notify a resource consent, there are two pathways

for notification: limited and public notification (Ministry for the Environment, 2011b).

Limited-notified Resource Consents

A limited-notification is required if the effects are deemed minor and localised. The Act limits submissions to only those identified as 'affected persons' and stops anyone else from making a submission on the application. A potentially adversely affected person under the Act may include: owners and occupiers of land; *tangata whenua* (indigenous people of the land); downstream resource users; Ministers with statutory responsibility; or any other person the Council considers is 'affected' in a manner different from the pubic generally (Ministry for the Environment, 2011b).

The caveat to establishing who 'affected persons' may be is that this cannot mean any person or organisation with an interest. The 'Quality Planning Guide' states:

> Just because some people and organisations may have an interest in a proposal does not mean that they may be affected.... Case law has shown that an affected person is one who is 'affected in a manner different from the public generally'. Being 'interested' in a manner different from the public generally has not been enough. (Ministry for the Environment, 2011b)

Therefore, being interested in an issue is viewed differently from being affected by an issue. To be affected, it is accepted that you have to live locally (Ministry for the Environment, 2011b). This view seems to contradict the broader assessment of environmental effects established normatively within the RMA

Another component of limited-notified consents is that the council can still decide that it will be nonnotified. If the council assesses that the adverse effects are minor, and written approval has been obtained from those the council considers as 'affected parties', then the resource consent can become nonnotified (Gleeson, 2000). The result is that an application may not reach the public domain. Another concern is that there is evidence of consents being given through resource consent purchasing "with well-resourced bodies influencing consent applications in their favour by buying the written consent of potentially affected individuals and communities" (Gleeson, 2000, p. 117). Consent buying undermines the goal of resource consent processes which were established to assess environmental

risks, and not to facilitate a mechanism by which developers could fast track their development.

Publicly Notified Resource Consents

Under the Act an application for any type of activity must be publicly notified if:

- the activity will have or is likely to have adverse effects on the environment that are more than minor; or
- the applicant requests it; or
- a rule or national environmental standard requires public notification (RMA, Sec, 95)
- regardless of any other matters, there are special circumstances (RMA, Sec, 95). (Ministry for the Environment, 2011b)

Publicly notified applications trigger public submissions, public hearings, and possible appeal to the Environment Court by any person who has participated in the previous processes (Fookes, 2000). They, therefore, provide the greatest participatory potential of the resource consent processes.

Environment Court

The Environment Court processes are an important component in the granting of consents as they provide a check on the quality of decision-making and they are a means to assess substantive information about environmental effects, while building case law by which to clarify the RMA (Morgan, 2000, p. 99). The Environment Court has jurisdiction to determine:

> …appeals about the contents of regional and district statements and plans, [and] appeals arising out of applications for resource consents. (Ministry for the Environment 2011)

The Environment Court process is a de-novo process as the court can consider matters anew. A de-novo process is the same as if the resource consent issue had not been heard before, and can exclude any decision previously made.

In summary, non-notified, limited-notification, public notification, and Environment Court processes can all limit participatory processes and, therefore, constrain who can determine what an environmental risk is, and who can determine environmental risks. None of these processes easily incorporate the broader social and cultural values established as normative values in the RMA. However, they do reflect the impact of the ‘effects-based’ process established within the institutional mechanisms of the RMA. The consent processes and the

Environment Court processes for councils, applicants, and submitters are primarily a technocentric and legal procedure rather than "a process for exploring implications and possible trade-offs of environmental concerns" (Morgan, 2000, p. 99).

In theory, publicly notified applications and Environment Court proceedings should provide the most robust means through which the public play the watchdog role under the RMA. Yet, as the examples below demonstrate, neither process guarantees that the community's views will be considered with any alacrity by consenting authorities even when an issue is of great concern. Examples are presented in Table 18 of these processes in action. They demonstrate that participatory processes are constrained by both procedures and the cost of participation.

For sustainable development, participation is seen as an important mechanism through which to make public institutions accountable, and through which to respond to voices of the citizens they are meant to serve (Kurian & Wright, 2012). Resource consent processes, and the linked Environment Court processes, should be sites where there is space for attention to conflict and difference, a place of social and cultural contestation, but this possibility seems to have been managed out of the resource consent processes. Instead of ascertaining environmental risks as determined by the publics, foremost in resource consent processes is the satisfying of legal (and development) requirements. Through the procedures established for public engagement constraints have been imposed on meaningful participation (Wynne, 2000). Therefore, while the RMA normatively suggests the need for strong participation, which would necessitate public involvement, the participatory mechanisms within the resource consent processes in action are very weak.

Table 18: Examples of Resource Consent Applications

Resource Consent Type	Problem	Outcome
Nonnotified	Community concern was raised in 2005 at the impact of a subdivision in Ohakune in the North Island. The area had a Water Conservation Order in place. A Water Conservation order is only given in recognition of outstanding amenity value or intrinsic value of a water body.	In 2008 the subdivision was approved under non-notified process. The only recourse for the community was through a judicial review, which can cost between $50-80,000, which the community could not afford to do.
Limited-notification	In 2008 a limited-notification route was used for a 79 lot subdivision in Opito Bay on the Coromandel Peninsula in the North Island. The Environmental Defence Society (EDS), a national group, was concerned that the subdivision would undermine the breeding grounds of the endangered dotterel, but the EDS were not deemed as an 'affected person'.	Because of the localised and specific targeting, limited-notified applications can, therefore, ignore the importance of broad public consultation. The only recourse for the EDS to oppose this consent was through an expensive judicial review. The Environment Court outcome was that the subdivision could proceed with some small concessions to EDS, local *iwi* and other concerned groups.
Public –notification	A Resource Consent was sought in 2010 for a factory farming style dairying operation in the McKenzie Basin in the South Island. The consents were for 16 dairy farms on 8,000 hectares with 18,000 cows. The scheme was highly controversial, and there were 3,000 submissions against this proceeding. Concerns spanned animal welfare, environmental impacts from effluent discharge, water take and potential water contamination, and the special landscape values of the MacKenzie Basin	The Waitaki District Council granted land use consents and compliance certificates for this operation. The subsequent outrage saw use of a Ministerial Call-in, which is a process where a Minister can have the consent reviewed, if it has aroused widespread public concern (RMA, Sec, 142). The Environmental Defence Society (EDS) subsequently took the Waitaki District Council to the High Court challenging the Consent on the grounds that the farms would impact iconic fragile tussock grasslands. The High Court found in their favour and quashed the consents (Green Party, 2010). While this could be seen as a success in terms of the environment outcomes, this success came at great expense for a community environmental organisation.
Environment Court	Under the RMA, the Environment Court may order any party to pay money to another party, or to the Crown, to help offset expenses incurred in a hearing. For example, someone appealing a council's decision to issue resource consent [the Appellant] might be ordered to pay the person who originally applied for the consent (the Applicant) or the council costs.	The Environment Court processes are, therefore, putting broad participation out of the reach of ordinary citizens, first, by virtue of individual costs to participate, and secondly, because of the deterrent created by the instances where the Environment Court has awarded costs against individuals and community groups who have taken action in the public interest.

Source: Laugesen (2010); Ministry for the Environment (2011); Gleeson (2010)

In summary, the RMA normatively suggests that sustainable environmental management requires that multiple perspectives and local knowledge should inform expert risk assessment in determining environmental risks, and that a cooperative approach is important. Nevertheless, the resource consent process is another example of how institutional mechanisms have instead marginalised robust community participation.

Both central government and regional councils have identified that the effects-based approach has failed to manage the cumulative impacts of development on the environment adequately. What follows is an assessment of how the current government is proposing to address these concerns. I make this assessment through an evaluation of the Fresh Start for Fresh Water package which was introduced in 2011. This package was significant because it flagged that central government would now provide more oversight of environmental problems.

A Fresh Start for Sustainability

In 2011, the MfE acknowledged that the lack of an overall nationally-driven strategic framework for freshwater had led to further degradation of the environment, thereby failing the "Purpose" of the RMA Act (Ministry for the Environment, 2011e). One reason it gave for this failure was a disconnect and lack of appreciation at the national level of the connection between the effects of land use intensification on water quality and quantity (Ministry for the Environment, 2011e).

This acknowledgement from the MfE came almost 20 years after the RMA was established. The response demonstrates a regulatory vacuum, an absence of strong central leadership, and recognition that an integrated and comprehensive approach has not shaped oversight of water resources on the part of the MfE.

A series of measures to address these concerns was outlined in the Fresh Start for Fresh Water package (Ministry for the Environment, 2011a). The package was framed around the introduction of a *National Policy Statement for Fresh Water Management* (NPSFWM) and Amendments to the RMA (1991). I assess each of these changes in turn.

The first example is concerned with demonstrating how central government is now planning to address water decline, through an evaluation of the discursive practices established within the NPSFWM. The second example demonstrates the social and ideological work of language (Fairclough, 1995) evident in the changes in the text of the RMA that MfE has proposed through an Amendment. These two examples together demonstrate how meanings and words established in texts that establish the institutions through which we manage water resources can change or maintain hegemony and can support weaker or stronger sustainability outcomes for the environment (Wright & Kurian, 2010).

The *Fresh Start for Fresh Water* announced that there would now be a National Policy Statement for Freshwater Management (NPSFWM) (Ministry for the Environment, 2011c). The NPSFWM would be the major vehicle through which central government would direct regional councils to address water pollution concerns. The key purpose of the statement was to enforce quality and quantity limits for freshwater. The NPSFWM states:

> In order to achieve the purpose of the RMA (1991) (the Act), the Crown recognises there is a particular need for clear central government policy to set a national direction ….This includes managing land use and development activities that affect water so that growth is achieved with a lower environmental footprint. (Ministry for the Environment, 2011c, pp. pp 3-4)

It further states that this step "is a fundamental step to achieving better environmental outcomes and creating the necessary incentives to use fresh water efficiently, while providing certainty for investment" (Ministry for the Environment, 2011c, Preamble, p. 3).

The above quotes are made within the context of or with reference to growth in dairy farming and demonstrate that even though the reason for change is the impact of dairy industry growth on the environment, the NPSFWM does not put in place any constraints on that growth. Change is seen as being required to provide certainty for business and to encourage continued growth, albeit with less of an environmental impact.

A linked cabinet report, *New Start for Fresh Water* (Office of the Minister for Environment, 2011), is still concerned, however, with the pace of change. It states:

> We are not sure whether we should move as fast as possible to change, or take a longer time to work through the options thoroughly with Māori, local government, stakeholders and the public. (Sec, 64b)

This concern about speed is reemphasised in the document where it states:

> Major changes made at speed and without local government, stakeholder or public buy-in are unlikely to be durable, and risk being unworkable or unnecessarily complex or costly. (Sec, 64d**)**

The final recommendation of this report is that:

> We should not rush the implementation of actions in significant or complex areas. Officials should investigate all potential options, including those that would fundamentally change the status quo. This does not commit us, at this stage, to any radical solutions – but it leaves open all the options for improving water management. (Sec 64e)

This report demonstrates that there is still reluctance on the part of central government actors to act in a decisive manner and take strong leadership on water problems, particularly if doing so has implications for business (the status quo). This hesitancy to "drive" substantive change and to move "slowly" is demonstrated in the NPSFWM. While there is an expectation that changes should be introduced into regional plans by 2014, it states that if this is impracticable, then through planned stages:

> Every regional council is to implement the policy as promptly as is reasonable in the circumstance, so it is fully completed by no later than 31 December 2030. (NPSFWM, Policy E1 (b)

This statement means that if it is "impracticable" for regional councils to change, the status quo can remain for another 16 years. This policy is hardly decisive, nor does it represent prompt sustainability action.

Under the NPSFWM, regional councils are now required to develop new rules within their freshwater objectives for their regions in order to sustainably manage the use and development of land and the discharges of contaminants in order to:

> Safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associate ecosystems of freshwater. (Ministry for the Environment, 2011c, p. 6)

This ruling seems a repeat of the expectation of the RMA when it was introduced. However, what is new is that councils are now permitted to consider setting some objectives (that is, they can introduce a more prescriptive approach for whole catchments) to ensure sustainable water outcomes.

The implementation guide to the statement states:

> An objectives and limits-based regime will provide certainty for both economic and environmental outcomes … avoid over-allocation and enable cumulative effects to be better considered and managed. (Ministry for the Environment, 2011d, p. 1)

Again, we see an emphasis on the importance of ensuring the balancing of economic and environmental imperatives, reflecting both the sustainable development and ecological modernisation discourses. The concern to give equal weight to economic and environmental imperatives within these discourses weakens the urgency with which environmental imperatives may need to be addressed.

At the time the NPSFWM was announced, there was criticism that there were no linked 'National Environmental Standards' set by which to determine acceptable water quality for the whole of the country (Green Party, 2011c). As outlined above, National Environmental Standards, if implemented, are required to be applied across all regions and integrated into regional plans in the same way (RMA, Part 5, Sec, 43 (2)). The then Minster for the Environment, Nick Smith, in response to these concerns stated:

> There is a tension between having one set of rules nationwide and the disadvantage of national standards for very different geographical areas ....The basic principle is to push decisions down to the lowest level appropriate [because] that is where the best knowledge lies (Nick Smith, NZ Farmers Weekly, 2012, p. 14).

The assumption here, endorsed by central government, is that different regions will ascribe value to water resources in different ways. The statement indicates the continuing support for a decentralised (devolved) approach for environmental management of water.

In November 2013, a Discussion Paper was released by the MfE which outlined how the NPSFWM would be implemented into regional plans (Ministry for the

Environment, 2013b). Rather than bringing in legally binding National Environmental Standards, the Ministry proposed a National Objectives Framework (Ministry for the Environment, 2013b).

The National Objectives Framework now states that "all water bodies must meet a minimum state for ecosystem health and health for secondary contact" (p, 29), and, in line with this objective, there will be some compulsory bottom-line limits for a number of environmental pollutants including nitrates, phosphates, and pathogens. Standards for ecosystem health and general protection for indigenous species will also be established.

The stated objectives have been criticised for being too timid. One major criticism is that, while limits have been set to protect ecosystem and human health, these limits are only at the secondary contact level (that is, boating and wading). There is no mention of protection limits being set for swimming, fishing, or water drinkability standards. There is criticism also that the limits set will impact on 20 per cent of the most sensitive species, with the possibility of local extinctions (Joy, 2012; McNicholas, 2013). Furthermore, despite nitrate leaching into groundwater being a major concern, salt leaching is the only attribute outlined as needing to be tested when managing ground water. As a result, there is no requirement to test for the key dairy pollutant, nitrogen (PCE, 2014). The nitrate limits are also set at a lower level than those now being established as best practice by some regional council. The PCE has stated that this situation "could mean that councils have to wind back some hard won gains and community agreements on water" (PCE, 2014, p. 4) such as those in the Rotorua and Taupō Lakes.

The government responded to these concerns by stating that, if higher standards were valued, then it was up to communities to decide this priority while knowing the fiscal implications (Ministry for the Environment, 2013a). The government discourse indicates support for further economisation of water. If communities want higher water standards, these will come at a cost. A cost-benefit and risk analysis will now be fundamental to a community objectively determining the value of water, rather than government supporting the intrinsic value of water, or the rights of communities to have high water quality standards. This discourse

appears to further undermine the sustainable development values established in the principles and purpose of the RMA which required that a balance be sought between sociocultural, ecological, and economic values.

A further concern about the NPSFWM that has been raised is that it did not determine that intensive dairy farming should be a discretionary activity that should require resource consent. Instead, farming has remained a permitted activity, if a regional council so chooses. As a consequence, the unregulated and voluntary approach through which the dairy sector manages its effects on water continues to be supported by government policy (Green Party, 2011c).

The *Fresh Start for Fresh Water* package has provided a $15 million fund to restore historically polluted waters, but, in a contradictory fashion, is also supports further land intensification through the establishment of a $400 million irrigation acceleration fund for rapid construction of regional scale irrigation schemes (Carter, 2011; Ministry of Primary Industries, 2013). It is already well understood it is the cumulative impacts from dairy industry growth that have contributed to water decline, but the Minister for Primary Industries, Nathan Guy, stated that support for irrigation is important because it will:

> Unlock the massive opportunities that water storage and irrigation can create for New Zealand… there is potential for another 420,000 hectares of irrigated land to be available … [this could] boost exports by $4 billion a year by 2026, which would support thousands of new jobs [and] with more consistent river flows in summer there will be real benefits for the environment with improved habitats for fish and birdlife. (Guy, 2013a)

Guy's claim that irrigation will be beneficial to the environment has been challenged by those who claim that irrigation projects could pave the way for an additional 1 million cows, and would be linked to reduced stream flows, and lead to increased water pollution and loss of water quality (Green Party, 2011a; Percy, 2013).

In summary, the long-awaited central government response to addressing water decline through a NPSFWM appears to reinforce the privileging of support for economic development over ecological sustainability concerns. The overarching discourse in the NPSFWM suggests that environmental risks are technical

problems best dealt with on a case-by-case basis at the regional level and with careful consideration of their effects on economic activity. The statement also emphasises that it is the community which needs to be mindful of and willing to pay for better water outcomes. If assessed against the analytic framework, the government's discourse is indicative of a weak green, technological discursive response to water pollution concerns. It is the calculated self-interest of communities, determined through a cost/benefit analysis not equity issues or intrinsic values, that determines water quality concerns.

The second example that is examined here is the proposed Amendment to the RMA. A Discussion Document was released in February 2013 (Ministry for the Environment, 2013d) which outlines the MfE's proposed reforms to the RMA. The MfE stated that the changes were necessary because:

> The predominance of environmental matters in the RMA … may result in an under-weighting of the positive effects … of certain economic and social activities. (Ministry for the Environment, 2013d, p. 35)

The Ministry website outlines further why these changes are considered as necessary:

> There was evidence that the broader economic effects of policy decisions were not being given adequate attention ….The new requirements therefore give explicit recognition that the introduction of new RMA policies and plan changes must be evaluated against how they will affect economic and employment opportunities. (Ministry for the Environment, 2014)

In the discussion document, the Minister for the Environment, Amy Adams, asserted that:

> Around New Zealand, frustration with the Resource Management Act is rife. The way RMA processes are operating is costing us all in time, money and lost opportunities. Delays and uncertainties mean potential new jobs are not being created. (Ministry for the Environment, 2013d, p. 5)

The discussion paper asserts that the environmental values of New Zealanders have changed since the RMA became law 22 years ago, and that they now care more about the economy and less about the environment, although they offer no evidence of this shift (Oram, 2013b). This is an excellent example of how a new "common sense" approach to the management of the environment is being promoted. For the Minister, the problem with the RMA is not its failure to protect

the environment from the effects of developers (its original intent), but that it is causing lost opportunities for developers, which in turn is costing New Zealanders job opportunities, and that now 'we' all care more about jobs than the environment. This framing reflects a technological discursive approach whereby nature should serve human ends. It is a utilitarian and anthropocentric view. The primary concern is economic efficiency, sustaining growth, and the ability of capital to maintain itself (O'Riordan, 1999; Pepper, 1998).

In response to the Discussion Paper, 13,000 public submissions were made, with 99 per cent being against the changes (Omundsen, 2013; Palmer, 2013). The primary concerns expressed in these submissions were that the changes would undermine local democracy and further erode environmental protection. There was concern that this change would mean local decision makers would be unable to turn down development proposals that threatened the environment, and that there would be fewer submission and appeals processes through which to counter development proposals (Omundsen, 2013). The overarching concern was that the proposed changes would imply a radical change to the core purpose and principles of the RMA.

The PCE's view was that the Amendment meant that "environmental matters would be treated as no more important than economic matters" [and that there would be] "equal status given to economic and environmental goals" (PCE, 2013a, p. 7), and that:

> Balance of the kind where environmental and economic concerns are given equal weight does not belong inside the RMA. The RMA itself provides the balance to the economic imperatives of the marketplace. It is not, and should not become, an economic development Act. (PCE, p. 9)

Geoffrey Palmer[31] reiterated how these changes are prioritising economic values, which in his view does not reflect the values of the New Zealand public:

> New Zealanders consistently identify quality of life, and the quality of the natural environment, as higher priorities than economic considerations. The current proposals are completely out of step with those priorities. They represent a significant step backwards for environmental protection in New Zealand. (Palmer, 2013, pp. 64-65)

This critique demonstrates that key values established through the RMA, such as ensuring that the quality of the environment should be prioritised, and that

communities' values should shape environmental policy, are being eroded through these changes.

In response to these concerns, the Minister for the Environment stated that critics of these changes were "scaremongering and out of touch with New Zealanders" (Oram, 2013b).[32]

Drawing on the PCE submission to the proposed RMA Amendment, I next demonstrate how language change in legislation can determine concrete material changes regarding how the environment may be differently valued if the proposed changes are enacted.[33] If these changes are instigated, they will rewrite the core normative values of the RMA and those things that regional councils will be required to assess as environmental risks.

Table 19 below summarises a Table within the PCE's submission. It demonstrates the changes that the government proposes to make to the RMA. On the left are extracts from the current RMA, and the proposed changes are on the right. The key changes are highlighted in bolded font.

First, many of the sociocultural and ecological values established as normative values in the RMA (1991) are removed and replaced by provisions which increase support for development. Second, the RMA was established in order to protect the environment from development based on the view that development would be environmentally sustainable and did not lead to species extinction or over exploitation and pollution clean ups (Palmer, 2013). However, the proposed Amendments to the RMA downgrade the protection of indigenous flora and fauna to "specified areas' and remove the need to protect the intrinsic values of ecosystems, maintain or enhance the environment, or maintain amenity values (which stand in for sociocultural values under the Act). The proposed changes also provide central government with more decision-making power; however, this is to support development, not to support better environmental outcomes. Changes include provisions that enable central government to: take individual consent decisions out of local councils hands; insert provisions in local council plans without consultation (including rights for urban land to be available for

development); and, direct the Environment Court to hear cases on points of law, thus removing the de-novo aspect of the Environment Court (Oram, 2013b).

Table 19: Proposed Changes to RMA

Principles Currently in Sec. 6 and 7	Proposed Changes to Sec. 6 and 7
Matters of National Importance	**Matters of National Importance**
The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development	The protection of **specified** outstanding natural features and landscapes from inappropriate subdivision, use, and development
The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna	The protection of **specified areas of** significant indigenous vegetation and significant habitats of indigenous fauna
The maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers	**The value of** public access to and along, the coastal marine area, wetlands, lakes and rivers
The protection of historic heritage from inappropriate subdivision, use, and development	**The importance and value of** historic heritage
Other Matters	**Other Matters**
The ethic of stewardship	**removed**
The efficient use and development of natural and physical resources	The **benefits of** the efficient use and development of natural and physical resources
The maintenance and enhancement of amenity values	**removed**
Intrinsic values of ecosystems	**removed**
Maintenance and enhancement of the quality of the environment	**removed**
Any finite characteristics of natural and physical resources	**removed**
The protection of the habitat of trout and salmon	Areas of **significant** aquatic habitats, including trout and salmon
The effects of climate change	The **impacts** of climate change
	The effective functioning of the built environment including the availability of land for urban expansion, use, and development
	The risk and impacts of natural hazards
	The efficient provision of infrastructure

Source: PCE, 2013, Summary Table Appendix 2

In summary, the approach implied within the NPSFWM and the proposed Amendments to the RMA illustrate that central government views regionalisation of water management as the best approach to environmental management, and that fresh water standards should now be determined by how much a community is willing to pay for better water quality. This view indicates support for the further economisation of the environment, with sociocultural and intrinsic environmental values being downgraded.

The statement and proposed amendment demonstrate that short-term economic goals of an elected government can override long-term sustainability imperatives. It illustrates how the determination of "effects" is inherently a political process, where even scientific knowledge and standards (usually given priority) are undermined in the name of economic development. Environmental risks are seen as being able to be dealt with on a case-by-case basis, with careful consideration given to their effects on economic activity. The statement and proposed amendment indicate a shift back towards the technological discourse, rather than a shift towards the comprehensive and integrated approach required of sustainable development, or even a strengthening of ecological modernisation imperatives which would see a focus on polluter pays (i.e., that development must demonstrate at the very least that it is shifting in order to become more eco-efficient). This value change is being driven by the Ministry for the Environment. The central government response is a good example of how a political ideology which gives priority to economic growth continues to hold sway in the current central government in New Zealand, thereby limiting the possibilities of environmental sustainability.

Conclusion

This chapter set out to establish the sustainability discourse that framed the RMA and how this discourse has influenced the management of the environment and ecological sustainability outcomes. The analysis demonstrates that while the normative values emulate sustainable development, the implementation mechanisms established through the RMA drew on an ecological modernisation approach. This approach has undermined the broad, inclusive, normative definitions of 'environment' and 'sustainable management' presented in the legislation and supported instead a technological approach to the environment.

One clause of the legislation's sustainable management definition – "to avoid, remedy, or mitigate any adverse effects of activities on the environment" (RMA, 1991, Part 2, 5) – has framed sustainable management.

Through the regionalisation of implementation, a fragmented and regionally bound approach to resource management has been supported. This move fractured the possibility of a comprehensive and integrated policy approach between central and regional government. Table 20 below summarises the findings as measured against the discourse framework.

Requiring regional council planning processes to be framed by effects-based management, and a nonspatial approach, meant that a scientific/technical approach of environmental problems was supported. The focus was on improving existing systems to make them compliant with the rules. The assumption was that if everyone fixed their systems, more sustainable land use would occur. In this approach, the ability to address cumulative impacts at the catchment level on water, or any mechanism by which to stop dairy industry growth, has been lost, and it is the combination of both that has led to water decline.

For sustainable development, a bottom-up, nonhierarchical governance approach with strong community participation is viewed as necessary for environmental policy-making. The major mechanism established for community participation for assessing new environmental risks under the RMA was the resource consent processes. In practice, this mechanism has been demonstrated to be a hierarchical, technocratic, and legal process which marginalises rather than supports public participation. This process was enabled through both the procedures that were established, and the possible cost of participation. Here, another example of ecological modernisation discourse in action with environmental risks being seen as technical problems best assessed through a cost/risk benefit analysis is evident.

Table 20: Normative and Institutional Discourse of RMA (1991)

		Contradictory Discourse in Resource Management Act (1991)
Normative Values	Sustainable Development	Balance sought between economic, environment and social/cultural elements, including Māori worldview. Needs of future generations must be taken into account. Articulates importance of value choices of individuals and communities. Economic growth and environmental well-being can be sustainably managed now and into the future in a way which enables people and communities to provide for their social, economic, and cultural well-being. Holistic understanding of complex layered and interrelated concerns that need to be addressed if ecological sustainability is to be achieved.
Institutional Mechanisms	Ecological modernisation	Top-down, hierarchical, expert-led state steers rather than rows. Ministry for Environment makes policy and sets national agenda and policy direction. Implementation transferred to decentralised actors. Environmental management devolved to regional councils. Environmental management system framed by rules and standards. Effects-based planning regime frames environmental risks as technical problems best solved through scientific means. The focus is on remedying, avoiding, or mitigating the effects of economic and other activities on the environment. Continued use and development is permitted anywhere, as long as effects do not transgress scientifically determined thresholds or established rules in a plan. Environmental performance standards preferred rather than strong regulation. Planners no longer direct location of activities, land use planning aspatial in that the market is the driver of land use configuration. Application of market-based instruments. User-pay charges; costs for participating in resource consent processes; fines for noncompliance. Weak participation processes. Participation limited to long-term planning processes, and resource consent applications – community dissent limited to analysis of environmental effects of application through resource consent hearings or Environmental Court hearings.

The focus on environmental effects as the primary problem of environmental management is reductive in that only a narrow range of concerns can be legitimately addressed. Effects-based management relies for its validity on expert discourse and quantitative measures, meaning that biodiversity concerns, connectivity between local ecosystems, and social and cultural issues can largely be ignored. By contrast, sustainable development is famed by the need to ensure that ecological, economic, and sociocultural values are all considered together.

This has not been the dominant approach supported through the implementation mechanisms legitimated through the RMA.

From a CDA view, "social structures exert their influence on social actors by defining a set of possibilities" (Wagenaar, 2011, p. 159), and it is through apparently benign social practices such as changes in language in legislation that power differentials in society are maintained or changed (Fairclough, 1992). An example of the most recent discursive change for sustainability has been presented in the review of the Fresh Start for Fresh Water package. This analysis has demonstrated that changes in language and social practices have further undermined the need to link together the core elements of sustainable development. Instead, the new 'common sense' is that a trade-off between environmental and economic values is now considered acceptable by central government. What is supported through these changes to the RMA appears to be the protection of an individual's right to develop in order to protect the sustainability of economic growth, and lost in these changes are the broader holistic elements required of sustainable development. This analysis has shown that the determination of how 'environmental effects' should be managed is inherently a political process rather than a scientific or community-driven process. This concludes the analysis of the RMA, and in the next chapter I turn to an analysis of the dairy industry's response to sustainability concerns.

---

[25] Social practices are understood as the more or less durable forms off social activity which when articulated together constitute the social fabric of an institution or organisation. Social practices could include activities, institutions, social relations, policy instruments, beliefs, knowledge, values, time, and place. An order of discourse is the network of social practices that constitute a particular discursive domain. In this chapter it is the sustainability discursive domain that is being analysed (Fairclough, 2003).

[26] *Rangatiratanga* refers to Maori control of all things Maori i.e. Maori sovereignty,

[27] *Kaitiakitanga* means the exercise of guardianship by the *Tangata Whenua* of an area in accordance with *tikanga Māori* [Maori customary values and practices] in relation to natural and physical resources; and includes the ethic of stewardship. *Tangata Whenua*, in relation to a particular area, means the *iwi* [tribe], or *hapu* [subtribe], that holds *mana whenua* [customary authority] over that area (RMA, 1991 P1 (s2).

[28] *Mauri* means the life force which all objects contain, that is their special nature.

[29] I note here that there have also been different responses by central government to elected regional councillors who have had a more green view on water quality concerns. The worst of these being exemplified in the sacking of Environment Canterbury's elected councillors. In 2010 the government in support of the burgeoning agricultural industry and their need for greater irrigated agriculture sacked the fourteen democratically elected Environment Canterbury councillors over concerns that water allocation and irrigation issues were not being dealt with effectively in the water plan. They were replaced with seven commissioners. In a complete disruption of democratic rights in this region, as yet there have not been any further local elections (Gorman & Watkins, 2010). This institutional response exemplifies the technological discourse.

[30] For example of the 36,000 resource consent applications received, 94 per cent of consent applications were made under delegated authority by local authority officers without public notification. Of the remainder, four per cent (1414) were publicly notified, and two percent (849) were limited notification (that is only affected parties could comment). For both publicly notified and limited notified resource consents only 0.56 per cent (203) were declined, and only 1 per cent of these were appealed to the Environment Court (Oram, 2013). On average only 10 per cent of those appealed, go to an Environment Court hearing (Taptiklis, 2009).

[31] Geoffrey Palmer (QC) as already noted is a former Prime Minister, but he was also the Environment Minister who played a key role in formulating the RMA.

[32] Included in the critics who submitted were: the PCE, the New Zealand Conservation Authority; Local Government New Zealand; Forest and Bird; The Environment Defence Society; Greenpeace NZ; Environment and Conservation Organisations of Aotearoa NZ; NZ Law Society; Resource Management Law Association; Historic Places Aotearoa; New Zealand Planning Institute; the Institute of Architects ;New Zealand Institute of Surveyors (Omundsen, 2013) .

[33] Currently this Amendment is being stymied by two of the Government coalition support parties being unhappy with the changes (Fish & Game, 2013; Maori Party & United Future, 2013).

Chapter 7

The Shifting Discourse of Sustainability within the Dairy Industry

> *In Mr Burrs' mind, that is grass, and that is productive land, and its best use is to turn it into a paddock, and we are saying, 'no', it is really important it is precious, and there are less than 10 per cent of wetlands left (RC4).*

Introduction

In 2008, Mr Burrs, a farmer in the southern Waikato area of PioPio, knowing the protected status of the 40 hectare Arapae Wetland on his property deliberately drained and destroyed it. The wetland had protected status both in the regional plan, and under the international RAMSAR Convention. It was deemed a wetland of international significance. The Environment Court fined Mr Burrs $73,000 and ordered the reinstatement of the wetland. Prior to purchase, Mr Burrs had received advice from the Department of Conservation and Waikato Regional Council as to the significance of the wetland and restrictions on what activity could occur. Judge Harland in her ruling stated that it was a clash of perspectives, and that Mr Burr was reckless in his approach to his legal obligations because he was driven to fulfil his objective to develop the property as an adjunct to the home farm dairy operation (Twentyman, 2012).

I start with this case because I think it captures well the conflict inherent in social change. Over the 100 years of New Zealand's dairy farming history, the 'common sense' assumption has been that, to be a good farmer, every acre should be productive, and draining swamps was an important part of gaining more productive land. Chapters 5 and 6 have demonstrated that there was also strong institutional support to maintain this productivist approach to land and land use. Today, however, this approach is seen as an extreme example of deliberate and rapacious environmental destruction for which the Burrs were convicted in the Environment Court. In Foucaldian terms, this episode demonstrates how social change has challenged the 'order of things'. The hegemonic productivist ethics, and its inherent reductive and utilitarian approach to the environment

demonstrated by Mr Burr's actions, are now being challenged by a sustainability discourse in New Zealand. In this chapter, I analyse how the network of institutions that comprise the dairy industry in New Zealand has responded to this challenge, and moved sustainability seemingly from the periphery into the heart of the dairy industry's practices and commitments, where it now sits alongside the broader strategic goal of economic profitability. I ask: How has sustainability been integrated into the dairy industry normatively and institutionally? What type of sustainability discourse has influenced this change? And, how effective is this approach for achieving ecological sustainability?

Substantive organisational change occurs when the leadership with the power to determine change accepts that change is necessary, and acts on this perception to forge a new direction thereby enabling people to value some identities and interests over others (MacDonald, 2003). Such structural change can be identified within organisational texts, and with this in mind, the focus of this chapter is to answer the above questions by critically analysing the key documents that have been produced by the network of institutions that construct the dairy industry, including Fonterra, DairyNZ, and Federated Farmers. The analysis draws on documents produced by these core dairy industry groups, in addition to documents jointly produced between the industry, government, and other actors. They make up the texts which enable an evaluation of the values and goals that the industry prescribes as necessary for sustainable dairy farming, and for a sustainable dairy industry. In carrying out this analysis, I also draw on data from the media, environment advocacy networks, and government documents, as well as interviews undertaken as part of this research.

Water Quality and Dairy Intensification

The defining resource issue which has forced the dairy industry into beginning the process of change has been the relationship between farm practice and water quality. This chapter begins by presenting some background on why freshwater quality issues began to be identified as a growing concern, and the links between a decline in water quality and the intensification of the dairy industry. I then turn to an analysis of the dairy industry's response.

In a review of regional council processes in 2006 (Hill-Young & Cooper, 2006), all councils reported concerns with both water quality and water quantity. The review found that, together, councils considered that point-source discharges of contaminants were effectively controlled through rules, but the effects of nonpoint -source discharges, and allocation of water, were the biggest freshwater management issues in all regions. They recognised that the decline in water quality was linked to the significant changes in land and water use resulting from the expansion and intensification of pastoral farming (Hill-Young & Cooper, 2006, pp. 4-8). A regional council planner commented:

> The difficulties with finding solutions for diffuse pollution are that while effluent problems are visible, you can see it, it is easy to understand and there is a system to buy to fix it … and making changes can be profitable. The next layer of problems to be solved for diffuse pollution is more difficult; there is nothing to buy to fix it, and the solutions are inextricably linked to the production system itself. (RC6)

This response illustrates that regional councils are aware that technical fixes to address the problem of water degradation were difficult to achieve given that the issue was linked to wider productivist approaches to land use itself.

Although the causes of freshwater degradation were repeatedly identified by central government, regional councils, and scientists (see Chapter 6), it was not until 2002 when Fish and Game (a statutory body charged with managing freshwater sports and game bird hunting in New Zealand) drew attention to the adverse consequences of dairying on waterways (Parkyn, et al., 2002) that wider public pressure was placed on the dairy industry to address its impacts on water. The public campaign under the name ‘Dirty Dairying’ successfully brought the linkages between water degradation and the dairy industry into the public domain (Deans & Hackwell, 2008a; Edgar, 2009).

Since 2002, studies such as those mentioned above (Deans & Hackwell, 2008a; Edgar, 2009; Parkyn, et al., 2002), and ongoing monitoring, have continued to provided evidence of the decline in lakes, rivers, and streams, and have attributed this decline to the impact of the growth and intensification of dairying. There is a consensus that the cause of the decline is increased fertiliser use (particularly nitrogen), increased stocking rates to achieve the higher productivity goals, and

the exponential growth in the national herd from 2 million in 1980 to over 6.5 million in 2013 (Environment Waikato, 2007a; Hamill & McBride, 2003; Joy, 2012; NIWA, 2010a; PCE, 2004, 2010; Statistics New Zealand, 2013; Vant, 1999, 2011; White, 2007).

As water pollution concerns have become the focus of environmental discourse, the acceptance of the dairy industry's productivist approach to dairying has been challenged. This approach, which has seen land and water valued only for its productive characteristics, now faces public criticism. These "tactics of resistance" by environmentalists, scientists, and the public (Darier, 1999, p. 18) have influenced change through identifying problems, building local concern, and offering solutions in order to promote greater responsibility among the principal actors (Huber, 2008; Neale, 1997).

Sustained critique of farming and dairy industry practices has seen the dairy industry react. To contextualise the industry's response, this chapter first provides an overview of the structure of the dairy industry. It then undertakes a discourse analysis of dairy industry documents to show the shifts that have taken place within the industry to integrate sustainability concerns into its practices and goals.

Dairy Industry Structure

During the 1980s and 1990s, at the same time that sustainability became a focus of community concern and government policy, the dairy industry was going through its own restructuring. As outlined in Chapter 5, the loss of the guaranteed market in Britain and the neoliberal reforms that led to the loss of farm subsidies after 1984, had generated a hyperproductive response framed by market diversification, intensification, and growth in production (Yerex, 1989). By productivist standards, the industry has been very successful. Table 21 resummarises the success of the industry's economic growth goals between 1980 and 2012 (see also Table 15). There are now fewer herds, but these herds are much larger; there is more land being used for dairy farming; and, more cows being farmed per hectare. Farming is now more intensive with milk production increasing from 5.8 million litres in 1980 to over 19 million litres in 2013. Thirty seven per cent of the national herd is now in the South Island, with South Island

farms being converted from land traditionally used for sheep farming to dairying. Because of climatic conditions, this land is much more reliant on irrigation. Taken together, these points show that the industry's economic success has been built on exponential growth and intensification of farming systems.

There are now over 6 million cows in the national dairy herd. Conservatively, one cow, produces the equivalent waste of 16 people; this growth in the national herd is, therefore, equivalent to having, unmanaged, the pollution effects of a population of 80 million people in New Zealand (Jay, 2007). Given that the current governments stated goal is to support the doubling of agricultural production by 2025 (Guy, 2013b), ensuring that the impacts of such growth of the dairy industry can be done in an ecologically sustainable way is critical to the long term sustainability of New Zealand.

Table 21: Summary Growth Dairy Industry 1980-2012

Statistic	1980	2012
Milk processed (million litres)	5,868	19,129
Average herd size	126	343
All cows	2.2 million	6.2 million
Hectares in production	996,723	1,638,546
Average number of cows per hectare	2. 07	2.83
Number of herds	16,089	11,798
Cow numbers – North Island	95 %	63%
Cow numbers – South Island	5 %	37%

Source: (DairyNZ, 2012; Statistics New Zealand, 2012)

After the loss of subsidies, the major focus of the different cooperatives and the Dairy Board was to ensure the economic stability of dairy farming through enabling economies of scale, increasing production, and forging new global partnerships to ensure better access to global markets. Through these changes, the Dairy Board became a multinational entity, and a major contributor to the world dairy market (Fonterra, 2013b). In 1996, there were 12 dairy cooperatives, and by 2000, through further amalgamations, only four cooperatives remained (Fonterra, 2013b).

The culmination of these changes was the Dairy Industry Restructuring Act (2001) which enabled the two largest dairy cooperatives, New Zealand Co-operative Dairy Company and Kiwi Cooperative Dairy, to amalgamate to form Fonterra. As a result, 95 per cent of New Zealand farmers were now part of one cooperative. Tatua and Westland Cooperatives chose to stay independent, and under the Restructuring Act, proprietary businesses could be established for the production, manufacturing, and marketing of New Zealand dairy products. This restructuring has seen new independent companies emerge including Synlait, Goodman Fielders, Open Country, and Miraka. These companies are linked together through a membership advocacy organisation, the Dairy Companies of New Zealand (DCNZ).

Alongside their manufacturing role, Fonterra also took over the former Dairy Board role of the marketing and exporting of the dairy products for farmer members. The Act also established that the Livestock Improvement Cooperative (LIC), previously a part of the Dairy Board (Ministry of Primary Industries, 2012), would now have oversight of the animal breeding and dairy herd testing databases. Through amalgamation there are now two major fertiliser cooperatives, Balance and Ravensdown. Organisations such as Dairy Women NZ, Shareholder Councils, DCNZ, and Federated Farmers (a membership organisation) also remain important strands of the dairy network focused on government policy, lobbying, and advocacy for farmers.

Currently, there are around 11,000 individual New Zealand dairy farm businesses that are supported by this network. The farmer-owned cooperative remains the dominant structure of the New Zealand dairy industry. Under the cooperative model, to be a shareholder, one must be a farmer. The majority of dairy farmers remain shareholder members of cooperatives, with the remainder being 'suppliers only' to some of the newer proprietary companies. The largest cooperative, Fonterra, still has over 90 per cent of dairy farmer shareholder members. Because of its size, Fonterra is the face of dairy farming in New Zealand (Fonterra, 2013a). The governance structure of Fonterra ensures that farmers have remained influential in shaping the industry goals both through their majority representation on the Board (13 of 16 members) and through the Shareholder Council (Fonterra,

2013a). That productivist principles are still the measure of the industry's achievement is evident in the statement below made in 2013 by DairyNZ. Success is linked with the dairy industry's being a dominant land user, its dominant position in the global dairy market, and its value to New Zealand's economy.

> Milk production grew 47 per cent in ten years to reach 1.69 billion kilograms of milk solids in 2012. [Dairying] now accounts for 21 per cent of New Zealand's grasslands and 46 per cent of stock units. On the back of milk production, New Zealand exported a staggering $13.7 billion in dairy products in 2012, accounting for approximately 29 per cent of New Zealand's total goods exported by value. This directly contributed $5 billion to New Zealand's GDP …. This growth means that the dairy industry now accounts for over a third of the world's traded dairy market. (DairyNZ, 2013b, p. 2)

The importance of Fonterra to the New Zealand economy is clearly evident. Fonterra's success is linked to its being a world leader in the production of safe, nutritious dairy product and its trading on New Zealand's clean green image. The impact of how closely aligned the New Zealand economy is to the dairy sector is evident in a recent global recall of Fonterra-produced whey powder due to a botulism scare. While subsequent testing demonstrated that there was no contamination, this scare initially saw boycotts internationally. The heightened concern with the whey powder contamination was driven by the 2008 Sanlu scandal. In 2008, one of Fonterra's Chinese joint partners, the Sanlu Group, was found to have included melamine in its production processes and had contaminated baby milk formula. This action affected approximately 300,000 children, causing kidney stones or kidney disease. The outcome was that six babies died, and 54,000 babies were hospitalised (Daily Mail, 2013; Fickling, 2013). Such scandals have a ripple effect on the larger New Zealand economy, demonstrating the pivotal role the industry has in New Zealand's economic stability.

There are three main arenas of expertise which constitute the broader support structure of the dairy industry. Oversight of Research and Development (R & D) and extension comes through the levy-funded DairyNZ; manufacturing and marketing are the responsibility of cooperatives and companies; and, lobbying and advocacy are undertaken by the membership advocacy group Federated Farmers

and all other industry actors. These arenas are strongly networked together with the common goal of supporting the New Zealand dairy farmer, and the broader industries economic, and more recently, sustainability imperatives. There are also many other external organisations involved in supporting the dairy industry. These include CRIs, universities, private farm advisory services, government ministries, particularly MPI and MfE, as well as farm advisory and educative programmes in regional councils. Table 22 presents a summary of the broad structure of the network of organisations that shape and support the dairy industry.

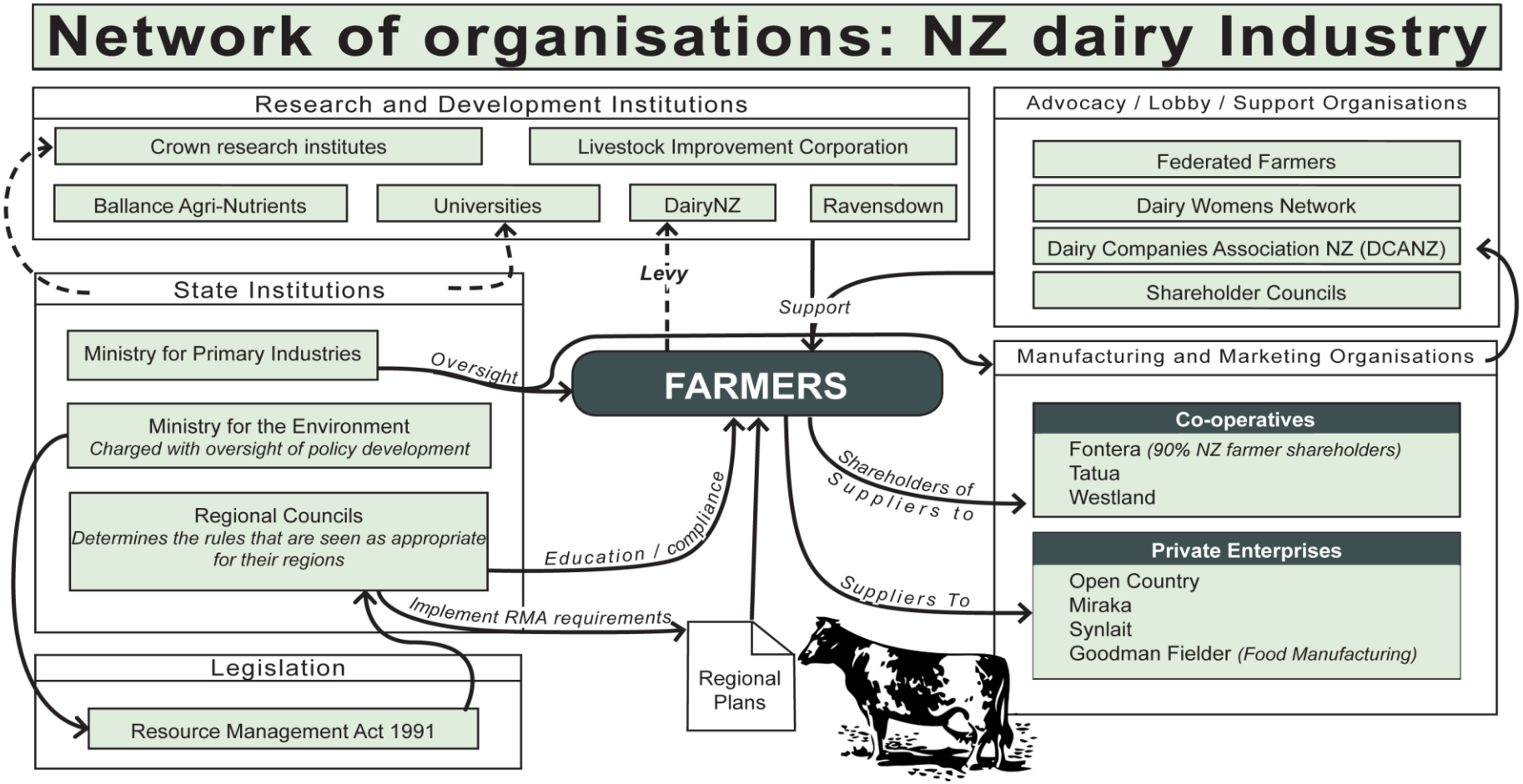


Table 22: Network of Organisations of NZ Dairy Industry

Industry Response to Sustainability

A technologically-driven, utilitarian land use approach, supported by the application of high rates of fertiliser to improve grass growth and chemicals to keep pests at bay, has historically sculpted land use by the dairy industry in New Zealand. This technological approach has meant that the commodification of nature and the implementation of instrumental values have long been embedded in the approach to the environment taken by the industry and by farmers. The acknowledgment of the need to incorporate environmental and sustainability values to manage the environmental impacts of productivism is a recent development. Balancing sustainability imperatives with economic goals is now an industry-wide concern. This is clearly evident in the following recent statements from spokespeople for the dairy industry:

> Fonterra has to be the champion for the environment and corporate sustainability. (Theo Spierings, Fonterra CEO, in Waikato Times, Sept 29, 2011, p.12)

> The number one issue is the need for the dairy sector to reduce its environmental footprint while remaining cost effective and growing as a sector. (Tim Mackle, CEO DairyNZ, in Tocker, 2012, p. 13)

> Sustainable dairying is about balancing profitability with environmental responsibility. This is the thinking guiding DairyNZ's efforts in our work with farmers and industry partners to find environmental solutions. (About DairyNZ, DairyNZ, 2013c)

Additionally under a banner heading "Environment is Farmers' First Priority", Federated Farmers President, Bruce Wills states:

> We now have an urban-dominated population and an overseas market scrutinising our environmental performance. Farmers now need to be more sensitive to their environmental footprint, it is important to get a balance between profitability and being able to farm for generations. (Burke, 2012, p. 15)

While pockets of concern have previously voiced the need to incorporate more ecologically sustainable dairy farming practices through such mechanisms as the Sustainable Farm Awards which were established in the Waikato in the 1990s (New Zealand Farm Environment Trust, 2013); an emergent organic and biological farming sector (Research and Development Group of the Bio Dynamic

Farming and Gardening Association, 2004): and some small projects carried out by AgResearch with farmers (Cottman, 1996), there is no evidence to suggest that before 2000 sustainability was a priority for the industry. As the above statements demonstrate, this is no longer the case. Sustainability, and sustainable dairy farming, is now recognised by the dairy industry as an industry-wide imperative.

Document Analysis

The core documents from these dairy industry networks that address the theme of sustainability are the following:

- Clean Streams Accord (Ministry Agriculture and Forestry (MAF), 2003 (c))
- The Dairy Industry Strategy for Sustainable Environmental Management (2006) (Dairy Insight, 2006)
- Primary Sector Water Partnership (Primary Sector Water Partnership, 2008)
- Dairy Industry Strategy for New Zealand Dairy Farming 2009-2020 (DairyNZ, 2009a)
- Fonterra Eco-efficiency Programme (Fonterra, 2009)
- Sustainable Dairying: Water Accord (2013) (Dairy Environment Leadership Group, 2013)
- Strategy for Sustainable Dairy Farming 2013-2020 (DairyNZ, 2013c).

What follows is an evaluation of illustrative examples from these texts to establish the normative values and institutional mechanisms that have underpinned dairy industry change. From this analysis, it is evident that the sustainability discourse shaping the dairy industry response has been the ecological modernisation discourse. The focus has been on technical and procedural innovation, a voluntary self-management approach, and building state-industry collaborative processes to find sustainability solutions.

Fonterra: The Clean Stream Accord

A substantive value change in the industry was not demonstrated until the Clean Streams Accord (CSA) emerged in 2003. The CSA grew from initial discussions between the Chief Executives of Environment Waikato and Fonterra Co-operative Group (Harding, 2007). This was a voluntary, nonbinding agreement between Fonterra and regional and central government (MAF& MfE).[34] It was a voluntary approach rather than a regulatory approach in keeping with the direction indicated in the 1997 government's 'Environment 2010 Strategy'. This strategy states that it favoured market mechanisms, economic approaches, self-regulation by

industry, and voluntary codes of practices and partnerships between the government and private sector as the best policy tools for 'encouraging' industry change (Ministry for the Environment, 1997).

The CSA was the first statement of intent which promoted the need for sustainable dairy farming in New Zealand. It demonstrated that the pollution effects of the industry on water would be taken seriously by Fonterra and the government. It was:

> ….the first time that targets had been set for environmental performance across all of New Zealand ….. [The aim was] to ensure environmental considerations become an automatic part of farm development and on-going day to day management. (Ministry for the Environment, 2004a n.p.)

The CSA gave Fonterra an influential role in shaping the water policy agenda and the timeframe for change, and preempted a regulatory response. The industry that was causing the environmental damage was, through the CSA, able to fundamentally shape the policies that would manage the issue. This concession by government was linked with the historical importance of the industry. The government's continued support of the industry was viewed as pivotal to the long term economic goals of New Zealand, and a voluntary approach also fitted with the effects-based approach of regional implementation requirements established through the RMA (1991). The problem was not constructed as a national water quality issue but as a dairy farm management problem which would be best fixed through self-management. It established that "water quality and practical farming had to be directly compared in order to determine an appropriate course of action" (Harding, 2007, p. 18).

The goal of the Accord was to have "where appropriate water suitable for fish, for stock and for swimming" (Fonterra, Local Government New Zealand, Ministry for the Environment, & Ministry of Agrictulture and Forestry, 2003, p. 1). This statement implies that there could be trade-offs if the costs were too high for farmers, whereby ecological sustainability might apply to only some areas (Harding, 2007, p. 17). This view emulates a "light green" perspective in which a technological fix within the current relations of production is possible. It places an instrumental value on nature, and treats environmental goods like any other commodity (Dryzek, 1997; Hudson, 2005). It assumes that environmental

improvement can occur alongside economic growth, reflecting a synergy between economic and ecological goals. All that was required to overcome the ecological crisis was technical and procedural innovation (Berger, et al., 2001; Hajer, 1995).

Furthermore the Accord states that:

> Measures must be cost effective, practical to implement in the context of existing farming operations, and clearly recognise the practical and financial constraints to implementation time frames. (Fonterra, et al., 2003, p. 2)

The stated goals of the Accord were both practical in improving the environmental performance of dairy farming, and ideational in presenting environmental management as an integral and important component of the dairy industry; additionally, there was now to be a focus on promoting sustainable dairy farming in New Zealand (Fonterra, et al., 2003). The importance of the Accord was that it was the first normative statement which identified that the current productivist approach to land management was not environmentally sustainable, and that the traditional productivist approach to farm management was having unacceptable impacts on water. It also established a preference for a multistakeholder approach rather than direct regulation. Taken together, the response emulates an ecological modernisation approach to environmental problems.

The Accord established a range of voluntary targets for farmers. The targets of the initial Accord were as follows:

- Dairy livestock were to be excluded from 50 per cent of streams, rivers, and lakes by 2007, and 90 per cent by 2012;
- Fifty per cent of regular stock crossing points were to have bridges or culverts by 2007 and 90 per cent by 2012;
- One hundred per cent of farm dairy effluent discharges were to comply with resource consents and regional plans immediately;
- One hundred per cent of dairy farms were to have in place systems to manage nutrient inputs and outputs by 2007;
- Fifty per cent of regionally significant wetlands (on dairy farms) were to be fenced by 2005, and 90 per cent by 2007. (Fonterra, et al., 2003).

None of these targets were met in full at the conclusion of the Accord in 2013.

The approach of the first Accord was hierarchical and involved directing farmers to make changes, albeit with little support. It was a voluntary self-management

approach relying on farmers' deciding to participate. The government, through the Accord, established a preference for a network approach whereby, a problem has been identified, change is now warranted, and government and the industry will solve it together.

Regional Action Plans developed between councils and Fonterra provided the objectives and details for how each region would meet the Accord's targets, but there was no compulsion to do so. Different incentives were given to farmers in different regions, for example, providing some funding for riparian tree planting; however, the assumption was that changes would be self-funded. These incentives were determined within the political discourse of regional councils' elected officials' ideologies, and within budget constraints. The *Regional Action Plans* all used soft language such as 'provide', 'advise', and 'encourage best management practice' (University of Otago, 2011b). In some areas there has been some compulsion, with Taranaki Regional Council, for example, establishing a *Riparian Management Strategy* which has required fencing and riparian planting of rivers and streams by farmers (Taranaki Regional Council, 2014).

The Accord's targets focused on both changes to how land was used (i.e., riparian planting, fencing, culverts over water) and on developing a new focus for farmers that addressed knowledge about farming systems (i.e., nutrient management plans, effluent systems). It was assumed that if farmers voluntarily made these changes and better understood the mechanisms by which their farming practices were leading to the pollution of water, such understanding would lead to more sustainable farming and a reduction of impacts on water. The success of the Accord was presented through annual snapshots of progress which showed results achieved against targets.

The implicit assumption was that if eco-efficient production systems were developed, the economy could be decoupled from the environment, meaning there were potentially no limits to economic growth. This approach reflected an ecological modernisation perspective.

By 2007, surveys such as one undertaken by Environment Waikato (EW) (Environment Waikato, 2007b) and the annual snapshot results[35] began to

indicate that farmers were not responding to the Accord to any great extent, and that the targets were not being met. The EW survey of 290 Waikato dairy farmers demonstrated the Accord had failed as a mechanism by which to change farmer behaviour. It found that 82 per cent of farmers interviewed had had no involvement with the CSA (Environment Waikato, 2007b, p. 3), and thus demonstrated that a voluntary approach with farmers taking individual responsibility did not seem to be working.

In 2007, Fish & Game reviewed the data from 12 regional councils to evaluate the extent to which each region had met its CSA targets. It found that in some cases councils did not know if the targets had been met. Overall, the data showed that none of the targets had been achieved within the timeframes set, and that the effluent target of 100 per cent compliance had not been met in any of the regional council areas. Table 23 below summarises their findings (Deans & Hackwell, 2008b, p. 10).

Table 23: Summary of Achievements Clean Streams Accord

Target	Goal	Outcome
Target 1	50% cattle excluded from water by 2007	67% yes; 3 don't know
Target 2	50 % stock crossings eliminated by 2007	75 % yes; 3 don't know
Target 3	100 % compliance with effluent consents (immediately)	0% no
Target 4	100% farms with nutrient management systems by 2007	17% yes; 5 don't know
Target 5	90% regionally significant wetlands fenced by 2007	15% yes; 7 don't know

Source: Deans and Hackwell (2008)

There was some confusion, however, as different methods and different groups had been employed to collect the data. The measure to determine whether or not farmers were meeting targets was based on a self-assessment questionnaire, managed by AgriQual NZ Ltd on behalf of Fonterra, and the assessment of effluent systems was undertaken by regional councils. However, different regional councils were using different methods to assess effluent compliance (Deans & Hackwell, 2008b; Horizons Regional Council, 2012).

The only Accord target which is linked explicitly to a regional council rule for farmers was the 100 per cent compliance with effluent resource consents, which

as a target was meant to have been met 'immediately' by all dairy farmers in 2003. This target had the biggest failure rate. One regional council staff member commented that this failure was linked to how effluent management was established in planning processes. He stated that:

> While farmers needed resource consent if effluent was going to water, effluent to land in most council plans is managed through a 'Permitted Activity Standard'. Farmers have viewed this as permission to discharge to land. For a long time, monitoring of farms was patchy at best. But in the last 5 years there has been better monitoring and enforcement, which has led to the identification of levels of noncompliance becoming more evident, and this data could be reported publicly. This has led to a change of culture by the industry as the data was embarrassing. (RC6)

The most comprehensive critique of the Accord was a 2008 review by Fish & Game (Deans & Hackwell, 2008b). Its assessment was that, if the goal was to reduce the impacts of dairying on the quality of New Zealand's fresh water, then it had failed. This failure was linked, in their view, first, to the fact that the Accord:

> … had not focused on measurable improvements in water quality, instead it had focused on increasing the number of dairy farmers operating at so-called 'best' practice levels. (Deans & Hackwell, 2008b, p. 4)

They also pointed out the contradictions of striving for better environmental outcomes while the industry was focused on hyperproductivist growth goals:

> … in line with Fonterra's stated production growth goal of 4 per cent compound per annum (or a doubling of dairy production in 17 years), dairy farming has continued to intensify and to expand. The effects of intensification are cumulative and pervasive even when coupled with the improved use of simple technologies such as fencing streams from stock, riparian planting and the use of nutrient management systems. (Deans & Hackwell, 2008b, p. 5)

In their view, while an Accord might be important for changing attitudes and actions among dairy farmers, it was no substitute for regulation which establishes what growth [if any] is possible within the ecological constraints of catchments Deans & Hackwell, 2008b).

The values expressed by Fish & Game emulate a dark green sustainability view. From this perspective, an ecologically rational approach is an imperative, and ecological values should drive environmental decisions rather than choices among alternatives (Bartlett, 1986). The first priority is that ecological systems must be

able to maintain their corrective capacity, and the economy must not undermine a region's or country's carrying capacity. From this eco-centric viewpoint, nature has intrinsic value irrespective of its use value (Eckersley, 1998); furthermore, to ensure sustainability, radical changes to the dominant social relations of production may be required.

Fish & Game's critique recognised that what remained untouched by the Accord was the historical institutional momentum of a productivist approach to land use which, despite the Accord, had continued unabated. A utilitarian approach to land use was unchanged. Fertiliser was still being used as the primary driver of growth; conversions and intensification of farming systems were continuing and moving into locations which had never previously been viewed as dairy farming regions. Increasing irrigation was required to sustain this growth, particularly in the South Island. Despite attention having shifted to the impacts of productivism on the environment, the environment was still being commodified to achieve the broader industry's growth goals.

The snapshot of progress reports, surveys, and monitoring of water all demonstrated that a voluntary self-management approach was not working as a mechanism through which to address the environmental implications of productivism, or as a mechanism by which to protect freshwater. The common sense assumption of the CSA is that, through more eco-efficient farm practices, the dairy industry would be able to internalise the externalities of the industry's impacts on water and, therefore, became sustainable. However, as a mechanism of change, it was described by Fish & Game as having failed, and water quality had got worse.

The failure of farmers to respond, and the failure to achieve targets generated further change within Fonterra. Importantly, while initially taking a bottom-up approach focused on changing farmer behaviour, Fonterra has refocused the goals of the entire dairy industry network. In 2010, for example, 13 sustainable dairying advisors were employed by Fonterra, and an annual farm assessment on all Fonterra shareholder farms was introduced. Alongside this move, effluent improvement plans were put in place for farmers who were consistently failing to

manage their effluent within their resource consents or the permitted activity rules (Fonterra, 2010).

A new institutional ethos of one-on-one support emerged in Fonterra. The 2010 Annual Report states that Fonterra's goal is to continue to work alongside farmers to encourage voluntary compliance with the Accord's goals, but that it also recognises the need to more actively encourage the noncomplying farmers to lift their performance (Fonterra, 2010, p. 21).

That this is a positive change was expressed in an interview by a regional council staff member:

> I would say that awareness is higher now than it has ever been in terms of the farming community. I think that the every year, every farm programme that Fonterra is doing will pay off for us. While it might take a couple of years to get real change, and we have to give farmers time, as it is expensive, and there is no regulatory requirement for this … they are now also looking at the whole planning of nutrient management on farm; that is a good area they are moving into. The focus now is on trying to lift a farmer to best management practice; that is real positive change, (RC6)

This quote demonstrates the paradox of regional planning processes. Regional councils under the RMA cannot set standards for freshwater, and yet clearly such standards are necessary to carry out their role of managing the adverse effects of the activities of individuals on the environment. Without the enforcement tool of regulation, they have had to rely on the foresight of the industry, and the bank balance and good will of individual farmers, to take environmental management of their farms into consideration. A regional planner stated that the failure of leadership by the industry:

> … had left those farmers who had recognised that there was a problem, and were willing to take on the environmental challenge, embarrassed both by the media representation of them as environmental vandals, and by the failure of their leaders to step up and provide support. (RC6)

However, the importance of the Accord in normative terms is that the impacts of dairy farming on water quality became part of a community and dairy industry conversation, and for those who voluntarily participated, concrete changes on farms were undertaken. It demonstrates a precept of ecological modernisation that environmental networks are now an important component of driving sustainable change. Importantly, over the 10 years of the Accord, pressure has

built to provide evidence that these targets are in fact helping to halt the decline of water quality. From this concern has emerged a new focus on research and development focused on the environment.

Back to the Future: Reconfiguration of Research

Since the state restructuring in 1984, the extension relationship forged over many generations of farming between CRI's and the dairy industry had been undermined (Galbreath, 1998). Consequently, there had been no clear institutional home for sustainability research oriented towards the promotion of environmentally sustainable farming practices, or the extension of this knowledge back onto farms (Valentine, et al., 2007). Nevertheless, as the complexities of environmental issues have emerged, this missing component in the sector has been recognised, along with the need for research that was focused on addressing impacts on the environment. Projects such as the Primary Sector Water Partnership, the Primary Growth Partnership[36], the Pastoral 21[37] project, and the Primary Industries Greenhouse Gas Consortium (Ministry Primary Industries, 2013), alongside the Sustainable Farming Fund [38], have reestablished the collaborative research and extension base which was fractured in the reconfiguration of New Zealand during the 1980s (Galbreath, 1998).

In the backdrop of the CSA was the Primary Sector Water Partnership (PSWP). The PSWP emerged out of the government's 2002 *Sustainable Water Programme of Action* (Ministry for the Environment, 2006b). It affirmed that water management was now an industry-wide problem, with the dairy industry a key group. The MfE acknowledged that what was required to address agricultural environmental problems was a partnership between government and industry, and that there was a need to develop new sustainability technologies for farms in order to support targets, including the nutrient targets set within the CSA and PSWP (Ministry for the Environment, 2004a).

This shift indicates two changes of viewpoint: first, that farm nutrient impacts on water were now being acknowledged as a serious issue needing to be addressed by all agricultural groups, and, second, that there was a shift away from the user-pays ideology established for research and development after1984. What emerged was the reestablishment of a collaborative extension relationship between CRIs,

the agricultural industry, and famers to together undertake research and development projects as an important mechanism to develop more sustainable farming practices.

From an ecological modernisation perspective, science and technological innovation are central to resolving environmental problems, the view being that solving environmental problems was beyond the state alone, and that there should be an increased interweaving of the state and industry to find solutions. As Dryzek comments, for ecological modernisation, "partnership is required to restructure the capitalist political economy along more environmentally defensible lines" (Dryzek, 1997, p. 144). This view is evident in this reconfiguration of the R&D relationship.

One outcome of this new R&D relationship has been joint research projects undertaken by the fertiliser industry, AgResearch (CRI), and DairyNZ focused on addressing dairy farming's environmental effects. This collaboration has included the development of: OVERSEER, as a nutrient management modelling tool for farms[39]; ongoing research to develop an accreditation programme for nutrient management advisors; and, the production of "regional benchmarks for nitrogen use efficiency, nitrogen leaching and phosphorus loss on dairy farms" (Primary Sector Water Partnership, 2011, p. 6).

While farmers failed to reach the CSA target of 100% of farms having in place systems to manage nutrient inputs and outputs by 2007, this failure can be attributed to the target being a voluntary commitment and to a lack of practical, scientific knowledge or effective technologies by which to support this goal. This weakness is slowly being addressed through the incorporation of the above technologies into farming practice. One outcome of this transition can be seen in the PSWP 2010 Report which states that the fertiliser sector has supported 98 per cent of all dairy farms to set nutrient budgets, and 35 per cent to develop the next step, which is nutrient management plans (Primary Sector Water Partnership, 2010).

Another indication of Fonterra's response to the sustainability imperatives was the introduction of an eco-efficiency programme. I next briefly summarise this programme.

Fonterra's Eco-efficiency Programme

Fonterra's broader sustainability strategy was framed around the development of an *Eco-efficiency Indicators Programme* for the entire company. The Clean Streams Accord is linked to this strategy under the 'Changing Farm Performance' indicator (Fonterra, 2009).

While the CSA focused on changing farmer behaviour, the focus of the eco-efficiency programme was on integrating sustainability processes across the rest of the supply chain. The reason for the introduction of this programme is stated as:

> Sustainability is one of the defining business, political, and social issues of the 21st century. Fonterra's business is based on natural resources, so protecting the environment is integral to our very existence. The sustainability indicators programme will help us realise our vision to be at the cutting edge of profitable and sustainable dairying. (Harris, Chair Fonterra Sustainabity Leadership Team Fonterra, 2009, p. 1)

The annual reviews of the indicators programme have demonstrated that this initiative has been effective in reducing water use within factory systems, increased recovery and recycling of materials, reduced energy consumption, and the development of a data system by which carbon dioxide emissions could be analysed. The two-fold requirement of ecological modernisation is technological innovation and that the environment should be part of the strategic vision of the company. This position requires the incorporation of environmental management systems which can enable the collection of information for monitoring and reporting (Huber, 2008). That this is evident in these changes can be seen in the 2006 Annual Report which states:

> Eco-efficiency programmes at our sites are significantly reducing the environmental footprint of our operations through initiatives such as maximising the recovery and recycling of materials, and the redesign of operating systems to minimise waste. For example a 90 per cent reduction in waste to landfill was set, and on average a 60 percent reduction in waste to landfill has been reached in New Zealand operations in the last 3 years. (Fonterra, 2006, p. 26)

It was well understood by the industry that the greening of the complete supply chain could potentially provide a competitive advantage for the industry. In shifting the focus, the view that sustainability should be a win-win for the business and for the environment was recognised. An industry respondent stated that:

> Fonterra is bigger than the New Zealand farmer; it is a global company and if we don't operate sustainably we won't have the market. (DI0)

The focus was not on finding the most ecologically sustainable farming systems, but "to set standards which will differentiate the industry in the market place' (D10). Another respondent stated that the industry had "set a world benchmark for dairy nutrition, and the focus now was on achieving the world standard for a sustainable dairy industry" (D14). D14's quotation reflects the ecological modernisation view that being a leader in the development of clean technologies is a market advantage, and can help build an industry's reputation as a good environmental citizen (Huber, 2008, 2009). Another industry respondent stated, "business success takes precedence over emotion. While organic farm systems may be nice to do, and they may be the right thing to do, if they are not economically sustainable, then you are out of business" (D9). This statement demonstrates a key element of the ecological modernisation discourse, that in order for the environment to be protected, it must first be demonstrated to be a resource with some direct and immediate economic benefit (Barry, 2003).

That support for an eco-efficiency approach in the supply chain is still conditional on its serving the short-term economic goals of the industry can be seen in the example of Fonterra's subsidiary, Glencoal, applying and receiving resource consent for a 28 hectare open-cast coal mine at Mangatawhiri in the Waikato. The coal will fuel three Waikato dairy factories. Fonterra's view was that a cheap energy supply remains important. There were 113 submissions received regarding the resource consent application, with only one in support. Submitters included local residents (including dairy farmers), local *iwi*, and regional and national environment groups such as Coal Action Aotearoa. They argued that this mine is both a local environmental and investment disaster. Its proximity to local houses and schools will lead to declining health outcomes through increased coal dust. It would also undermine the very green credentials Fonterra has being trying to build in its supply chain. Submitters suggested that Fonterra had an

opportunity to take leadership and demonstrate support for green, alternative energy systems in its factories (Chisnall, 2013; Oram, 2013a). These concerns, however, have not deterred Fonterra's ongoing use of coal for the Waikato dairy factories.

In summary, the establishment of an industry-wide environmental management system through the eco-efficiency programme and the CSA can be seen to reflect some key ecological modernisation assumptions. The first is that it is possible through developing close-looped eco-efficient production systems to decouple economic growth and environmental deterioration. Second, through such processes, the organisation can enhance its competitiveness by acquiring green credentials which will strengthen its position in the market place. Third, it demonstrates that the problem is being defined as an economic sustainability problem, not as an ecological sustainability problem. The ecological dimension is prioritised only to the extent necessary to preserve economic growth (Barry, 2003; Hajer, 1995).

Closely related to these initiatives have been three whole-of-industry sustainability strategies, the first in 2006, the second in 2009, and the last in 2013. What follows is an assessment of the normative values that were evident within the 2006 and 2009 whole-of-industry strategies, and an assessment of the 2013 Sustainable Dairy Accord and the new 2013 whole-of-industry strategy.

Dairy Industry Strategy for Sustainable Environmental Management 2006

In 2006, the *Dairy Industry Strategy for Sustainable Environmental Management* was announced. This strategy emphasises that the industry wants to "establish the importance of environmental issues and action within the industry" and demonstrate this change through putting in place environmental management systems, as well as developing the mitigation tools which will reduce the industry's impact (Preface Vision Dairy Insight, 2006 n.p.). It affirms that the strategy is:

> A clear signal that the industry as a whole regards sustainable environmental management as important … Our vision is one of enjoyable profitable dairy farming, that looks after the environment for future generations, for farmers, and the wider New Zealand public (Forward, Dairy Insight, 2006 n.p.).

It also states that:

> It is important that dairy farmers respond proactively to concerns about the impact of dairying on the environment … the environment is not isolated from all the other factors. (Dairy Insight, 2006, p. 4)

The strategy makes clear in its Foreword that while the industry is concerned to improve environmental outcomes, it is equally concerned with ensuring dairy farm productivity and business viability is sustained (Dairy Insight, 2006). The implicit assumption is that economic and environmental benefits can be simultaneously achieved.

As with the CSA, the focus of the strategy is on changing farmer behaviour stating "the decisions they [farmers] make on a daily basis determine environmental outcomes", and "farmers need to be empowered with respect to environmental management" (Dairy Insight, 2006, p. 6). To do so, the strategy envisages "a set of metrics that defines the current state of farmer behaviour in relation to key practices for sustainable environmental management in dairying" Dairy Insight, p.18).

The 'metric' proposed in this strategy reflects a utilitarian view, and presumes that environmental impacts can somehow be identified and matched to individual farmer behaviour. Again the assumption here is that by increasing the number of farmers operating according to best practice the result will be environmental improvement (Jay, 2003).

The focus on changing the practices of individual farm businesses meant that broader industry practices were not scrutinised. The dairy industry's strategic productivity goals (currently 4 per cent growth), which had supported the increased production and intensification of the industry and which were leading to increased water pollution, were never questioned. The importance of this strategy, however, is that it was the first whole-of-industry statement which began the process of presenting the vision of a sustainable dairy industry. Sustainable dairy farming was now to be a key strategic goal for the whole dairy industry network. This strategy was superseded by the 2009 strategy which I assess below.

Dairy New Zealand's Strategy for New Zealand Dairy Farming 2009-2020

The *Dairy New Zealand's Strategy for New Zealand Dairy Farming 2009-2020* (DairyNZ, 2009a) was a whole-of-industry strategy endorsed by DairyNZ, Dairy Companies of NZ (DCANZ), and Federated Farmers. The reasons for a new strategy just 3 years after the previous strategy are summarised as follows: changing public opinion with regard to the impacts of dairy farming on the environment; the perception that there was complacency amongst farmers to fix this impact; noncompliance with dairy effluent discharges; regional councils shifting to control dairying nutrient leakage to water; water availability; greenhouse gas emissions; pressure from international consumers and retailers; and, the need to address concerns about food miles and food safety. The strategy states that:

> At a high level, the [2006] Strategic Framework has not been effective at achieving the required change at the required pace. Whilst ambitious targets were set, clear pathways to achieve them (especially on farm) were not. (DairyNZ, 2009a, p. 42)

The 2009 Strategy reframes the industry's approach to sustainability and acknowledges that, although the 2006 strategy has had 'many positive influences' and had helped to build farmer awareness about the seriousness of the need to change, the targets set were ambitious. It recognises that sound support had not been provided to farmers in order to provide clear, achievable pathways to reach these targets. This situation had made it "difficult to rally a call to action" (DairyNZ, 2009b, p. 42).

The 2009 strategy established a 'Farming Systems' approach linking the farm system and the broader industry together. It proposes change as needing to happen across the industry's sociocultural systems. The strategy states that "these areas are tightly interdependent, and changes to any component require changes to the whole" (DairyNZ, DCANZ, & Federated Farmers, 2009, p. 16). It recognises that the context for dairy farming has changed, with many drivers outside the farm gate which are not in the direct control of farmers. Hence, there is now the need for 'systems thinking' to shape the industry. [40]

The strategy states that systems thinking will require the collaboration of all parts of the industry, farmers, researchers, rural professionals and policy developers to

work together to influence the future direction. The strategy reiterates that while there is still an imperative for productivity improvement, this must now be done in the "context of responsible stewardship of land, water, and the wider environment" (DairyNZ, DCANZ, & Federated Farmers, 2009, p.16). There is recognition that there is "a tension between increasing production and productivity goals via intensification or conversion, and reducing the environmental footprint of dairy farming". The key question for the industry is how to "increase the profitability, sustainability and competitiveness of New Zealand's dairy farmers" (ibid 2009a, p. 8).

In language that resonates with the ecological modernisation discourse, the strategy suggests that in the industry's view, integration of environmental concerns alongside productivist goals will be to their competitive advantage. The focus now is to be placed upon acquiring the necessary skills and organisational change within the industry. The 2009 strategy also emphasises the importance of collaboration between the government and dairy industry, stating that "negotiated agreements with local and national government are necessary to provide viable and practical options" (DairyNZ, 2009a, p. 23).

This statement illustrates the observation by Bührs and Bartlett (1997) that even "symbolic policies can start to lead a life of their own, they can create their own constituencies and momentum which will lead to improvement, and also lead to the opportunities for new issues to be dealt with" (1997, pp. 97-98).

In summary, the two strategies demonstrate an industry transforming itself through paying attention to more than just productivity goals. The final part of this discussion of sustainability and discursive change is an assessment of how failure has been interpreted into new values and institutional mechanisms for addressing sustainability concerns within the industry though the *Sustainable Dairying Water Accord* (2013) and the *Strategy for Sustainable Dairy Farming 2013-2020*.

Sustainable Dairying Water Accord 2013

The momentum from research undertaken in order to understand how to address the impacts of dairy farming on the environment, and the industry's acknowledgement that farmers needed concrete support to incorporate the new sustainability targets into their farming practices, can be seen in the changes

incorporated into the new 2013 *Sustainable Dairy Water Accord.* (Dairy Environment Leadership Group, 2013). The changes are as follows.

The 2013 Accord is now not just for Fonterra farmers but for all dairy farmers, and the companies which receive their milk. Oversight for the Accord sits with the Dairy Environment Leadership Group (DELG).[41] The Accord states that:

> The Accord partners have made a series of commitments. And through those commitments they are accountable for its targets and monitoring of progress. Companies are incorporating these commitments into standards and supply chain contracts. DELG will monitor the implementation of the Accord. Annual reports of progress will be undertaken by DairyNZ, and DCANZ who will report to DELG. This report is subject to external third party audit. (DairyNZ, 2013d, p. 1)

It is seen as a commitment by "accountable" partners, DairyNZ, dairy cooperatives, and proprietary companies, with oversight by the DELG.[42]Nevertheless, in keeping with the first Accord, a self-management and voluntary approach, rather than a regulated response, remains the clear preference of both the industry and government.

This preference fits with the notion of the politically modernised state envisioned by ecological modernisation. The view that underpins this approach is that a less prescriptive and a more cooperative dialogical policy style which is inclusive of a plurality of views is the best means for addressing environmental problems (Jänicke, 2009). From this viewpoint, what are required are state-industry partnerships and regulatory frameworks decided on by markets and the state together to solve local environmental pollution problems. Ecological modernisation approaches tend to support as best practice voluntary agreements, nonbinding standards and rules, self-regulation, and certification programme (Gouldson & Murphy, 1997; Van-Tatenhove & Leroy, 2009). All of these elements are evident in the state/industry response to the problem of water and the redesign of the 2013 Accord.

As in the 2003 Accord, implementation is through annual targets established against a timeframe for change (i.e., nonbinding rules). Now, however, farmers and the accountable partners must demonstrate improvement in relation to these targets. The role of accountable and supporting partners will be to ensure that

there is effective R& D, and extension services for farmers in order to enable best management practice so that farmers can achieve the targets. Therefore, while the Accord is voluntary, there are now more stringent checks and balances reflecting a carrot and stick approach. The means for this closer scrutiny is through "supply agreements" developed by the dairy companies. In this regard, Fonterra has established "Supply Fonterra" and Synlait has "Lead with Pride" (Dairy Environment Leadership Group, 2013).

The Fonterra supply agreements are framed by three programmes: effluent management, waterway management, and nitrogen management. Fonterra acknowledges that improving dairy shed effluent compliance has been largely ineffective, but that the introduction of the effluent management programme in 2010 has had good results, and it aims to build on this achievement (Fonterra, 2013c, p. 7). The Fonterra Annual Report states that:

> …between the introductions of the effluent management programme in August 2010 and until July 2012 we have closed almost 2,400 [regional non-compliance] cases, enabling farmer shareholders to bring their effluent systems up to required standards. (Fonterra, 2012, p. 14)

The new supply agreement will build on its Annual Farm Assessment Programme (Every Year Every Farm) which was introduced in 2010; however, it will now also include an environmental assessment of each farm. The Fonterra 2012 Annual Report further states that:

> As a condition of supply, shareholders are now required to exclude stock from all waterways that permanently contain water, are wider than one metre and deeper than 30cm at any point. The Supply Fonterra Waterway Management Programme is actively working to ensure that shareholders meet this requirement by December 2013. (Fonterra, 2012, p. 14)

The industry has put in place a triage response. For those farmers who are identified as being at risk of on-going noncompliance, or not complying with their resource consents, the Sustainable Dairy Farming Advisory Team (SDFAT) will provide support to improve response in these three areas.

Nutrient management is the target that has garnered the most attention given the impacts of nutrients on water quality. The nutrient target in the Accord states that:

> Dairy farmers will manage Nitrogen (N) and Phosphorus (P) loss from dairy farming systems; acknowledge the need to manage within nutrient loss limits; and pursue continuous improvement in nutrient use efficiency. (Dairy Environment Leadership Group, 2013, p. 8)

To facilitate this change, the emphasis is on cooperative R&D between dairy companies, DairyNZ, fertiliser companies, and CRIs. OVERSEER will be used to model and understand the nutrient loss and nutrient conversion efficiency for each farm. This oversight will provide regional performance benchmarking through which farmers can better assess their efficiency and make changes. The target has been set at 85 per cent benchmarking by November 2014, and 100 per cent by November 2015 ((Dairy Environment Leadership Group, 2013, p. 8,). In conjunction with the benchmarking, an accreditation and training programme for nutrient management advisors is also being developed (Primary Sector Water Partnership, 2011).

The new Accord's targets are the same as those in the previous Accord, but a new target is established for new farm conversions. The goal is "to ensure that new dairy farms use good practice at the outset to minimise potential negative consequences on water" and under this target no milk will be picked up until these systems are put in place (Dairy Environment Leadership Group, 2013, p. 12).

What is being described in the mechanisms and processes for change in the new Accord is an ecological modernisation response to solving local environmental problems. First, a less prescriptive and more participatory process is institutionally supported, and second, more science and technology are deemed necessary to solve environmental problems (Fischer & Freudenburg, 2001; Mol, 1996). The use of the combination of new science and technology in conjunction with an environmental management system describes the preventative innovation element of ecological modernisation. Through a process of continually improving environmental productivity by means of new technologies such as OVERSEER, and new management practices (i.e. benchmarking of farm performance against best management practices), the Accord encourages a close-looped, eco-efficient production system aimed at decoupling economic growth and environmental deterioration (Dryzek, 1997; Hajer, 1995). The on-farm solutions are to design

new systems which are framed by a better overall understanding of how the whole farm works in relation to the environment.

The Accord presents a mix of technical solutions to guide the development of environmental management systems on farms and education and individual farm support. A collaborative approach is established in order to develop science and technologies to support the new requirements on farms. However, farmers are also required to universally adopt and comply with the new imperatives explicitly stated in their supply agreements. The new focus is to "measure to manage" to ensure environmental compliance. The focus of the industry, through the targets, is the reduction or elimination of the production processes which are having an impact on the environment.

For ecological modernisation, the integration of environmental concerns into organisational goals and reporting mechanisms through which to monitor achievement is necessary. Performance bench-marking and monitoring are features of the Accord processes, as is the integration of sustainability into the dairy industry's strategic goals. The motivation for change for ecological modernisation is the competitive advantage such changes will bring to a business; this motivation is also evident as a major driver for the industry.

Table 24 below presents the key elements of an ecological modernisation approach within industry. All these elements are indicated in the New Zealand dairy industry discourse.

Table 24: EM Elements for Environmental Management

EM and Environmental Management
Include environment in strategic vision of the company.
Internalise production externalities.
Promote ecological responsibility through development of clean technologies.
Have government which promotes innovation in environmental technologies.
Make most saving through less resource and energy use; eco-efficiency.
Build public reputation as good environmental citizen; this is a competitive advantage for industry.
Build institutional reflexiveness in order for industry to be self-critical concerning its practices.

At the announcement of the new Accord, there were expressions of concern from environmental groups that despite what was being supported by government and the industry having already demonstrably failed, this approach was again being supported. In their opinion, what was required was a regulatory response which established acceptable limits and sanctions if these thresholds were crossed. A Green Party spokesperson stated:

> Farmers didn't meet the targets of the last Accord, and the new one is no better as it has no clear sanctions for breaches … It is about industry good practice, but voluntary accords don't stop pollution. (Sage, 2013)

Fish & Game stated that:

> Once again there's lots of measuring and modelling mentioned, but no solid commitment to actual targets or stocking rate limitations ....Water is a public resource being used by this sector for private commercial gain, the dairy industry owes it to Kiwis to demonstrate what it is, or is not achieving (Fish and Game New Zealand, 2013).

The environment groups' concerns demonstrate different values regarding what constitutes sustainability best practice. Water, for these groups, has intrinsic value; it is a public, not a private resource and, therefore, ensuring the ecological sustainability of water and not production imperatives should be prioritised. From this perspective, there needs to be regulation which determines clear limits which are determined by ecological values and catchment carrying capacity. In contrast, the Accord once again facilitates a focus on best management practice and voluntary self-management. What remains undiscussed in the Accord is that best management practices, even in conjunction with nutrient management, will have little impact on improving water quality if the industry continues to grow without restraint.

The Accord sits as one component of the *2013 Strategy for Sustainable Dairy Farming 2013-2020* (DairyNZ, 2013c) which I discuss next.

Strategy for Sustainable Dairy Farming 2013-2020

The banner title for the 2013 *Strategy for Sustainable Dairy Farming 2013-2020* (DairyNZ, 2013c) is "making dairy farming work for everyone". The strategy states that the industry now recognises that, to achieve sustainable dairy farming,

it must now balance economic and environmental goals. The industry's goal is to be "competitive locally and globally", while being "responsible, today and tomorrow". This vision is now necessary in order to:

> … show everyone how world-class we can be as dairy farmers while being caring custodians of the land. (DairyNZ, 2013c, p. 3)

The language of sustainable development normatively frames the strategy. The strategy states:

> Dairy farming is committed to sustainable development of the dairy industry to enhance New Zealand's prosperity. This means development of the national dairy industry that meets the needs of the present without compromising the ability of future generations to meet their own need. (DairyNZ, 2013c, p. 57)

A responsible dairy farming industry is outlined as one that is connected with the wider community's values and is one where future growth ensures wise use of resources. In order for this goal to be realised, the industry recognises that it must incorporate increasingly stringent environmental standards into its farming practices (DairyNZ, 2013c, p. 33).

While the normative values expressed in the strategy incorporate the language of sustainable development, in practice, the mechanisms through which to achieve a more sustainable dairy industry draw on the ecological modernisation discourse. The strategy states that building a reputation as a responsible industry will be the New Zealand dairy farmer's competitive advantage on the world stage. Achieving a sustainable dairy industry will require more technological efficiencies and innovative R&D on farm and across the industry. Partnership between the industry and government is also seen as crucial to the strategy's success (DairyNZ, 2013c, p. 33).

The strategy assumes that while economic and environmental benefits can be achieved together, and that it is still possible to grow, growth must now be managed in a responsible way. It states:

> There is still considerable scope for dairying to contribute to the economy through increased growth, higher value milk and value added dairying processing; however New Zealanders have made it clear that such growth must be achieved responsibly, and not at the expense of environment. (DairyNZ, 2013c, p. 57)

The strategy remains efficiency-oriented, with improvement being a matter of better environmental management. Sustainability will occur through ensuring that preventative technologies are incorporated into farming and industry practices. One difference, however, is that where prior strategies had nothing to say about what type of growth was sustainable, this strategy acknowledges that growth, through intensification of farming systems may need to be curbed. Sustaining the economic growth goals of the industry will require adding value to products, and higher value milk.

In summary, key elements of the ecological modernisation approach shape the strategy. There is a focus on both technical and procedural innovation (Huber, 2008). The strategy supports an environmental management approach and further cements environmental concerns into industry and farmer goals. These changes are viewed as necessary due to concern not only from the broader New Zealand public, but also because being able to demonstrate a more sustainable dairy industry, and more sustainable dairy farming, is a competitive advantage in the global dairy market.

Assessment of Institutional Approach

A substantive strategic environmental plan requires the identification of goals, establishment of a common direction, setting of priorities, and evaluative criteria through which action can be coordinated and guided. The plan requires appropriate means for achieving goals, and a logical sequence of actions whereby they can be adopted. While such a plan cannot outline a definitive blueprint, it does enable for planned learning, adjustment to changed circumstances, and restrategising (Bührs & Bartlett, 1997, p. 75). The trajectory of change across the different dairy industry strategies and accords substantively fits this approach. There has been an adaptive management approach which over the last 10 years has seen the reprioritising of concerns and goals with set targets with corresponding dates for achievement. A mechanism for checking what has been achieved was also established. When there was failure, it led to the development of new goals and process for integrating strategic environmental goals across the whole dairy industry network.

For example, in the initial phase the goal was incremental change and it focused on changing individual farmers' practices. The second phase introduced a whole-of-industry response which has seen a transition to a more adaptive and integrated approach across all the dairy networks to achieve sustainable dairy farming and a sustainable dairy industry. Good process and good outcomes are both now seen as critical. In the area of nutrient management, there is now also an acknowledgement that this issue may require a radical rethinking of farming practice towards an acceptance of farming within limits (Dairy Environment Leadership Group, 2013, p. 4).

From an ecological modernisation point of view, the development of environmental management systems which measure outcomes against goals is pivotal. These measurements provide the evidence of the decoupling of economic growth from environmental impacts. The Clean Streams Accord and the Fonterra Eco-efficiency Programme are examples of the integration of environmental management systems into dairy industry practices.

Ecological modernisation also envisages that state-industry partnerships, voluntary agreements, nonbinding standards, self-regulation, and certification programmes are the best approach through which to solve local environmental problems. While reform is necessary, the best means to achieve it is through negotiated and agreed-upon standards set in collaboration by the state and industry. These elements were demonstrated as having framed the government and industry's response to improving its environmental impacts.

Conclusion

I began this chapter by referring to the question of identity change. The analysis has shown the challenge of sustainability has reshaped the dairy industry's identity and what it means to be a good and responsible dairy industry. Good farmers and a sustainable dairy industry must now be more than stewards of productivism.

Sustainability has been recognised as a problem with implications for the systems of production and consumption, resource depletion, and pollution abatement (Dryzek, 1997). In order to be a sustainable dairy industry, a balance must now

be sought between continued economic growth and the ecological carrying capacity of regions. This readjustment has required the industry to refocus its goals to better understand the effects on the environment of a productivist approach to land use, and to integrate preventative environmental criteria into land-use practices and the industry's supply chain systems.

This chapter concludes by pointing to some contradictions with the dairy industry's response to sustainability. A recent report by the PCE concluded that declining water quality is linked to intensification of farming systems and the scale of expansion of dairy farming, and, that even if the best mitigation technologies are in place, there will be further water decline if farm conversions continue (PCE, 2013b).

Likewise Princen (2005) argues that sustainability approaches which are built on production efficiency and cooperation as the two organising principles are of little benefit if through-put still increases. In order for long-term ecological sustainability goals to be achieved, what is required is some determination, or direction, as to how much of an industry is "sufficient" or "enough". Without such a determination, reformist discourses can continue to disguise, ignore, and displace the true costs of production, and, therefore, fail to take into account the long-term ecological context and ecological costs (p. 16). He states that:

> Under the condition of environmental criticality a different set of principles are needed, a set that embodies social restraint as the logical analog to ecological constraint, a set that guides human activities when those activities pose grave risks to human survival. Sufficiency is a class of principles sensitive to critical environmental risks, to the needs of management and self-management, when it is otherwise all too easy to evade responsibility for such risks. (Princen, 2005, p. 19)

Sufficiency in his view, therefore, offers an ethic of sustainability which puts to the fore the preservation of the biophysical environment, not the preservation of economic growth. However, questions about how much dairying is sufficient are not part of the current dairy industry response. For example, the 2013 Accord states that while new farm conversions will be required to have more stringent environmental criteria, the question that has still not been addressed is: are further farm conversions ecologically sustainable? Furthermore, intensification of farming systems is still not viewed as a problem. At the same time as nutrient

management and other best management practices are being integrated into farming practices, irrigated agriculture and water storage projects are also being supported. Irrigated agriculture is more intensive and nitrogen concentrations in water will increase with more irrigated agriculture (PCE, 2004). Such projects are supported as a means of increasing productivity gains in order to remain internationally competitive, but they could undermine the mitigation processes being put into place.

There has also been no visible resistance to the government's stated goal of doubling agriculture production by 2025 (Guy, 2013a). This goal could see a further 650,000 hectares of land linked with pastoral production, and upwards of another million cows in the national herd (Green Party, 2013b; Stringleman, 2013). This aspiration suggests that there can never be too much dairying, if it suits the economic goals of government and the industry.

The Ministry for the Environment (MfE) statistics released in July 2013 demonstrated: that 61% of monitored sites on New Zealand rivers are now unsafe for swimming; that another 19.5% of monitored sites have a grade of fair, which means people risk becoming ill if they swim there; and, that only 19.5% of monitored rivers were graded very good, or good and suitable for swimming (Green Party, 2013a). Likewise, NIWA monitoring and catchment studies demonstrate that water quality is continuing to deteriorate in pastoral regions (NIWA, 2010a). These statistics indicate that the current institutional and industry approach has not managed to limit agricultural practices in any significant way to protect the environment or mitigate the management of environmental decline. While the assumption of reformist discourses is that it is possible to internalise externalities, and balance economic and environmental goals, the litmus test of substantive dairy industry change for sustainability through the reformist discourse of ecological modernisation will be demonstrated if there is monitored evidence which shows a reduction in the industry's impacts on the environment, and if the changes have simultaneously generated environmental and economic benefits (Milanez & Bührs, 2007). The above statistics indicate that this goal appears illusory at the moment. Table 25 below presents a summary of the dairy industry discourse.

Table 25: Key Elements of Dairy Industry Discourse

Key Elements	Dairy Industry Sustainability Discourse	Discourse
Normative Values	**Phase one** Economic benefits and environmental benefits simultaneously generated; Acknowledgment of interdependence of economy and ecology; Continued economic growth through technological innovation; Economisation of the environment	**EM**
	Phase Two Recognition of the three pillars of sustainability: the economic, environmental and sociocultural; Industry's licence to operate now requires consideration of community and ecological values	**SD**
Institutional Approach	Environmental management; process focused; Eco-efficiency primary mechanism for change	**EM**
Implementation Mechanisms	Voluntary and cooperative approach between government and industry ; Strong resistance to regulation, self-management preferred; transparent regulation that outlines responsibilities and rules; Collaborative processes between dairy industry networks, and government R&D institutions to support development of new innovative clean farm technologies; Main goal is to balance economic and environmental benefits	**EM**
Approach to Risk	**Phase one** Environmental risks are science and technical problems; Change a win-win for dairy industry, recognition of the economic benefits of sustainability (clean and green) credentials in international market differentiation; Cost/risk /benefit analyses; Expert driven; Technological expertise	**EM**
	Phase Two Growing recognition that environmental risks are ideological issues requiring attention to social, cultural, ethical, and economic considerations; Substitution and possible limits accepted	**SD**

The following chapter through analysis of two comparative case studies examines different approaches to achieving the sustainable management of agriculture. Two regional responses informed by community engagement processes and involving 'Variations' to regional and district planning procedures have led to requirements of farming within the ecological limits or carrying capacity of catchment areas. These examples point to strategies to achieve farming within ecologically sustainable limits.

---

[34] The MAF (Ministry of Agriculture and Forestry) is now subsumed into a bigger Ministry the Ministry for Primary Industries (MPI).

[35] MfE website has archives for all the snapshot of progress reports - See for example http://www.mfe.govt.nz/publications/land/dairying-clean-streams-accord-snapshot-mar07/index.html.

[36] 'The Primary Growth Partnership invests in "innovation" research which focuses on both economic growth and sustainability for New Zealand's primary sectors. For example Balance Agri-nutrients research on improving nutrient leaching on dairy farms is/funded by the PGP http://www.mpi.govt.nz/agriculture/funding-programmes/primary-growth-partnership.aspx. The fund has specific parameters in that it will only fund those projects seen to have 'high levels of innovation" and demonstrate they can increase growth of the sector. They also must display best practice in the area of sustainability and resource efficiency, and that there is a clear path that the innovation will lead to increased "capture of the market", but also demonstrate "best practice sustainability in the use of its resources- increasingly a key market demand" (Falconer, 2011).

[37] The pastoral 21 research programme is a co-joint research project led by AgResearch focused on enabling increased farm production while reducing the industries environmental footprint.

[38] The Ministry of Agriculture and Forestry's Sustainable Farming Fund was set up in 2000 to fund projects that contribute to the economic, environmental and social wellbeing of New Zealand's land-based primary industries (Ministry Primary Industries, 2013)

[39] 'OVERSEER is an agricultural management tool that assists in examining nutrient use and movements within a farm to optimise production and environmental outcomes. The model calculates the nutrient flows in a farming system and identifies potential for risk of environmental impacts through calculation of nutrient loss as run-off and leaching. OVERSEER is jointly owned by MAF, Fert. Research and AgResearch' http://www.agresearch.co.nz/our-science/land-environment/nutrient management/Pages/overseer.aspx

[40] Systems thinking calls for a new science and praxis of complexity to deal with the problematic relationship between agriculture and the environment in which it is conducted. It challenges agriculture to rethink the language of reductionism and positivism which has underpinned agricultural science but which in turn has led to degradation of biophysical environments. Bawden argues that this requires both production enhancement and impact assessment and that it must also include ethical, moral and aesthetic concerns as well (Bawden, 1991, p. 2632).

[41] The DELG comprises representatives from the dairy sector, central government, regional councils, *Iwi* and NZ Fish and Game Council

[42] The accountable partners are Dairy NZ, Fonterra, Open Country, Miraka, Synlait, Tatua and DCANZ; The Supporting Partners are the Fertiliser Association, Ravensdown, Balance, Federated Farmers, Irrigation NZ and NZ Institute of Primary Industry Management ;"Friends of the Accord" are regional councils, central government (MPI and MFE), Westland Milk Products and the Federation of Maori Authorities.

Chapter 8
Farming within Limits

Introduction

In contrast to the focus on voluntary action and market-friendly rules that mark the ecological modernisation approach, there are some small-scale instances of greater state intervention to advance environmental sustainability. This chapter offers an in-depth assessment of two comparative cases studies, Lake Taupō and the Rotorua lakes, which are situated in the central North Island and are exemplars of such interventions. These cases offer a powerful alternative to the norm for the rest of the country. They offer a blueprint for a more positive ecologically sustainable agricultural pathway (shaped by sustainable development). There is of course no guarantee of the use of this model in the rest of the country given the growth agenda of the current government and the dairy industry.

The chapter focuses on two key questions: How does the choice of sustainability discourse differently construct political and institutional action and hence outcomes for sustainability in New Zealand? And, what political, social and environmental conditions are conducive to the adoption of an ecological modernisation or sustainable development approach?

As the previous chapter demonstrated, since 2003, the dominant approach for the incorporation of sustainable land management practices to improve ecological sustainability outcomes by Fonterra dairy farmers and regional and central government has been the voluntary mechanism of the CSA. The goal of the CSA was for farmers to voluntarily incorporate into their farming practices actions that would address the cumulative impacts of dairy farming on water (Ministry for the Environment, 2003a). However, prior to and overlapping the introduction of the CSA, regional and local councils in two regions had initiated a different change process to address water quality deterioration in their catchments. Because lakes act as sinks for the wider catchments, lake subcatchments have been particularly vulnerable to pollution from past and present land-use practices (PCE, 2012).

Growing awareness within both regions that lake water decline was a concern, and that further decline was inevitable if measures were not taken, resulted in planning for mitigation from the late 1990s. This chapter examines how 'variations' from the norm within the institutional practice of regional and local councils, reflecting a distinct sustainability discourse, have been used to construct different outcomes for land and water.

The analysis relies predominantly on institutional and community documents which have been produced in these regions to support change. The chapter will proceed as follows. Each region is introduced, followed by an analysis of the trajectory of changing values and institutional processes which have shaped the response to lake water decline. As the focus is on agricultural sustainability, particular attention is given to how the discursive approach has informed land-use practices in these regions.

Case Study: Lake Taupō and the Rotorua (Te Arawa) Lakes

Two regions geographically defined by freshwater lakes, Taupō and Rotorua, have responded more actively than others to community and scientific concern with water decline. In these catchments, a voluntary approach to sustainable land management by landowners was seen as inadequate to protect the lakes. This belief led the Waikato Regional Council, which is responsible for Lake Taupō, and the Bay of Plenty Regional Council, which is responsible for the Rotorua Lakes to implement variations to their regional planning rules. These variations have led to pastoral and other farming becoming a controlled activity, with prescribed levels of fertiliser use.[43]

Across the country regional councils have the authority to establish the criteria by which farming activities are carried out through rules in their regional plans. For example, in the Waikato region, dairy farming was established as a permitted activity, and in the Bay of Plenty, dairy farming was established as a discretionary activity which required resource consent. Under Sec 15 and Sec 70 of the RMA (1991), regional councils are also required to determine and constrain contaminant levels in water. There has been no precedent in New Zealand, however, for regulation of farm nutrients, such as nitrogen and phosphorous, as contaminants.

By the mid-1990s, water quality monitoring in these regions was indicating that discharges of contaminants were in breach of the criteria established in the RMA, and the contaminants of most concern were farm nutrients, particularly nitrogen and phosphorus (Brodnax, 2006). It is this requirement under the RMA that has given regional councils the authority to implement variations to the rules in their regional plans which could limit nutrient use (as a contaminant) on farms. It has been the combination of the RMA (1991) and the Local Government Act (2002)[44] requirement to develop a *Long Term Community Plan* (LTCP) which has provided local government agencies with the authority to work with their communities to support these changes.[45]

From a CDA standpoint, language (discourse) can maintain or change social relations, and evidence of change in discourse can be found in the policy documents which are produced to bring about changes in behaviour and practice. The language in these documents can reveal the assumptions regarding what values, processes, and relationships are viewed as acceptable (Fairclough, 1992). The focus of this chapter is to demonstrate which sustainability discourse has shaped the process of change and shifted land use to become more ecologically sustainable.

Lake Taupō

Lake Taupō is New Zealand's largest lake, situated in the central North Island. An iconic lake, it has long been a major tourist destination.[46] Land use in the catchment includes forestry, sheep and beef farming, and a small pocket of dairy farming. From the late 1990s, there was a growing scientific awareness of the ecological decline of Lake Taupō, with the main threat identified as being nutrient inputs (particularly nitrogen) from intensified agricultural practices (Edgar, 1999; Gartner & Coulter, 2002; Vant, 2001; Vant & Huser, 2000; Young & Kaine, 2009). At the time, the region was being assessed for further agricultural expansion and increased dairy conversions (MAF, 1997). However, concern from scientists, Ngāti Tuwharetoa[47], and the community organisation the Lakes and Waterways Action Group[48] turned attention to finding ways of addressing water decline. From this initial concern emerged a process which has seen a distinctive

approach to environmental management of the lake, an approach which can be seen as being informed by the sustainable development discourse.

Forging a New Vision for Lake Taupō

Under the RMA, regional councils and territorial authorities (city and district councils) were given responsibility for managing land use to control the quality of lakes and other bodies of water. As for the Lake Taupō catchment, both the Waikato Regional Council (WRC) and the Taupō District Council (TDC) have statutory responsibility in different ways for ensuring water quality.

In 1996, the TDC began the process of developing the 10-year strategic plan, including the LTCP for the district. The refocusing of the processes and procedures for how the lake water quality problem would be differently managed has been attributed to the deliberative approach that shaped that first district plan. The view in the development of that plan was that:

> A conventional 'plan' would mean little unless it took a holistic approach covering the economy, the people, and the natural environment; that is, it must recognize that all parts of the community - people as well as agencies and business - needed to be involved in the planning process. Furthermore, it was realized that a mere planning document, however well prepared, would be ineffective without continued joint participation and support by all parties affected - which means all the community. (Gartner & Coulter, 2002, p. 1)

The plan required the three mutually reinforcing pillars of sustainable development – ecological integrity, social equity, and economic security – to be considered together and translated into future planning processes. The plan states that:

> Only a long term and integrated approach to resource management in the Lake Taupō catchment will be effective in dealing with the complex and often inter-related resource management issues facing this waterbody. (Taupo District Council, 2007, pp. Sec 2, p5)

As part of the development of the plan three groups, including community, local government and *iwi* actors, were established to have oversight for determining the values and direction for the natural environment, the people, and the economy. In setting the values and direction, the view was that the planning process should be a community-driven process involving all members of the community (Gartner & Coulter, 2002, p. 1). From the beginning, therefore, there was support for a sustainable development approach with the incorporation of a less hierarchical

and more bottom-up change process. The management of local environmental risks was seen as requiring environmental, sociocultural, and ethical values all to be considered together.

In the development of the plan, the Lakes and Waterways Action Group was given the responsibility to lead the processes for determining community values for Lake Taupō. With full administrative support from the TDC, public meetings and a community survey were undertaken. The result was that 14 normative values in relation to the ecological and economic priorities that should guide decision-making for the lake were identified. These values were: commercial opportunities; clear water; Ngati Tuwharetoa values; diverse plants and animals in lakes and rivers; foreshore reserves; geological features; good trout fishing; high quality inflowing water; outstanding scenery; recreational opportunities; safe swimming; safe drinking water; weed-free lake; and, wilderness areas (Te Arawa Lakes Trust, 2000).

The survey confirmed the importance of the lake to the community, and the outcome of the wider consultation was a clear direction from the community that an ethic of environmental protection was required. Ninety per cent of the participants rated environmental protection as more important than economic development, and 78 per cent that protection of the lake was a collective not an individual responsibility (Stewart, Johnson, Rosen, & Boyce, 2000, p. iv). The characteristics most highly valued were clean and clear water, public access, natural character, and cultural values, especially for Māori (Petch, Young, Thorrold, & Vant, 2003; Stewart, et al., 2000). As previously established, a sustainable development discursive approach views community dialogue, community risk perception, multiple perspectives, and local knowledge as being crucial, and requires that values of communities should guide decision-making and become the benchmark against which to check subsequent actions (Lawrence & Arunachalam, n.d.; Lundqvist, 2004). The approach to sustainability that shaped the TDC planning process emulates these elements of the sustainable development discourse.

To incorporate these values into practice, a Joint Management Group (JMG) was established. Its role was to develop and implement an action plan, which would

sit within the broader district plan, through which the community's values for the lake could be realised (Taupo-nui-a-Tia Joint Managment Group, 2004). The structure of the JMG itself challenged the 'normal' hierarchical approach and relationship between communities and government institutions. In other regional planning contexts, community participation has been restricted to the making of submissions on regional plans or resource consent processes. However, the JMG saw for the first time an integrated resource management strategy where *tangata whenua*, local government, central government, and community actors were mandated to work together (de-Jong, 2011, p. 5; Taupo-nui-a-Tia Joint Managment Group, 2004).[49] The then Minister for the Environment, Marion Hobbs, stated:

> The government recognises that ….partnerships such as this one are key to preserving our society and our environment. (Environment Waikato, 2003, p. 3)

This comment by the Minister implicitly recognises both that Treaty settlements have changed how the environment will be managed in the future in New Zealand, with a legitimated role for the inclusion of Māori values, and that there was a need for central, local, and regional government to work together for environmental restoration (Environment Waikato, 2003). The goals of the action plan were seen as unique in the way it was "a community change process, which sought to protect the environmental, economic, cultural and spiritual values of the lake community, through melding together community-based processes and the Principles of the Treaty of Waitangi" (Petch, et al., 2003, p. 1).

Over a period of 3 years, the plan was developed. For sustainable development, the integration of processes which can break down sectoral lines is important (Lundqvist, 2004). The *Action Plan* identified which organisation(s) should lead the implementation of each action, and which organisations should play a supporting role. It stated:

> Collaboration was a key principle which framed the actions [and this] required the close working together of the organisations involved. (Taupo-nui-a-Tia Joint Managment Group, 2004)

Gartner and Coulter's (2002) assessment of the process is that it has acted in a way that:

> … has tended to break down compartmentalized thinking with organisations now becoming involved in activities outside their direct

> areas of responsibility. It thus develops partnerships in the process of seeking solutions. (Gartner & Coulter, 2002)

In the development of the *Action Plan*, the JMG provided a regular community forum to discuss progress on a range of projects (Taupo-nui-a-Tia Joint Managment Group, 2004), and the Lakes and Waterways Action Group continued to hold community meetings with "the main agenda being issues around protecting Lake Taupō and the sustainable development of its catchment" (Lawrence & Arunachalam, n.d., p. 17). A feedback loop through which to assess how the *Action Plan* was progressing towards its stated goals was established, and this was a community-led process. The final *Action Plan* named *2020Taupō-nui-a-Tia Action Plan: An Integrated Sustainable Development Strategy for the Lake Taupō Catchment* was released in 2004 (Taupo-nui-a-Tia Joint Managment Group, 2004).

The plan identified 'priority threats' and outlined the different agencies which would take the lead in addressing them. These 'priority threats' are summarised in Table 26 below. What can be seen is that they, again, spanned the expectations of sustainable development that social, cultural, *iwi*, environmental, and economic issues needed to be simultaneously addressed.

For each of the priorities, a research plan was developed to obtain any additional information that would be required to realise the values. The action plan also established monitoring indictors and performance standards to assess progress and to keep track of emerging issues (Taupo-nui-a-Tia Joint Managment Group, 2004). The action plan set in place an adaptive management process (Jänicke & Jorgens, 2009). Adaptive management approaches focus on target-setting, monitoring, and feedback to enable an assessment of progress towards goals. This promoted coordination and investment in long-term planning for sustainability, a long-term intergenerational view, and a means to mediate in the development of common interests across conflicting goals (Dryzek, 1997; Lundqvist, 2004). It is evident that these ideas informed the plan. For example, a Lakes and Waterway Action Group spokesperson stated:

> You need policies for the long term. The Lake Taupō protection project is for fifty years …. You need that certainty and purpose in policy. (LWAG spokesperson in de-Jong, 2011, p. 81)

This comment points to the way the planning process was shaped by a sustainable development normative framework shaped by sustainable development, with the aim of balancing ecological sustainability, social equity, and economic security in an integrated way (Langhelle, 1999; Solow, 1992).

Table 26: Priority Threats 2020 Action Plan

Priority Threats to the 2020 Community Values	
Ecosystem Health – Water Pollution through:	
Nutrient enrichment from farming (run-off into the lake) Introducing new species affects ecological processes such as food web and distribution of species Nutrient enrichment causes reduction in trout growth and numbers	Sediment loading (ash) from large volcanic eruption Nutrient enrichment from sewage Loss of habitat and desirable species Animal and plant pests threaten native vegetation and desirable fish species (competition)
Human Health –Bacteria and Other Disease-causing Organisms in:	
Roof tank water deposited by birds and possums Lake water – from wildfowl, septic tanks, pipe failure and storm water groundwater – from surface leakage (inadequate wellhead protection) Lake water from boat sewage discharge Beach litter Roof drinking – water, spray-drift contamination for general population	Nails and glass shards – causing wound infection Toxic algal blooms in: Lake water – impairing drinking-water quality at source Chemicals in: groundwater chemical contamination (arsenic, boron, molybdesum) for susceptible people Groundwater – elevated nitrates impairing health of the very young.
Quality of life	
Sewage pollution in the water Toxic algal bloom Declining water clarity Weed growths along the shoreline Inappropriate sites for new subdivisions Invasive pests and weeds	Overdevelopment of Taupō lakefront Restrictions to legal access Thefts and vandalism Beach litter Visual pollution Noise pollution Destruction of unique geological features
Ngati Tuwharetoa	
Confusion in the roles and responsibilities of government agencies in the management of natural resources within the Ngati Tuwharetoa *rohe* (boundary) Lack of partnership between Ngati Tuwharetoa and government agencies in the management of natural resources within the Ngati Tuwharetoa *rohe* Intellectual and cultural property rights of *tangata whenua* need to be protected Adverse effect on *mauri* (the essential quality and vitality of a being or entity) through the mixing of waters from other catchments Discharge of human sewage and storm water into water bodies	Need to make sure both *hapū* and tribal *wahi tapu* (sacred locations) are protected, while keeping their exact nature and location confidential to *kaitiaki* (guardians) Lack of knowledge on the status or condition of *wahi tapu* areas Confusion about roles and responsibilities in enforcing the harvest of native species. This confusion results in insufficient protection of *mahinga kai* (food-gathering places) Ad hoc implementation of Crown Minerals Act 1991 and Resource Management Act 1991 by agencies in the area of mineral exploration The management of geothermal resources is controlled by statutory authorities as opposed to Nga Tuwharetoa

Source: Taupō-nui-a-Tia 2020 Action Plan (pp. 7-8)

Process of Change

The focus of this research is on the relationship between institutional practices, sustainability, and land-use change. In this section, I turn to an analysis of how the community's vision for improved water quality in Lake Taupō was interpreted from the plan and translated into new requirements for the agricultural sector. I do so through an examination of the processes that were undertaken to support the variation to the regional plan.

Under the plan, Environment Waikato (EW) was ascribed a number of roles. These involved ascertaining what level of water pollution was acceptable to the lake communities, ascertaining scientifically what actions needed to be taken to address the lake decline, and working alongside the agricultural sector to find pathways to translate these goals into actions. The major ecological threat to the lake was nitrogen, and the goal was to lower its use in the catchment. Table 27 below outlines EW's role.

Table 27: EW's Actions in Managing Change for Lake Taupō

Priority Threat to the 2020 Community Values	Environment Waikato Actions
Water pollution through nutrient enrichment from farming (run-off into the lake) leading to: Toxic algal blooms in lake water; lowering drinking water quality; declining water clarity and weed growth on shoreline Impacts on tourism, recreation, and cultural values	Reduce manageable nitrogen input into the lake by at least 20 per cent Work with farmers to find acceptable solutions Make a variation to the regional plan to instigate a new regime for controlling diffuse run-off of nutrients from all land

Source: (Taupo-nui-a-Tia Joint Managment Group, 2004, p. 30)

In sustainable development, the process of change is important and there is an emphasis on cooperative and nonhierarchical ways of working. These ways of working are reflected in how EW acted in facilitating change. Through a public engagement process, EW first presented four options to the community for the maintenance of the lake. These were:

1. Better water quality than now, with much less intensive land use in the catchment.
2. Maintain current water quality by reducing nitrogen output from existing land uses and preventing further land use intensification.
3. Slightly lower water quality than now, with existing land use remaining the same but no further intensification.

> 4. Lower water quality. Do nothing to change land use in the Catchment. (Environment Waikato, 2007c, p. 3)

The community supported option two, that is, that water quality should be maintained at 2001 levels by reducing nitrogen from existing land use, and preventing further land-use intensification.

To achieve this end, there was scientific agreement that 20 per cent of manageable nitrogen from the catchment would need to be removed, and would primarily have to be done through changes to agricultural management practices. Over 92 per cent of manageable nitrogen entering the lake was attributed to the pastoral sector, and, therefore, the focus turned to changing pastoral farmer land-use practices (Environment Waikato, 2007d). This change was to be achieved through stakeholder engagement, increasing the use of best management practices[50], and a variation to the regional plan. In the next section, as an example of how these three goals came together, I analyse the change process through the example of the introduction of 'Variation 5'.

Changing land-use practices: Variation 5

Variation 5 was introduced to manage the use of nitrogen within the catchment, and to find the best mechanisms by which nutrient management could be enforced on farms (McKenzie, 2004; Waikato Regional Council, 2011).

The variation was controversial as it was the first time a regulation would determine, and enforce, what level of nitrogen could be used. It meant that farming is now a controlled activity requiring a resource consent (Taupo-nui-ā-Tia Joint Managment Group, 2007, p. 10). The Environment Court approved the variation in 2008, but it took until July 2011 for the plan to become operative due to a drawn-out Environment Court appeals process (Waikato Regional Council, 2011).[51]

From 2000, EW organised consultation meetings with landowners and other stakeholders. Those organising the consultation processes recognised that it was necessary to set a common direction for managing change. Pastoral farmers were, however, initially shocked to be labelled polluters (Yerex, 2009). From this concern emerged a regional farming group, Taupō Lake Care (TLC). TLC was

strongly supported by farmers, with 90 per cent becoming members (McKenzie, 2004). The purpose of TLC was:

> To keep the lake clean while continuing to have viable farms and flexibility to run their business. (Yerex, 2009)

From this statement it can be seen that the need to improve the lake's water was also a value shared by the farmers in the region, but changes needed to ensure that farming remained economically viable.

Sustainable development implies that an effective social change process should encourage participatory processes which enable discussion and collaboration in goal-setting. The outcome of such processes can be a long-term commitment to the change required. Research undertaken with famers demonstrated that a collaborative approach is also viewed as necessary for effective change (Dresser, 2008; Kilvington, 1998).

A participatory process was started by EW officials to discuss the variation and how they would put in place a cap on nitrogen use. They expected that the variation would be implemented quickly, but landowners in the catchment wanted to be genuinely involved in the policy development process (EW Group Manager in Yerex, 2009). One EW official stated that implementing the variation was much more complex than first thought, and that it had been a learning process for EW staff:

> With anything new regional councils have had the view they have to figure everything out … [But] when policy and complex problem solving is this new, and novel, you don't know what the answer is. You can't anticipate and solve it in a linear fashion …. I don't think EW would have figured out how to implement a cap unless we'd had all the consultation … Accepting that the farmer, is the person best placed to know in the context of their farm what is going to work or not work … that was the key learning. (Young in Yerex, 2009, pp. 58-59)

This comment reflects the point that the process of engagement itself had become part of the outcome, and led to a more collaborative learning approach (Rosenbaum, 2011). The formal concern to be addressed in the meetings was to determine how to set a nitrogen cap for all the agricultural sectors in the lake catchment 'fairly'. The negotiation was around two different approaches to setting caps: averaging (the cap set by averaging across all land uses in the

catchment), and grand-parenting (the cap set on an initial allocation of nitrogen based on existing nitrogen leached from individual properties) (Environment Waikato, 2007d).

The approach chosen would have different impacts on different sectors. Ngati Tūwharetoa (a large forest owner), and other foresters, argued that they would be uniquely disadvantaged through a grand-parenting scheme as forestry currently used much less nitrogen than pastoral farming. The TLC group argued, however, that the grand-parenting approach was necessary for pastoral farming in the catchment to be economically viable (de-Jong, 2011, p. 66). The eventual outcome was that the variation reflected the TLC view, and Variation 5 established a nitrogen allocation system whereby a grand-parenting approach was used to establish nitrogen allocation levels.[52]

The nitrogen allocation level was established from an assessment of the highest amount of nitrogen that had been used on each farm during the years 2001-2005. This figure became the benchmark for a Nitrogen Discharge Allowance (NDA) for each farm in the district. This outcome was not without controversy. Pastoral farmers, who had higher nitrogen use at the time of capping, could continue through this process to farm with higher nitrogen intensity than other pastoral farmers in the district. Tūwharetoa, whose forestry enterprises were a low nitrogen form of land-use, were left in their opinion "to off-set pollution caused by other high nitrogen use land users … in effect they would be subsidising someone else's pollution" (J Hura in Yerex, 2009, p. 64).

This outcome is also a good example of the sustainable development discourse shaping change. It illustrates how a balance of economic and environment concern shaped the management of change, rather than a focus only on environmental sustainability. If it were the latter and intrinsic value of the lake was the most highly valued entity, an averaging approach which would have prioritised the foresters land use would have been supported. An averaging approach would also have been more representative of the true external costs of the pastoral economy (in terms of their nutrient effects) on the environment. This demonstrates how, by seeking a balance between economic and environmental goals, reformist sustainability discourses can elide from a strong sustainability

(dark green) approach to the environment which would prioritise ecological sustainability outcomes.

Sustainable development approaches emphasise the importance of there being sufficient budget for implementation (Lundqvist, 2004). To manage the removal of nitrogen from the lake, the Lake Taupō Protection Trust was formally established in 2008. The Trust has an $82 million fund generated from central government and from local and regional funding. The Trust's role is to remove 20 per cent of the manageable nitrogen from the catchment within 15 years. The Trust can buy and resell private land from landowners in the catchment and place covenants on land when sold which will ensure permanent nitrogen restrictions (Lake Taupo Protection Trust, 2013).

Through the participatory processes it was decided that a nitrogen trading scheme should be established. The CEO of the Lake Taupō Protection Trust stated that such a scheme was a means of demonstrating that there was an economic value in sustainable land-use. The view was that this type of economic instrument would allow flexibility for farmers in how they together managed nitrogen in the catchment.

> You can take you land, convert some to forestry, moderate or change your stocking levels and get a nitrogen payment from us or other farmers in the catchment (Fleming in de-Jong, 2011, p. 78)

This Lake Taupō scheme is the first trading scheme for a diffuse source of pollution that has been established in New Zealand. Under the scheme pastoral landowners can both buy and/or lease nitrogen quota from other farmers in the catchment or sell nitrogen to the Trust (Lake Taupo Protection Trust, 2007; Taupo-nui-ā-Tia Joint Managment Group, 2007). As long as an individual's increase is offset by an equivalent decease elsewhere in the catchment the overall goal of reduced nitrogen will still be achieved (Duhon, Young, & Kerr, 2011, p. 6). Such an approach coheres well with an ecological modernisation response where market values are used to help to support better environmental outcomes, and could be seen as incorporating the polluter pays principle (Dryzek, 1997; Harvey, 2005). It also affirms that the process of engagement informed the selection of instruments and the acceptance of these instruments (Lundqvist, 2004; Rosenbaum, 2011). Yerex, a local farmer and member of the Lake Taupō

Protection Trust, commented that the self-management approach increased farmers' willingness to buy in to the changes (Yerex, 2009).

This assessment of the process of negotiation that has shaped the introduction of farming with a nitrogen cap has demonstrated that a cooperative approach has been central to managing change. Sustainable development is an approach to managing environmental risks which is pluralistic and incremental with no avenues ruled out (Torgerson, 1994), and in which both the process and outcome are important. Even though, from the outset, the goal was to develop a regulatory response, the final shape of the regulation was informed by expert risk assessment and stakeholder discussion which together determined the outcome. This plan has led to a novel new approach – nutrient trading – being incorporated as a mechanism to stop water decline. Yerex (2009, p. 4) summarised the process they had all been through thus:

> There was never a grand prescriptive plan … rules, guidelines, strategies have all evolved. This has never been done before; we are all starting from scratch on a journey that if successful will take years to show the full effects of success. (Yerex, 2009, p. 4)

Table 28 below presents a summary of stakeholder explanations of what worked well in this engagement process, and what did not.

Table 28: Perception of Stakeholders who engaged in Variation 5 Process

Positive	Negative
Full and open dialogue on issues where emotions might emerge but personalities could feel safe Meeting regularly (weekly, at times) with particular agenda items to discuss and not being immune to revisiting contentious issues Bringing in science professionals with practical farm systems expertise as part of the consultation process Education – building landowner awareness of the effects land use activities have on the environment. Education – building regulators' awareness of how policy impacts on affected communities both economically and socially Demonstrated was that consultation and engagement with affected communities is critical in achieving successful change, and implementation of policy goals The lakes farmers can be seen to be leaders in sustainability best practice.	Unfairness in final Nitrogen Discharge Allowance. This outcome led to a loss of opportunity for Māori landowners and foresters and pastoral farmers who had used less nitrogen. The social impacts on farmers should have been considered at the beginning of the change process. This did not happen; therefore, the process of change was emotionally stressful for farmers, families and communities. Farms are now valued for their productive capacity and this stops future growth through conversion or development. Farmers' businesses are capped, while their competitors locally and internationally are not. Until this approach is compulsory across all New Zealand, farmers in this catchment will be disadvantaged economically.

Source :(Botha, 2012; Cottrell, 2012; Richardson, 2012; Yerex, 2009; Young & Kaine, 2009).

In summary, the risk to Lake Taupō of further water degradation was an issue that elicited both a top-down and a bottom-up response. A convergence of community, *iwi*, regional council, district council, central government, and the agricultural sector goals to uphold water quality in Lake Taupō saw a process develop which kept the need to balance environmental, sociocultural, and economic factors at the forefront. This process has challenged the assumption that the impacts of the diffuse pollution effects of farming are not the responsibility of the land user. For this catchment, farmers must now pursue their economic goals within ecological limits and support the ecological sustainability of the lake. The effectiveness of drawing on a sustainable development discursive lens as a mechanism through which to generate social change, and support the goal of long-term ecologically sustainable outcomes, was demonstrated through this process.

I next turn to the second comparative case study, the Rotorua Lakes.

Rotorua-Te Arawa Lakes

Rotorua, like Taupō, is another iconic tourist destination in New Zealand, with a third of all international visitors spending at least one night in the Rotorua district (Dibley, 2009). The Rotorua district has a population of 70,000, with Rotorua itself having the largest settlement with a population of approximately 60,000 (Dibley, 2009).

A quarter of the Rotorua district is plantation forestry and 45 per cent is in pasture. Forestry accounts for 10 per cent and agriculture for 7.5 per cent of the local economy. Agriculture consists of dairy, beef, sheep, and deer farming, with dairying accounting for three-quarters of Rotorua's pastoral economic output (PCE, 2006). The population is 28 per cent Māori and 38 per cent of land in the region is in Māori ownership. The regional council is one of the few territorial authorities to provide for designated Māori seats in order to ensure Māori representation in local government elections.

There are 12 lakes in the Rotorua district (and some smaller bodies of water), all with differing characteristics and different water quality problems (Edgar, 2009; Hamilton, 2011; Park & MacCormick, 2011; PCE, 2006). This situation has meant that the strategy required to address the lakes' problems is a much more

complex problem in terms of environmental management and land-based changes than for Lake Taupō. Unlike Taupō where there were clear linkages between the problem and the cause, in the case of the Rotorua lakes, there is no one set of actions which can be developed to alleviate their decline. The significance of the problems affecting the Rotorua lakes is evident in a 2003 report to the MfE which states:

> There is a good chance that Lake Rotoiti will lose much of its remaining oxygen this summer. If this happens, the fish and all life in the lake will die and it will become an unpleasant and smelly place. However, there is no simple, quick or cheap solution to the problems with Lake Rotoiti and other stressed lakes in the Rotorua area. (Ministry for the Environment, 2003b)

Forging a New Vision for the Rotorua Lakes

Scientific monitoring had demonstrated that the Rotorua lakes had been in decline since the 1960s, and that different agencies had worked to monitor and ameliorate this decline (Edgar, 2009; Miller, 2003). The consensus among scientists was that the decline had been caused by the high level of nutrients and sediment entering the lakes from historical and ongoing land-use practices. This situation had led to high rates of phytoplankton growth and increased eutrophication. Eutrophication had led to more frequent algal blooms, lake weed growth, poor water clarity, and low oxygen levels particularly in the summer months (Park & MacCormick, 2011; PCE, 2012). Lakes were frequently being closed to the public due to the associated health risks of algal blooms[53], and this closure was affecting not only local residents but also tourism (Abell, Hamilton, et al., 2011; Environment Bay of Plenty, Rotorua District Council, & Te Arawa Lakes Trust, 2005; Hamilton, 2011).

Historically, there had been no comprehensive regional group with oversight for the lakes. To fill this void, and coordinate the many groups and interests concerned with better management of the lakes, a Lakes Management Working Group (LMWG) consisting of the Te Arawa Māori Trust Board[54], Environment Bay of Plenty (EBOP), and the Rotorua District Council (RDC) was established in 1998. Through their Treaty settlement, Te Arawa has statutory rights, and, therefore, had been included in resource management issues in the catchment (New Zealand Government, 2006).

In establishing the LMWG, it was acknowledged that participation by all members of the Rotorua community was seen as important. The first action of the LMWG was to establish a community-driven vision for the Rotorua lakes. In 2000, as the result of a community consultation process, *The Strategy for the Lakes of the Rotorua District* was presented by the LMWG (Te Arawa Maori Trust Board, Environment Bay of Plenty, & Rotorua District Council, 2000b). The vision was that:

> The lakes of the Rotorua district and their catchments are preserved and protected for the use and enjoyment of present and future generations, while recognising and providing for the traditional relationship of Te Arawa with their ancestral lakes. (Te Arawa Maori Trust Board, et al., 2000b, p. 3)

The strategy outlined the five community values which had emerged from the community consultation process. These values are summarised in Table 29.

Table 29: Community Vales for Rotorua Lakes

Community Values for the Rotorua Lakes
1. The right of public access, use and enjoyment of the lakes 2. The principle of guardianship (described as kaitiaki when exercised by the tangata whenua) and the protection of the mauri of the environment (indicating that the environment has a life force of its own and is not an inert, lifeless object) 3. The principle of sustainable resource management (ensuring each generation can continue to use and enjoy the resources of the Rotorua district) 4. The significance of community pride in the lakes reflected in the notion of "Te mana o Te Arawa" 5. The requirement to take into account the principles of the Treaty and to provide for the relationship of tangata whenua with their ancestral resources. (Te Arawa Maori Trust Board, Environment Bay of Plenty, & Rotorua District Council, 2000a, p. 3)

Source :Te Arawa Māori Trust Board, Environment Bay of Plenty, & Rotorua District Council, 2000.

The values reflect the sustainable development discourse in that ecological, economic, and sociocultural values should all be considered together, and that rights of future generations must also be considered. Through the inclusion of Māori values, a dark green ecological worldview was also recognised. In this holistic worldview, nature and humans are inseparable; therefore, if one is damaging nature, one is damaging oneself. From this perspective, economic decisions should work within the constraints of the environment (Bartlett, 1986).

The strategy states:

> For the Māori community and the people of Rotorua … there is a sense of pride, place, mana, status and culture involved in achieving excellence in managing the lakes. The Māori perspective which takes a holistic view of the issues has significant benefits. Conversely, an approach that compartmentalises jurisdictions can fail to address broad management problems in a co-ordinated and cohesive manner. (Te Arawa Maori Trust Board, et al., 2000a, p. 3)

Sustainable development legitimates itself though sectoral integration of environmental concerns and through respect for local knowledge and different perspectives (Lafferty, 2004a). The Human Rights Commission view was that the joint management approach established in the Rotorua lakes:

> … is an example of Māori and Pākehā working for change and standing together to do so along with the Crown. (Human Rights Commission, 2013 n.p.)[55]

The discourse articulated in the strategy was that, if the vision for the lakes were to come to fruition, a coordinated and cohesive interagency and community driven process was necessary. The strategy states:

> For each goal we have prepared a proposed schedule of tasks, and invite interested parties to identify where they could contribute, either by managing a task or by participating in a team working towards resolving a particular problem …. Participation is in part ownership of a problem and in part ownership of a solution that will significantly contribute towards achieving the community vision for the lakes. (Te Arawa Maori Trust Board, et al., 2000b, p. 9)

In summary, normatively the values that frame the vision for the lakes were underpinned by sustainable development. This perspective reflected the view that a holistic approach that incorporated sociocultural, economic, ecological concerns, and a long-term view must all be addressed together.

This strategy was subsequently adopted by the RDC in 2002 as the overarching vision in its district plan, and was translated into the EBOP 2002 proposed Water and Land Plan[56] (Bay of Plenty Regional Council, 2008).

EBOP was given the lead role in developing a specific strategy to transform the vision into a concrete plan, the plan which I next review.

Process of Change

The LMWG was clear that the key to successful improvement of the lakes required a whole-of-catchment response. As a result, the interrelationship between land and water must be acknowledged at all times. Understanding the relationship between the condition of the lakes and the links with surrounding land use practices was, therefore, crucial to improving water quality (Te Arawa Maori Trust Board, et al., 2000b). It was understood that in order to support this overarching long-term sustainability goal, the focus of land-use change would require agriculture to change from a high nitrogen loss activity, to a low nitrogen loss activity (Bay of Plentry Regional Council, 2008).

In 2004, EBOP as the lead actor presented an overview document –*The Rotorua Lakes Protection and Restoration Programme: Outline of Project Structure and Timeline*. This document articulated the vision for the lakes as concrete goals, as well as an action plan and timeline, for addressing water decline for each lake. The aligned responsibilities of different actors were also outlined to ensure the restoration programme came to fruition (Environment Bay of Plenty, 2004). The document synthesised the vision for the lakes into four key values: protection, use, enjoyment, and management. Each value had aligned goals and required that environmental performance standards be established. The monitoring and evaluation of results was also viewed as necessary. This process would provide the feedback mechanism as to whether or not the objectives were being met. It was also recognised by the LMWG that scientific research for land and water, community and farmer engagement, and a rule change to the regional plan would all be necessary (Environment Bay of Plenty, 2004, p. 2).

Sufficient budget for sustainable development must be allocated to ensure implementation of goals (Lundqvist, 2004). An assessment of costs associated with how the lakes restoration should be funded by different actors was undertaken in 2004. In 2008, a Memorandum of Understanding was signed between regional and central government which confirmed funding for the restoration programme. Central government allocated $72 million over 10 years for the restoration of Lakes Rotorua, Rotoiti, Rotoehu and Okareka (McKinlay Douglas Limited, 2004). Other central government funding was also made

available through mechanisms such as the Sustainable Farming Fund and the Lake Ecosystem Restoration NZ project. The then Prime Minister, Helen Clark, stated:

> In recent years New Zealanders have become acutely aware of the need to act on the state of our freshwater resource ….The Rotorua lakes are a dramatic example of the problem we face …. Our government's decision to sign the Memorandum of Understanding was an acknowledgement that tackling the problems of Rotorua's iconic lakes is a national as well as a local priority. (Clark, 2008)

This national/local funding split contrasts with the 'norm' for regional councils where funding for environmental problem solving is generally determined (and constrained) by the rates available in a region. The overarching responsibility for checks on whether the goals of the *Protection and Restoration Programme* were being met ultimately sat with the LMWG. This oversight required that:

> All parties meet regularly to discuss and debate issues, consider funding for specific projects on a case-by-case basis, facilitate consultation amongst and between parties and with other stakeholders, and negotiate funding for work to be done. (Human Rights Commission, 2013n.p.)

The summary table, Table 30 below presents the values and goals of the Programme of Action.

Table 30: Values and Goals for Lakes Restoration

Values and Goals for Restoration of Rotorua Lakes	
Protection Address the causes of lake water pollution. Deal with pollution from septic tanks. Determine the extent of pollution from stormwater runoff. Define and refine lake water quality standards. Examine the status and future of the catchment bank protection scheme. Address plant and animal pest problems. Determine present and future reserve areas. **Use** Establish an urban development policy. Establish a rural development policy.	**Enjoyment** Develop a recreation strategy. Monitor and report on recreation activities. Define esplanade reserve areas to ensure public access to each lake. **Management Goals** Establish in partnership with Te Arawa a c-management framework that achieves the best integrated management. Establish meaningful and binding working relationships with the *iwi/hapū* and their ancestral lakes.

Source: Rotorua Lakes Protection and Restoration Programme EBOP 2004

Combining Lake and Land-based Actions

From this holistic goal two separate but interlinked scientific strands, one for water and one for land, emerged to support the restoration programme. The first

strand focused on understanding the lakes, finding ways to directly address lake decline, and through these target appropriate intervention (Abell, Özkundakci, & Hamilton, 2010; Abell, Özkundakci, Hamilton, Miller, & Steven, 2011). This strand can be viewed as the end-of-pipe, or 'react and cure' component. The second strand was linked with prevention, that is, to stop the problem at its source. The goal was to change land use from a high nutrient loss activity to a low nutrient loss activity (Abell, Hamilton, et al., 2011; Bay of Plentry Regional Council, 2008). These strands were to be brought together through action plans for each lake. At the time, 9 of the 12 Rotorua lakes had water quality poor enough to have triggered action plans (Environment Bay of Plenty, 2013).

In order to evaluate the process of change, the next section looks at each strand in turn, and then reviews the Lake Okaro Action Plan to demonstrate how they were brought together.

Lake Water Strand

Lack of knowledge was one of the key constraints which limited improvement of the lakes. The Rotorua lakes are shallow and sediment rich and many have different characteristics; as a result, therefore, one solution could not suit all of the lakes. In order to understand and address the lakes' decline, the LMWG recognised that new scientific research to understand their distinctive characteristics were required (McKinlay Douglas Limited, 2004).

In order to facilitate increased scientific understanding of the lakes, EBOP established, in 2002, a Lakes Chair in the School of Biology at the University of Waikato,[57] and central government supported the establishment of the Lake Ecosystem Restoration New Zealand (LERNZ) research project. The remit of the LERNZ research team was to develop models and practical tools to build new scientific knowledge about the lakes. This would enable concrete actions to be undertaken. A linked goal was that the LERNZ programme would also produce new knowledge and practical tools for other regions in New Zealand.[58]

This type of research and development, and the acquisition of new scientific knowledge, is an important component of sustainable development as promoted by the Brundtland Report (WCED, 1987). Sustainability science runs counter to the traditional relationship between scientists and decision makers:

> Traditionally scientists and decision makers have had different purposes with different values, interests, concerns and perspectives and have tended to lack a mutual understanding of each other's knowledge systems. (Liu, Gupta, Springer, & Wagener, 2008, p. 846)

Science for sustainability is defined as science that should instead:

> … advance basic understanding of the dynamics of human-environment systems, facilitate the design, implementation, and evaluation of practical interventions that promote sustainability in particular places and contexts, and improve linkages between relevant research and innovation communities on the one hand, and relevant policy and management communities on the other. (Harvard University's Center for International Development, 2013)

A science for sustainability approach is evident in the relationship established between the LERNZ team, other lakes and land researchers, the LWMG, and the broader lakes community. The relationship between scientific knowledge building and sustainability is seen as a technical scientific problem and a governance problem. The science research is driven by community values in support of more sustainable economic and ecological goals (Liu, et al., 2008). The leader of the LERNZ team acknowledged this shift in thinking when he stated:

> The focus of lake research has subtly changed from identification of lake water quality problems and causal agents of eutrophication to alignment with management actions in specific lakes and use of models to help to address information gaps. (Hamilton, 2011, p. 4)

The goal of the LERNZ project has been to build understanding through a combination of targeted investigations and adaptive trials (see for examples Hamilton & McBride, 2013). It has been an adaptive management approach whereby the findings of applied research are effectively communicated to regional managers and directly inform policy (Abell, Hamilton, et al., 2011). A member of the LERNZ team stated that:

> We run scenarios and those scenarios can give a much more definitive picture of what is manageable … and so I would say that the models have made a big difference. It has meant real teeth to the science that underpins some of the policy. (S4)

Alongside the development of models, a major focus of research has been trialling the effectiveness of different tools to aid the removal of nutrients from the lakes (for example, a floating wetland; a sea wall to block nutrients moving between

lakes; oxygenation of lakes; weed harvesting; alum used to bind phosphorus in the lakes) (Hamilton & McBride, 2013; LERNZ, 2012).

A spokesperson from the LMWG is clear about how important the cooperative research approach has been for the success of the lakes programme:

> The partnership with the University of Waikato, as well as considerable advances from other research providers and the farming sector have substantively "changed the game" in terms of understanding of both the cause of water quality degradation, and the range of responses that can be adopted. (Environment Bay of Plenty, 2010, p. 8)

In summary, the research model that has shaped the science programme behind the lakes water component of the restoration programme has involved proactive engagement with stakeholders in search of practical solutions (Kates, 2011). The practical science being developed is linked to outcomes that "meet the needs of the current generation without jeopardising the future generation" (WCED, 1987). What has emerged through this process is a form of sustainability science in support of sustainable development.

The next section evaluates the land-use change strand of the Restoration Programme.

Changing Land-use Practice

The overarching goals for lake restoration were outlined in the Rotorua Lakes Protection and Restoration Programme, and how these goals would inform and change land use was further refined in the EBOP Water and Land Plan (Bay of Plenty Regional Council, 2008). The focus of land-use change was to move agriculture from a high nitrogen loss activity to a low nitrogen loss activity (Bay of Plentry Regional Council, 2008).

The norms and mechanisms that were articulated in the *Water and Land Plan* emulate key elements of the sustainable development discourse. To ensure long-term ecological sustainability of the lakes, participation by farmers and the wider community was necessary, as was a land-based research and development programme, to identify and build new knowledge. A variation to the plan was also required in order to regulate nutrient leakage from farms. Table 31 presents a synthesis of the values, goals, and policy instruments expressed in the *Water and Land Plan* which would shape land-use change.

Table 31: Values and Mechanisms to Support Land-use Change in Rotorua District

Values
Partnerships
Encourage a partnership approach with landowners.
Promote and encourage the establishment of community, farmer-based care groups and support these through the provision of technical advice, administrative assistance, and assistance in the development of farm management plans.
Encourage and provide for community involvement in the management of water and land resources. This may be carried out in conjunction with the city council and district councils, other resource management agencies, *tangata whenua* and other organisations as appropriate
Institutional Mechanisms
Regulatory Measures
Establish a regulatory measure to control the export of nitrogen and phosphorous from land-use activities in the lakes' catchments that exceed the TLI specified in the Plan. Doing so will require a cap on nutrient loss to set standards based on perceived environmental limits.
Research and Development
Support the trialling of soundly-based initiatives that seek to increase the sustainability of land and water management.
Support research through which to understand and clarify the nutrient exports of different land uses and best nutrient management practice.
Support the development and trials of other technologies in the pipeline such as the SCION spatial mapping software programme.
Support the use and research into farm management techniques such as BMP i.e., reduction of fertiliser use; removal of cattle from land over winter; better effluent management systems.
Land Stewardship
Support environmental programmes on farms such as fencing, riparian planting, improvement of wetlands, and protection of significant indigenous vegetation.
Support extension programmes that can provide practical demonstrations of techniques that may be used to bring about sustainable management on farms.
Encouraging the development and implementation of industry-based best management practices, codes of practice, environmental management systems, and self-monitoring programmes that achieve the sustainable development and management of land.
Support use of technologies such as OVERSEER to understand how nutrients work within farming systems; and support farmers to make changes accordingly through the use of nutrient plans.
Subsidies
Subsidise famers who undertake priority remedial work which has potential environmental benefits.

Source: Water and Land Plan (BOPRC (2008)).

Commissioned research was undertaken by EBOP and DairyNZ to assess the cost and effectiveness of the different mechanisms to achieve low nutrient sustainable farming. The research found that a suite of interventions including subsidies, education, land stewardship, partnerships, research and development, and a regulatory response would all be necessary as instruments to change land-use

practices (Fraser, 2011; Greenhalgh, 2011). The acceptance that a transition to sustainable land use requires a coordinated, collective effort, and that both biological and social systems together need to be addressed, was demonstrated through this collaboration (Dryzek, 1997).

Sustainable Science through Collaborative Processes

While pastoral farming in the Rotorua lakes catchment occupies only 45 per cent the land, it is responsible for 75 per cent of the excess nitrogen and 46 per cent of the excess phosphorus entering the lake each year (PCE, 2006). Therefore, in order to achieve nutrient reduction, a major focus was to find the means by which to reduce the excess nutrients leaving dairy farms. A coalition of government and industry actors came together with the object of addressing the unsustainability of current land-use practices. Research was co-funded by the dairy industry and the government's sustainable farming fund (Dresser, 2008). Collaborative research has been focused on understanding the relationship between farm management practices and nutrient leakage, and trialling best management practices to understand their potential to support less intensive farming practices (Dresser, 2009; Ledgard et al., 2007; Longhurst & Smeaton, 2008). A bibliography of the then current research being specifically undertaken or which has relevance to the Rotorua lakes was prepared in 2008 (Richie, 2008). The research found that "there is no silver bullet" but what has been achieved is a picture of what to expect from different practices under local conditions (Richie, 2008, pp. 11-12).

Research was also undertaken for EBOP to provide an overview of local practical tools and resources that can be used to shift farmer attitudes and behaviour towards sustainable farming (Heath, 2011). An example of collaboration between DairyNZ, Federated Farmers, local farmers, *iwi* and government researchers were the establishment of a monitor farm and an education programme for local farmers (Martin, 2011). [59] One goal of the monitor farm was to evaluate the efficacy of biological farming systems, which is an approach to sustainable farming based around rebuilding soil fertility and encouraging less reliance on chemical farming techniques. This research has been supported by the Rotorua Māori Research Institute, who, in conjunction with local landowners, held the first biological farming conference in New Zealand in 2011 (Martin, 2011).

The pursuit of sustainability is exploratory and variable, and local experimentation is the essence of the search for sustainable development. (Dryzek, 1997; Torgerson, 1994). The research both into land-use change and behavioural change undertaken by CRIs, DairyNZ, farmers, the regional council and other researchers in the Rotorua lakes' catchment emulates the exploratory approach of sustainable development. It has focused on practical science in search of solutions through which to guide sustainability governance (Kates, 2011). A new regulatory mechanism – Rule 11 – has been a part of this experimentation.

Rule Change 11

As in the case of Lake Taupō, the reduction of nutrients from land use either leaching through the ground into water or running across land into water was seen as the major problem that needed to be addressed. To support achievement of this outcome, Rule 11 was introduced in 2005 as the regulatory mechanism by which to set a cap on nitrogen and phosphorus use on farms.

The rule established that properties over 0.4 ha were required to have nitrogen and phosphorous losses assessed, and from these would be determined a permitted nutrient leakage cap benchmarked for each property (Ledgard, 2009; Park & MacCormick, 2011). The determination of how to assess the cap took a form similar to that used for Lake Taupō with a grandparenting approach being selected to determine the benchmark. The nutrient discharge rights would be established on the basis of historical land use. The benchmark was set by averaging nutrient use over a 3-year period between July 2001 and June 2004 (Park & MacCormick, 2011, p. 2). Once the benchmark was established on farms, landowners would not be permitted to intensify their land use unless they could demonstrate they had offset any nutrient loss effects through best management practices such as riparian planting, herd homes, nitrogen inhibitors, or wintering off stock (Bay of Plenty Regional Council, 2013; Park & MacCormick, 2011; Salmon, 2010).[60]

Nutrient trading was also assessed (Anastasiadis, Nauleau, Kerr, Cox, & Rutherford, 2011; Lock & Kerr, 2008), but was rejected by the LMWG and EBOP because of a lack of current knowledge about nutrient movement in the lakes. Furthermore, because each lake was unique, risks could not be easily aggregated across the lake catchment (Lakes Water Quality Society, 2010).

The LMWG and EBOP were aware that reduction through benchmarking alone could not meet the nutrient reduction required to improve water quality and that other substantial actions would be required (Park & MacCormick, 2011). The goal, therefore, of Rule 11:

> … was not specifically to improve lake water quality, it was intended only to prevent further increase in nutrient exports from land within the catchments to the lakes (Foster & Kivell, 2009, p. 14)

The scale of the problem is such that it is estimated that for Lake Rotorua, 30 per cent of the catchment may need to be changed to low intensity farming or other uses to reach the target (Lakes Water Quality Society, 2010). Nevertheless, Rule 11 did establish a regulatory line in the sand for farmers that production through intensification was no longer acceptable. One interview participant summarised the situation thus:

> It is still very difficult to see how farming can exist in the lakes' catchments if all the water quality targets that everyone wants are to be met. Currently, there is no new easy technological solution, and solutions such as artificial wetlands are very expensive … currently we do not have the answers as [to] how to balance economic and ecological imperatives, and that is the point, we have got to … no one really wants to have the scary conversation that dairying may well not be possible within the constraints of the catchment. Can you have a gorgeous environment and productive use? (RC 9)

In summary, Rule 11 sits as one mechanism amongst many to support changing land-use practices, and benchmarking is the first step towards understanding the extent of the problem, and possible solutions.

A feedback loop is important for sustainable development, and the mechanism established for the lakes demonstrates this process. For example, reviews undertaken of Rule 11 in 2009 (Dresser, 2009; Foster & Kivell, 2009) found that as yet it has not reached its stated goal. This failure was due in large part to resistance by farmers, and implementation underresourcing. At that time the situation was "a weakly monitored freeze on leaching" (Dresser, 2009, p. 5). One review states that:

> While Rule 11 has the potential to provide a strong control on nutrient export, its success or otherwise cannot be seen until it is properly implemented and benchmarking is complete (Foster & Kivell, 2009, p. 19).

No negotiated process between farmers and regional council was undertaken before the introduction of Rule 11, and the outcome has been that proactive farmers have had their farms benchmarked, while resistant farmers have not. Thus far there has been no comprehensive acceptance of the need to benchmark farms, as required under Rule 11.

While farmer and community-led groups have emerged in response to the needs of particular lakes (the latest being the Lakes Rotorua Primary Producers Collective established in 2011)[61], there is no one, overarching stakeholder group that has been established in the Rotorua lakes. This oversight was recognised as a missing piece of the puzzle in the review of Rule 11, and, in 2012, a 'Stakeholder Advisory Group' was established. The advisory group consists of regional and local councils, the Lakes Water Quality Society, the Rotorua Primary Producers Collective, foresters, and Māori trustees. The group's mandate is to work together to develop rules and land-use incentive schemes in a collaborative way (Straight Furrow, 2013).

In the last section, I evaluate an "action plan" which is a process that brings the science, decision makers, communities, and farmers together.

Action Plans

In order to undertake the lakes restoration programme, determining the level of deterioration in each lake was the starting point for remedial work. The Water and Land Plan established the water quality targets for each lake through the use of the 'Trophic Level Index' (Burns, Rutherford, & Clayton, 1999) (TLI).[62] The Table 32 outlines the Trophic Level Index.

Table 32: Trophic Level Index

Trophic Level Index	Lake Type
Less than 2	Very good water quality (microtrophic)
2-3	Good water quality (oligotrophic)
3-4	Average water quality (mesotrophic)
4-5	Poor water quality (eutrophic)
Greater than 5	Very poor water quality (supertrophic)

Source: (Environment Bay of Plenty, 2013)

There was a hierarchical approach to lake restoration with the worst lakes as determined by the TLI being focused on first. The long-term goal is that all the Rotorua lakes will have an action plan (Bay of Plenty Regional Council, Rotorua

District Council, & Te Arawa Lakes Trust, 2011; Environment Bay of Plenty, et al., 2005). The TLI has provided a strong scientific basis for restoration and in so doing has facilitated a common narrative through which changes in the health of the lakes could be understood by the communities involved. [63] An interview respondent stated: "it has been a pivotal tool for setting goals and maintaining community momentum" (RC6). What follows is a review of an Action Plan for Lake Okaro

Okaro Action Plan

The Okaro Action Plan was been developed by a working party comprising representatives from regional and district councils, scientists, landowners, *iwi* and community groups. The working party's role is to:

> … discuss and evaluate options and solutions to improve lake water quality, identify knowledge gaps and recommend action. (Bay of Plentry Regional Council, 2012, p. n.p.)

The development of the plan began in 2003 when an initial group of the six landowners in the Okaro catchment, sector group representatives, RDC, and EBOP met to consider options (Environment Bay of Plenty, Te Arawa Lakes Trust, & Rotorua Disctric Council, 2006). The "Okaro Action Plan" was subsequently developed and implemented in 2006.

Ninety per cent of the land around Lake Okaro is in pasture, and the major source of nutrients entering the lake originates from agricultural sources (Abell, Hamilton, et al., 2011). Lake Okaro had the highest TLI of all the Rotorua lakes at 5.5 (supertrophic). It was one of the first lakes to have an action plan developed, and the goal was to reduce the TLI to 5.0. The plan outlined six initial actions necessary to achieve this target. These included the use of new technologies (a nutrient absorbent lakebed cap), ecological protection (wetland construction, riparian planting), change to farming practices (best management practice),[64] and ongoing monitoring of all the actions in order to monitor TLI levels (Environment Bay of Plenty, et al., 2006). A fund was also made available for farmers to subsidise the implementation of these actions.

A proactive approach has been taken by the landowners, and in 2009 with assistance from the government Sustainable Farming Fund they formed the

"Okaro Lake Restoration Group" the goal being to try and reduce the impact of their collective farming operations. The land owners stated that:

> They are taking a proactive approach to increasing Lake Okaro's water quality by investigating their environmental performance, primarily by utilising OVERSEER and are considering the use of an environmental management systems approach to demonstrate improvement, and environmental accountability. (Birchall & Paterson, 2011, p. 2)

The group has stated that "this project illustrates a community employing a collective, collaborative and transparent approach to nutrient-loss management" (Birchall & Paterson, 2011, p. 7). Although the lake still has one of the highest TLIs, there has been improvement. The 2010 TLI assessment states:

> The TLI for Lake Okaro declined by over half a unit between 2008 and 2010. This dramatic improvement moves the lake nearer to a eutrophic classification rather than supertrophic and it is now under its TLI target for the first time since regional council monitoring began. (Bay of Plenty Regional Council, 2010, p. 4)

The CEO of EBOP has emphasised the importance of setting targets, stating, "the TLI targets are vital, it is one of the lessons we have learned, to know what you are aiming for" (Bayfield, 2011, p. 44). He adds:

> Lake Okaro remains the most degraded lake, but it is here we have been able to make the most progress so far. It is our practice pond, and the work we are doing here will tell us more about what we can do as we tackle the bigger ponds. Okaro is proof that our methods are actually working. It is on a very small scale but we know that we can significantly improve water quality because we have done it. (Bayfield, 2011, pp. 43-44)

The action plan approach recognises the following: the importance of putting in place processes through which to build scientific knowledge of the problem; that strong community and farmer participation is required; that assessment of goals and their relevance is also important; and that through a feedback loop new knowledge is produced to solve emergent problems. The Okaro Action Plan is a good example of an adaptive, integrated, and collaborative approach. It demonstrates that through the action plan approach, the core elements required for sustainable development are framing the restoration programme for the Rotorua lakes' catchment.

In summary, the risk of further water degradation in the Rotorua lakes' catchment saw a community driven restoration programme put in place. The vision of the

community was long term sustainability of the lake, and to achieve this goal the sustainable development discourse has shaped the lakes restoration programme.

Conclusion

Ensuring ecological sustainability of the Taupō and Rotorua lakes was at the heart of the reason action was undertaken to restore the water in these catchments. The analysis revealed that the institutions charged with addressing the deterioration of the lakes drew from the outset on the sustainable development discourse to shape their response. The process has confirmed that a community-driven process is conducive to the incorporation of a sustainable development discursive approach, and that how a community responds to sustainability concerns has different ecological sustainability outcomes.

The governance institutions charged with oversight of the lakes recognised that a community-driven process was necessary, and that community and *iwi* values should guide the strategies developed to restore the lakes. In order for long-term sustainability of the lakes to be achieved, there was a need to address environmental, sociocultural, and economic factors together.

An integrated approach was established, with central and regional government actors providing funding to ensure the vision was achievable. As a result, funding was available to carry out practical scientific research to understand the causal links between lake decline and land management practices. The relationship between scientific knowledge-building and sustainability was established as a scientific technical problem, and a governance problem. This approach recognised that complete understanding of complex systems is not possible, and that it is better to build understanding through a combination of mechanisms, including targeted investigations, and adaptive trials. The need for stakeholder and community engagement in the change process was also recognised, demonstrating that sustainably requires proactive engagement with stakeholders in search of practical sustainability solutions.

To ensure the overarching goal of nutrient reduction, it was also determined that it was necessary to regulate the levels of nutrients leaving individual farming systems. This is a very different response to the dominant institutional approach

which has supported self-management and a voluntary approach more reflective of the ecological modernisation discourse.

Through the requirements of the benchmarking of farms and establishing nutrient caps farming is no longer a stand-alone unit of private production. The economic goals of farmers are now constrained by the ecological limits established for the lakes. The cumulative effects of all land users must now be considered and addressed together. Through this process, the usual productivist methods of intensifying production through increased fertiliser use and stocking rates have been challenged. This direction represents a major ideological and value shift which challenges the productivist discourse that has long framed agricultural practice in New Zealand.

What is evident in the analysis of the discourse is that sustainable development has been the influential discourse normatively and institutionally that has shaped the restoration programmes for Lake Taupō and the Rotorua lakes. How these communities have responded provides good examples of answering the question that Rydin (1999) poses: Can we talk ourselves into sustainability? In these catchments, the answer has been "yes". Lee (1998) talks about sustainable development needing to be woven into the institutional fabric, that adaptive management requires culturally, economically, and ecologically viable relationships between people and the environment they inhabit. Learning from experience provides the opportunity to reach and maintain a managed equilibrium efficiently and the resilience to persevere in the face of surprise (Lee, 1998). This condition recognises: that there is no one blueprint for sustainable development; that sustainability is a negotiation between competing interests; that it is political, and provisional, and locally specific (Brand & Karvonen, 2007). This is the approach that best describes the processes for sustainability in the lakes catchments.

These case studies demonstrate that if there is the community and institutional will to do so, it is possible to interpret and implement the sustainability goals of the RMA in a different way. What was identified through these case studies was that regional councils in conjunction with other actors can be progressive, that they can incorporate precautionary and preventative approaches, and take actions

when a problem is recognised. Table 33 below summarises the discursive elements that have shaped change in these lakes' catchments.

Table 33: Discourse Elements Shaping Change in the Lake Taupō and Rotorua - Te Arawa Lakes

Key Elements	Sustainable Development	Lake Taupō	Rotorua (Te Arawa) Lakes
Normative Values	Acknowledgment of the interdependence of economy and ecology Economic growth constrained by wise use of resources Intergenerational and intragenerational equity Anticipatory environmental policy-making Economic and environmental benefits can be simultaneously generated.	√	√
Democratic Process	Discursive democracy –- strong participation through local civil society networks Institutions guided by community values	√	√
Institutional Approach	Adaptive and integrated approach which addresses scientific, social, environmental, and economic aspects of farming The process and outcome are both critical.	√	√
Implementation Mechanisms	Cooperative rather than competitive. Nonhierarchical approach with establishment of joint institutions with oversight for the lakes' restoration	√	√
Approach to Risk	Environmental risks political and ideological Social, cultural, and ethical values to be considered together Expert risk assessment balanced with community risk perception Multiple perspectives and local knowledge shape goals and actions	√	√

The next chapter presents the results of the Q-sort survey conducted with key stakeholders that are focused on sustainability and a sustainable dairy industry. It

provides a means of critically examining the values and worldviews around sustainability which shape the discourses of the key actors.

---

[43] In 2011 both Environment Waikato and Environment Bay of Plenty were rebranded, with Waikato Regional Council and Bay of Plenty Regional Council as their monikers. Many of the documents I analyse are under the original names, which I use if they are stated as such.

[44]The purpose of the Local Government Act is to provide for democratic and effective local government that recognises the diversity of New Zealand communities; and, to that end, this Act—

- (a) states the purpose of local government; and
- (b) provides a framework and powers for local authorities to decide which activities they undertake and the manner in which they will undertake them; and
- (c) promotes the accountability of local authorities to their communities; and
- (d) provides for local authorities to play a broad role in meeting the current and future needs of their communities for good-quality local infrastructure, local public services, and performance of regulatory functions (LGA, Part1,Sec 3)

[45] The Local Government Act has now been amended and District Councils are no longer required to have a *Long Term Community Plan* (LGA, 2001 Sec 288 Repealed). This is another example of how influential the political ideology of central government can be in instigating social change legislatively for sustainability at the local government level. The changes have reshaped what is seen as legitimate in local government planning processes.

[46] The importance of the region as a tourist destination can be seen in that 700,000 people visit the district each year, including 128,000 international visitors (Taupo District Council, 2007).

[47] Ngati Tuwharetoa are the major iwi (tribe) in the region, and collectively own 47 per cent of the pastoral land and 55 per cent of the forested land in the catchment (Lake Taupo Forest Trust, 2004).

[48] The Lakes and Waterways Action Group was established in 1998. It was a diverse group which included individuals, community groups, bodies with statutory responsibilities and environmentally related associations such as Forest and Bird and Fish and Game (Gartner & Coulter, 2002).

[49] In 1992, as part of their Treaty settlement with the Crown, Tūwharetoa were vested ownership of the lake bed of Lake Taupō. This has given them statutory rights with regard resource management issues with regard the Lake.

[50] Best management practices include fencing, riparian planting, farm management and nutrient management plans.

[51] During the early negotiation of the variation between farmers and the council, national farming groups were not involved, but once the final changes were being negotiated in the Environment Court they became concerned at the possible precedent setting outcomes of this variation, which could make farming a controlled activity in the rest of New Zealand (Yerex, 2009).

[52]EW justified the grand-parenting preference because: The grand-parenting approach meant that pastoral land owners could continue their existing land use without the need to obtain additional nitrogen leaching rights. This meant that the variation will not need any immediate up-front costs to be met. If an averaging approach had been taken, this would have meant that forestry and undeveloped land would gain a surplus of nitrogen allocation. This would have put pastoral landowners in deficit, and pastoral farmers world have had to immediately reduce nitrogen to meet the rule, or purchase nitrogen allocation from foresters or owners of undeveloped land. EW supported the view that this would be inequitably to pastoral farmers (Environment Waikato, 2007, p. 53).

[53] Algal blooms can lead to potentially severe health effects on humans and animals from contact with water. They have led to dogs and cows dying from coming into contact with the water (Waikato Regional Council, 2014).

[54] Te Arawa is the *iwi* (tribe) of the region with *mana whenua* (territorial rights) status. The 2006 Te Arawa Treaty of Waitangi settlement included the return of the Rotorua lake beds to Te Arawa (New Zealand Government, 2006, pp. Part III,Sect. 48,49,50).

[55] The Human Rights Commission states that "this relationship is an example of what is meant by Article 29 of the United Nations Declaration on the Rights of Indigenous Peoples, which says that indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources. States shall establish and implement

assistance programmes for indigenous peoples for such conservation and protection"(Human Rights Commission, 2013).

[56] This plan became operative in 2008.

[57] The inaugural Chair is Professor David Hamilton from Waikato University Biology Department.

[58] LERNZ is funded by the Foundation of Research, Science and Technology (Lake Biodiversity Restoration contract UOWX0505), now superseded by the Ministry of Science and Innovation. The LERNZ website and their newsletters provide ongoing information with regard the research projects being undertaken. There are two strands to the LERNZ programme, pest fish management and lakes water quality.

[59] A monitor farm usually focuses on a single farm business for 3-4 years. But during this time it becomes the focal point for the broader farming community. It has back up and involvement from industry experts and tracks the success of new management processes or instruments.

[60] That mitigation work and best management practices could be assessed as part of the benchmarking process demonstrates that sustainability research undertaken in the catchment had demonstrated the viability of different practices on nutrient minimisation (Ledgard, 2009; Richie, 2008).

[61] This group was initially established for Rotorua Lake dairy farmers (the largest dairy farms in this catchment are Māori Trust farms), but it now represents all pastoral farmers and Māori land owners in the Rotorua Lake catchment (Kingi, 2011). Māori land comprises an estimated 30 per cent of land in the lakes catchment with approximately 10 per cent of Māori land and 12 per cent of non-Maori land currently used for dairying (Rotorua Lakes Land Innovation, 2011).

[62] Trophic levels of lakes are critical indicators of water quality. They provide a measure of the nutrient status of a body of water .The Trophic Level Index system enables an analysis of deterioration through measuring lake water quality across variables such as total nitrogen, total phosphorus, chlorophyll A (algae) and lake clarity. The resulting numeric value ascertained through the combination of these variables (the TLI) is used to provide the environmental bottom line for the lakes (Burns & Bryers, 2000, p. 1). This quantitative system provided the definitive information about the state of the lake water quality in the region. The TLI methodology has been adopted by MfE, and will be used in New Zealand to enable the comparison of water quality between different lakes (Bay of Plenty Regional Council, 2008, p. 52).

[63] The TLI must also take into account the groundwater lags of nutrients in setting the targets i.e. they must accommodate the nutrients still to come from past land-use practices. It is estimated that the lag can be upwards of 80 years (Abell, Hamilton, & Paterson, 2011).

[64] Best management practices included in the action plan includes the setting of nutrient budgets; protecting riparian areas; wintering off dairy cows outside the catchment; using covered winter feed pads; applying nitrification inhibitors; planting woodlots on less economic pasture land; implementing stocking and grazing management (Sec 6.41 Environment Bay of Plenty, Te Arawa Lakes Trust, & Rotorua Disctric Council, 2006, p. 25).

Chapter 9

An Analysis of Discourses in the Sustainable Dairying Debate

Introduction

The changes necessary for a transition to a sustainable society constitute a controversial and divisive public policy issue. The controversy is often about what values should guide decision-making, whose interests should benefit, and at what cost. More specifically, and with regard to this study, ideas about what is required to ensure a sustainable dairy industry are contentious in New Zealand reflecting strongly held, conflicting views about, actions that can ensure that dairy farmers reduce their impact on fresh water.

For policy on controversial issues, it is important to have democratic legitimacy, and this can be achieved through participatory processes (Baber & Bartlett , 2005; Dryzek, 2006; Dryzek, 2010; Dryzek & Stevenson, 2011). Participatory processes have the potential to lead to less antagonism and distrust if the affected public(s) have a concrete and meaningful role in formulating the best solutions (Beck, 1995; Kurian & Wright, 2012; Wynne, 2001). As demonstrated in Chapter 8, a community-driven process framed by sustainable development has shaped the restoration programmes for the central North Island lake catchments. The process has taken time, but has seen an effective response from the urban and rural communities and institutional commitment to the long-term sustainability of the lakes. Getting to this outcome was not without controversy, but various participatory mechanisms including community surveys and collaborative stakeholder engagement were important in achieving the outcome.

Another participatory process particularly suited for the study of issues that are socially contested, argued about, and debated is Q-methodology. Q-methodology is well suited to analysing aspects of the politics of environmental policy, particularly if these are understood as struggles over ideas (Stone, 2002). Understanding these ideas is important because:

> Policy problems are not simply matters of the facts of a situation, they are matters of interpretation and social definition … and the subjective

> dimension always serves as the foundation for defining policy problems. (Kathlene, 2006, p. 97)

A Q-survey fits well with the aim of enabling the many unique voices in the contentious issue of sustainability and the dairy industry to be heard. It is thus particularly appropriate to address the central focus of this chapter which is the exploration of the range of perspectives amongst key stakeholders on the controversial issue of sustainability and the dairy industry in New Zealand. The chapter specifically asks: What are the major discourses on sustainability among stakeholder groups in the arena of the dairy industry and sustainability? What are the convergences and divergences of sustainability views amongst these groups? Additionally, what are the commonalities and differences with regard to the potential solutions and implementation mechanisms that should frame efforts to attain more robust sustainability outcomes?

The focus of Q-methodology is on discourses, not individual worldviews. This emphasis reflects the insight that, to resolve controversial policy issues, it is more important to represent all relevant discourses than represent individuals (Dryzek & Niemeyer, 2008). Consequently, a large number of participants are not required in Q-surveys. Instead, what is needed is to ensure that those who participate are representative of different discourses. Thus Q-methods can make visible those discursive positions, which due to power differentials, may otherwise be underrepresented in policy decision making.

The Q-survey, therefore, allows the research to shift away from being primarily problem focused to solution focused, with the solutions being identified by the survey respondents. This instrument enables the identification of entrenched positions on sustainability and the dairy industry, and thus provides a basis for a more informed conversation between stakeholders by making them aware of the differences and similarities between strongly held positions. As all discourses are represented equally (it is egalitarian), the results of a Q-survey are more likely to facilitate engagement, and achieve buy-in from all or most stakeholders. For this reason, the results can help to inform sustainability politics and policy development and contribute to better sustainability policy outcomes.

This chapter provides an overview of the results of a Q-sort survey untaken in 2013. The next section describes the methods undertaken to carry out the survey, followed by a discussion of the five discourses that emerged from the survey analysis. The chapter ends with a discussion of the implications of the analysis for policy solutions for sustainability.

Method

Q-methodology as a survey method requires participants to prioritise their values and beliefs against other values and beliefs. The Q-sort (i.e., the responses to survey statements) lets the participants determine what, from their perspective, is meaningful and significant. Ranking different statements in relation to each other allows patterns in subjectivities across participants to be identified. Through the cluster analysis, these responses are then aggregated together and the results provide an indication of "the idealised forms of discourse latent in the data" (Barry & Proops, 1999, p. 338). The clusters that are generated indicate a group of people who have ranked the statements that they agree or disagree with in a similar way, indicating a shared viewpoint or discourse. Q-survey is, therefore, an approach which enables connections and linkages between sets of statements to be seen (VanExcel & deGraaf, 2005). For this survey, the goal was to generate a snapshot of the views and values with regard to sustainability and the dairy industry.

The survey was completed by 41 participants drawn from the stakeholder groups which represented the diversity of views that populate the order of discourse of sustainability and the dairy industry. The survey was anonymous, but as part of the survey there were a range of non-compulsory demographic questions around affiliation, gender, and educational qualifications. Not all participants chose to answer them. All but two stated their affiliation, and this showed that the participants included a good spread of regional and central government actors, dairy industry actors, scientists, academics, and environmental groups. Also of those that responded nine identified themselves as women and thirty as male. The qualifications of the participants are outlined in the summary Table below.

Qualification	Number
Doctoral	8
Postgraduate	8
Masters	6
Bachelors	7
Diploma or equivalent	7
Secondary School	3
No answer	2

The 46 statements that made up the survey were drawn from an initial 400 statements which had emerged from all the primary data gathered, referred to here as the "concourse". The concourse comprised the existing opinions, views, values, and discourses of the key stakeholder groups, and was developed through a systematic search of the interviews, documents, and media representations of sustainability and the dairy industry. A rigorous selection process was undertaken to identify the final statement selection (see Chapter 3).

The participants ranked the 46 statements in a forced pyramid sort. The statements had to be arranged across a quasi-normal distribution from (+4) to (-4) with (0) indicating indifference or a view that the statement was not as important as others. The forced sorts, therefore, required the participants to prioritise what they viewed as the most important values and concerns. The number of statements required for each part of the scale is presented in Table 34 below.

Table 34 Distribution of Statement Rankings

Scale score	-4	-3	-2	-1	0	+1	+2	+3	+4
No. of statements	3	4	5	7	8	7	5	4	3

To analyse the resulting Q-sorts, SPSS software was used to carry out a hierarchical cluster analysis. Hierarchical cluster analysis methods are suited to situations in which the researcher cannot state beforehand how many groups are present in the dataset. It thus offered "a kind of retrospective reasoning" (Beckstead, 2002, p. 308). The empirical procedure enabled classification of how the participants similarly (or differently) sorted their statements, and led to the identification of five distinct discourses, with different numbers of participants being affiliated with each discourse. Cluster one comprised 15 participants;

cluster two, 11 participants; cluster three, 2 participants; cluster four, 3 participants; and, cluster five, 10 participants. Although two of the discourses comprised only two and three participants, they were quite distinct in terms of their statement selection. As noted above, for Q-methodology, it is important to ensure that all relevant discourses are represented. Hence, it is not how many people in a group that is important, but what can be discovered through analysing the cluster's discourse.

The SPSS software produced a report which presented the overall score for how each cluster ranked each statement. It is from this report that the analysis of each of the discourses was undertaken. The forced nature of the Q-sort required that the participants prioritised their selections and it was the +4, +3 and -4 and -3 statements which determined whether participants' sorts were part of one or another of the five discourses. The numbers in the report that indicate strong agreement between participant sorts fall between +4.0 and +2.0, and the numbers which indicate strong disagreement range between -4.0 and -2.0.

An example of this report is presented in Table 35 below. Each column represents a statement and how these statements were ranked within the different discourses. For example, the ranking of statement 1 (St1) for discourse 1 was 2.8, for discourse 2 it was 3.6, for discourse 4 it was 2.3, and for discourse 5 it was 2.9 (see **bolded** below). The bolded numbers indicate that discourse 1, 2, 4, and 5 all strongly agreed with the statement "that ecological sustainability is fundamental to our existence". Conversely, for statement 3 (St3), "Our right to swim and fish in waterways is at risk", was strongly disagreed within discourse 4 with a ranking of -2, while in the other discourses this statement was not a strongly agreed or disagreed with statement. The final example in Table 35 indicates that statement 4 "NZ farm production needs to continue to grow in order to feed the world" attracted strong disagreement in discourse 1, while for other discourses this was not an important statement.

Table 35: Example of Statement Selection Rankings

Statement	**St1** Ecological sustainability is fundamental to our existence.	**St3** Our right to swim and fish in waterways is at risk.	**St4** NZ farm production needs to continue to grow in order to feed the world.
Discourse 1	**2.8**	1. 4	**-2. 6**
Discourse 2	**3. 6**	1.9	-1. 2
Discourse 3	.5	. 00	-.5
Discourse 4	**2.3**	**-2.0**	. 33
Discourse 5	**2.9**	-60	-1. 5

Survey Results: A Snapshot of Five Sustainability Discourses

Five distinct sustainability discourses emerged from the cluster analysis and each is discussed below. In interpreting the values and solutions expressed within each sustainability discourse, I draw on the discourse analytic framework and the spectrum of sustainability worldviews presented in Chapter 2. Table 36 provides information as to the affiliation of the Q-sort participants who undertook the Q-sort survey. This demonstrates that each discourse comprised diverse stakeholders, and the discourses that emerged were not aligned with particular stakeholder groups. In otherwords each discourse included a mix of representative groups. The participants who populated the different discourses did not divide across their stakeholder roles, instead, different discourses included a mix of scientists, farmers, farm support groups, environmentalists, and regional council staff**.**

Table 36: Self-selected Affiliation of Q-sort Participants

Self-selected Affiliation of Q-sort Participants & numbers in each	
D1Holistic Ecological Sustainability Discourse **15**	Dairy Farmer; staff of local/regional government; research institute; university; community environment group; scientist; academic; other
D2 Sustainable Science and Policy Discourse **11**	Local/regional government staff; Māori *iwi;* Māori statutory body; policy analyst; community/environment group; academic
D3 Progressive Green Dairy Discourse **2**	Dairy Farmer; farm consultant
D4 Conservative Dairy Discourse **3**	Dairy Farmer; farm consultant; community/environment group
D5 Pragmatic Dairy Discourse **10**	Dairy farmer; farm consultant; elected representative in a farmer support organisation; local regional government staff; dairy

	manufacturing sector worker; policy analyst; community environment group; other

Most participants took the opportunity to make some comment on why they selected particular statements, and these comments are drawn on to support the interpretation of the results. The process of analysis involved asking the following questions of each discourse: What are the normative values being expressed? What are the institutional mechanisms for achieving sustainability (i.e., government leadership, regulation, market mechanisms, voluntary accords, participatory processes, individual actions, or the status quo)? What problems with the dairy industry are identified? What are the solutions?

Holistic Ecological Sustainability Discourse

We all live in the environment and depend on it for our wellbeing. It underpins all aspects of the economy, environment, society, and culture. We have no right to degrade and continue to destroy what is unique in this land to increase our wealth.

Increasing pollution long term is madness. We are just leaving problems for our children to inherit.

What we have is special, and future generations should be able to enjoy our unique flora and fauna.

The presentation of the Q-survey data proceeds as follows. A summary table of the strongly agreed and strongly disagreed statements for each discourse has been produced (see Tables 37-41). From these, an assessment of each discourse is undertaken. This step is followed by an assessment of the convergences and divergences across and between the different discourses. Finally, a discussion of the Q-survey's findings is presented. If the statements are referenced in the text, they are referred to as S1 or S2 and so on. Text boxes are used to draw attention to exemplar quotes for each discourse, and these selections are informed by the comments made by survey participants.

Discourse 1: Holistic Ecological Sustainability Discourse

Within this discourse, environmental protection is fundamental. The environment comes before the economy and should not be traded off. It has been the actions of the dairy industry, and the lack of national oversight, which together are responsible for environmental decline. This discourse offers a dark green

worldview which positions ecological values as having preeminence. Therefore, protecting the environment has priority over protecting the economy through support for the dairy industry.

"Limits to growth" (Dryzek, 1997; Meadows, et al., 1972) shape this discursive view, with the sacrifice of water quality to increase farm production being viewed as unacceptable. From this perspective, economic imperatives should not undermine the environment. For this discourse continued growth of the dairy industry cannot be justified if it undermines the environment. It does not view current dairy farming practices as sustainable, and does not agree that farmers have been unfairly targeted over water quality concerns. This discourse does also not see that the dairy industry is committed to sustainability.

The science on the impacts of the dairy industry is seen as indisputable, and within this discourse, water problems are accepted as having been caused by higher rates of nitrogen use on farms and dairy intensification. Climate change is accepted as a real problem that needs to be addressed. Intergenerational equity issues were also seen as a priority. A comment from one of the interviews seems to summarise the concerns of this cluster: "if the government wants to trade off increased water pollution for more economic growth, they should be clear about this rather than pretend that we can have clean rivers and a million more cows" (S4).

The solutions that are associated with this discourse include a need to have consistent national environmental standards for water, air, and soil quality. There should be strong leadership, a national plan, and careful environmental monitoring. This discourse did not see voluntary accords as leading to better sustainability outcomes. Instead, there should be strictly regulated limits on stocking rates as a mechanism to control nitrogen leaching into water. These solutions reflect the institutional preferences of the sustainable development discourse. Moreover, within this discourse, Māori are recognised as having a unique status with regard to debates over water, with them having a special role to play in water management and environmental policy. This discourse is characterised by strong concern about the environment and a faith in the government as a key actor that must take more responsibility for solving the problem. The core normative values emphasise ecological sustainability.

Sustainability, for this cluster, would be achieved by ensuring that the economy works within the carrying capacity of ecological systems.

Table 37: Holistic Ecological Sustainability Discourse

Discourse1	**Strongly Agree**	**Mean**
+2 to +4	1. Environmental sustainability is fundamental to our existence.	+2.8
	7. Sacrificing water quality to increase farm production is unacceptable.	+2.2
	8. NZ needs consistent national environmental standards for water, air, and soil quality.	+2.6
	21. Sustainability needs strong leadership, a national plan, and careful environmental monitoring.	+2.6
	13. Climate change is not some distant threat, it is happening now.	+2.2
	6. The flora and fauna of NZ have intrinsic value and, therefore, need protection.	+2.2
	Strongly Disagree	
-2 to -4	4. NZ farm production needs to continue to grow in order to feed the world.	-2.6
	35. The primary sector is the backbone of the NZ economy and Regional Councils should not interfere with this.	-2.6
	23. We have to accept environmental degradation as a trade-off for a strong economy.	-2.6
	40. Water quality problems in rivers are overstated; only a few have nitrogen management concerns.	-2.4
	26. Farmers have been unfairly targeted over water quality issues.	-2.3
	16. Voluntary approaches like the Clean Streams Accord are the best way to address dairy pollution.	-2.2
	41. Māori are just another group and should not have any special say over water.	-2.1

Discourse 2: Sustainability Science and Policy Discourse

Within this discourse, ecological sustainability is again seen as fundamental. It presents a dark green view on the spectrum of environmental worldviews. From this viewpoint, if we undermine nature, then we are undermining ourselves. The impacts of the dairy industry on the environment were seen as unacceptable. In this discourse, climate change was acknowledged as a problem, and the scientific facts of what is causing water decline are accepted as established. Water decline is seen as being due to higher rates of nitrogen use and the intensification of the dairy industry. There was also strong disagreement that farmers have been

unfairly targeted over water quality issues, and it was seen as unacceptable that the environment could be traded off for the economy. For sustainability to be guaranteed, a limit on the growth by the dairy industry was seen as being required. Dairy farming was seen as being underregulated, which led to environmental degradation.

The solutions that emerged focused on changing relationships and changing processes.

Sustainability Science and Policy Discourse

You can have you own opinions, but not your own facts. The science is robust and clear on the link between nitrogen application, pasture growth, increased production, and leaching. More nitrogen entering water creates a highly eutrophic environment with attendant degradation.

A strong economy is not possible if it is built on damaging the environment. Our health and wellbeing are reliant on fully functional ecosystems.

The continued cases of noncompliance demonstrate there has been poor leadership by the dairy industry.

Stakeholder discussion and community engagement were among the highest ranked statements in this discourse. Participatory processes were central to good environmental policy for sustainability. There was a responsibility to ensure the community understands the issues, problems, and opportunities, and is enabled to determine the best options for sustainability. The need for central government leadership, a national plan, and careful environmental monitoring was also supported.

Monitoring was required, not only at the regional level, but at the national level as well. Voluntary accords were not seen as the best means through which to solve environmental policy problems, this view being exemplified in the comment that "voluntary approaches usually fail regardless of industry".

Table 38: Sustainability Science and Policy Discourse

	Strongly Agree	
+2.0 to +4.0	1. Environmental sustainability is fundamental to our existence.	+3.6
	7. Sacrificing water quality to increase farm production is unacceptable.	+2.9
	28. It is important to seek community involvement early when environmental problems are being addressed.	+2.8
	21. Sustainability needs strong leadership, a national plan, and careful environmental monitoring.	+2.6
	27. As there are so few wetlands left, they should be protected, not drained.	+2.6
	6. The flora and fauna of NZ have intrinsic value and, therefore, need protection.	+2.3
	25. Stakeholder discussion offers the best chance of reconciling economic and environmental objectives.	+2.0
	13. Climate change is not some distant threat, it is happening now.	+2.0
	Strongly Disagree	
-2.0 to 4.0	12. The link between higher rates of nitrogen use and water degradation is not scientifically established.	-3.4
	40. Water quality problems in rivers are overstated, only a few have nitrogen management concerns.	-3.0
	35. The primary sector is the backbone of the NZ economy and Regional Councils should not interfere with this.	-2.9
	26. Farmers have been unfairly targeted over water equality issues.	-2.5
	23. We have to accept environmental degradation as a trade-off for a strong economy.	-2.4
	16. Voluntary approaches like the Clean Streams Accord are the best way to address dairy pollution.	-2.1

This is because there is no financial incentive or regulatory stick to incentivise compliance; therefore voluntary approaches are not likely to be successful. Strong regulation and participatory processes were seen as pivotal to addressing sustainability, especially as environmental degradation was seen as having social implications. Environmental policy was, thus, to be guided by community ethics and values. This discourse recognised that both scientific and nonscientific knowledge were needed. While this discourse is very similar to discourse 1, it places a much higher priority on the need for participatory and collaborative processes between community, industry, and government actors. This discourse

Sustainability Science and Policy Discourse

Strong leadership and a clear vision are required for sustainability. Leaving standards to each region has too much political interference by vested interests and more central government direction would assist.

Collaborative policy-making backed by robust science is the best way to optimise progress for sustainability.

We need to measure to manage. This is the missing sustainability link in New Zealand. We need to be able to compare performance across the country, and also check whether what we are doing is working. If you don't know at what point your use becomes abuse, then you are in trouble.

is informed by those who were engaged at the coalface of developing solutions for sustainability problems.

Further examples of comments made by members of the sustainability science and policy discourse are presented in the accompanying text boxes.

Discourse 3: Progressive Dairy Discourse

Within this discourse, achieving sustainability will depend on making changes to farmer behaviour. These changes are seen as being most likely to occur through building relationships between farmers, researchers, and other community stakeholders. The focus is on changing farming systems. An emphasis is thus placed on the need for farmers to take more responsibility for the impacts of dairy production on the environment, and to work towards finding ecologically sustainable solutions. This discourse includes requiring farmers to be part of the emissions trading scheme. Again, a dark green worldview is expressed, with environmental sustainability being seen as fundamental. It is viewed as scientific fact that the increased use of nitrogen and intensification of the dairy farming systems have led to the decline in water quality; but sacrificing water quality to increase farm production is unacceptable. Sustainable farming practices require a focus on the development of a whole-farm approach, and the trialling of new ecologically friendly innovations. This discourse emulates most closely the ecological modernisation discourse in its emphasis on the need for more science and technology to provide innovative new solutions. For this discourse, the production goals of the dairy farmer must recognise, and be informed by, ecological limits.

> ***Progressive Dairy Discourse***
> ***Traditional farming has gone too far, you only need to compare soils and organic life on bio farms. You see a greater balance. It is all about balancing inputs with outputs. Biological and organic farming approaches mean more working with nature rather than trying to change it in order to grow more grass at any cost to the soil.***
>
> ***The use of market mechanisms such as nitrogen trading in order to balance economic and environmental goals is a good approach. If there is a recognised value for something, people will value it more and use it more efficiently.***

Organic and bio-farming systems are viewed as the most ecologically sustainable approach to date, and from within this discourse, therefore, such farming systems should be supported even if they are currently not as economically viable. Market mechanisms such as nitrogen trading and a price on water are viewed as acceptable methods through which to drive change in the industry. That is, it is

accepted that sustainability can be supported through an economisation of the environment (Mol, 1995). By putting an economic value on nature, dairy farmers will be encouraged to take the environment into consideration.

Table 39: Progressive Dairy Discourse

	Strongly Agree	
+2.0 to +4.0	25. Stakeholder discussion offers the best chance of reconciling economic and environmental objectives.	+4.0
	19. A farm plan approach with input from specialists is needed to solve problems of soil nutrient overload.	+3.5
	28. It is important to seek community involvement early when environmental problems are being addressed.	+3.0
	7. Sacrificing water quality to increase farm production is unacceptable	+2.5
	20. Scientific innovation can solve the sustainability concerns facing the dairy industry.	+2.5
	21. Sustainability needs strong leadership, a national plan, and careful environmental monitoring.	+2.0
	23. We have to accept environmental degradation as a trade-off for a strong economy.	+2.0
	Strongly Disagree	
-2. 0 to -4.0	36. Farmers should not be part of the Emissions Trading Scheme until new technologies enable them to reduce emissions.	-4.0
	24. Dairy farming faces few controls; more regulation will ensure environmental sustainability.	-3.5
	43. Environmental rules are ineffective because they do not address the cumulative impacts of farm pollution.	-3.0
	12. The link between higher rates of nitrogen use and water degradation is not scientifically established.	-2.5
	37. Organic farming systems need to be profitable if they are to be supported as a model for NZ farming.	-2.5
	6. There is a lot of hysteria over environmental matters.	-2.5
	44. Creating protected areas on private property is an invasion of private property rights.	-2.0

Participatory processes, particularly stakeholder discussion, were the highest ranked statement, but this participation was to be within the context of strong national leadership, with a national plan and national environmental monitoring. The institutional solutions supported within this discourse emulate once again ecological modernisation. State-industry partnerships and a cooperative approach, with experts, communities, and the dairy industry seeking solutions together were seen as the best approach to support sustainability change (Jänicke & Jorgens,

2009). The overarching problem for sustainability in this discourse, however, was identified as the individual farmer and the wider dairy industry. The need to improve farming practices to make them sustainable was emphasised.

Discourse 4: Conservative Dairy Discourse

This discourse rejects the view that the dairy industry is the main cause of environmental decline. The links between water decline and nitrogen are not accepted as being scientifically established, and the view is that water pollution problems in rivers are overstated. Environmental problems are not seen to be as bad as alarmists suggest. The view is that the industry is already highly regulated and further regulation or the use of market mechanisms, such as a price on water or nitrogen trading, is the wrong way to solve sustainability problems. While there is an acceptance that environmental sustainability is important, the caveat is that economic sustainability must come first. This position was supported with comments such as "you can't be in the green if you are in the red", and strong agreement with the statement that economic imperatives should take preeminence over ecological values in sensitive catchments like the Rotorua lakes. There was disagreement that the community's right to swim and fish is at risk, that dairy farming needs more regulation, or that there should be limits established by councils on how farmers use their land. The view is that the dairy industry is being responsible with regard to addressing sustainability issues and concerns, and demonstrated by industry leaders' taking action. There was also strong disagreement that Māori had any special rights with regard to water management.

Conservative Dairy Discourse

Nitrogen is a growth substance, and it cannot be proved scientifically that it is causing water degradation.

Companies are now committed to sustainability; they have employed staff and are undertaking lots of research into making dairying more sustainable.

Rules or regulation that prioritise ecological or sociocultual values over economic values were not acceptable within this discourse. Instead, it supported the continued growth of the industry through increased irrigation and further farm

conversions. Here, the traditional productivist approach to the environment remains unchallenged.

The view within this discourse was that the dairy industry already had too many rules, and that any further regulation was unnecessary. Because the science was disputed, more science was seen as necessary to demonstrate that it was the dairy industry causing problems with water. From this technological perspective, the discourse demonstrates a strong belief in science as the arbiter of environmental risks. Ethical or sociocultural concerns do not need to be examined. Environmental problems should be addressed in an ad hoc and case-by-case manner. There was strong disagreement with proposals to use market mechanisms to determine water allocation. Water was seen as a free good, and, therefore, it should not be privatised because it belongs to everyone, including dairy farmers.

The position fits most readily into the light green technological discourse. There is an economisation of the environment, with nature being seen a free good and a base for continued economic growth.
Environmental scientific facts are disputed, as is the existence of environmental limits. Dairy farmers are seen as already being good stewards of the land, and current farming practices are not viewed as the cause of environmental decline.

Table 40: Conservative Dairy Discourse

	Strongly Agree	
+2.0 to +4.0	12. The links are not scientifically established between higher rates of nitrogen use and water degradation.	+3.3
	46. Dairy farming is highly regulated when it comes to environmental matters.	+3.3
	9. Water should never be privatised; it belongs to everyone.	+2.6
	1. Environmental sustainability is fundamental to our existence.	+2.3
	17. The dairy industry is committed to addressing sustainability concerns	+2.0
	40. Water quality problems in rivers are overstated; only a few have nitrogen management concerns.	+2.0
	32. Economic sustainability is a prerequisite for environmental sustainability.	+2.0
	Strongly Disagree	

-2.0 to -4.0	24. Dairy farming faces few controls; more regulation will ensure environmental sustainability.	-3.3
	34. NZ catchments are varied, and we need to decide stocking rates on a regional basis.	-3.3
	10. The best approach is to put a price on water and nutrients and establish trading opportunities.	-3.3
	15. In sensitive catchments such as the Rotorua Lakes the environment should come before the economy.	-3.0
	29. Māori have much to offer with regard the holistic management of environmental resources.	-2.3
	3. Our right to swim and fish in waterways is at risk.	-2.0
	38. Dairy farm conversions should not proceed if they require irrigation to make them viable.	2.0

Discourse 5: Pragmatic Dairy Discourse

As with the conservative dairy discourse, in the pragmatic dairy discourse there is strong disagreement that water decline can be attributed to the growth and intensification of the dairy industry. It shares similarities with the conservative dairy discourse in that, while it accepts that environmental sustainability is important, the caveat is that economic sustainability must come first. This discourse sees no contradictions with continued growth and intensification through further conversions and the use of irrigated agriculture. There is also strong disagreement that organic and bio-farming approaches are more environmentally sustainable than conventional farming approaches. Statements illustrating this include: "while organic and bio-farming might be nice to do, it has to be profitable first to be supported", and "we cannot direct a nation's primary industry on ideas alone, we must seek objective proof, and biological farming approaches have not been proved".

This discourse emulates a light green, technological approach to sustainability. While there was recognition of the interdependence between humans and nature, nature was viewed as needing protection in order to protect economic goals. For this discourse, ecological problems come second to economic imperatives. As one respondent stated: "if we drive farming business to be so clean, and no one else is doing this then we are not competitive …, why does New Zealand need the second best water in the world, why not the tenth" (DI5).

This discourse does not see that more rules or regulation are required for the dairy industry to address sustainability concerns. This view is that a voluntary, self-management approach, rather than a regulatory response, is the best mechanism to encourage sustainability. Stakeholder discussion with government is the most important mechanism by which to find acceptable sustainability solutions. This view is reflected in the following comment: "collaboration amongst stakeholders is core to success for environmental policy". A partnership between state and industry where problems are solved together, and regulatory frameworks decided on by market and government actors is envisaged as the preferred response. There is a preference for voluntary agreements, nonbinding standards and self-regulation (Buttel, 2000; Jänicke & Jorgens, 2009). The use of market mechanisms, such as a price on water or on nutrient trading, is rejected as the best means to address water decline, as are limits on stocking rates.

Pragmatic Dairy Discourse

Farmers have been unfairly targeted in the debate over clean water while other contributors have been ignored.

You cannot be environmentally sustainable if you are not economically sustainable.

Degradation occurred out of ignorance, we are now more aware of the effects and through new research we are now doing something about it.

Conventional farming was supported over organic or biological farming systems. Growth is not a problem, with further farm conversions which rely on irrigated agriculture being acceptable. The sustainability problem was to sustain productivism. While there was recognition that there was a problem to be solved, environmental risks were seen as technical problems, and in resolving them a trade-off between economic and environmental values was accepted. For this discourse, sustainability challenges will be resolved through building the relationship between the government and the industry. While similar in many ways to the conservative dairy discourse, the pragmatic diary discourse places a greater emphasis on community involvement and stakeholder discussion being required to reconcile sustainability objectives

Table 41: Pragmatic Dairy Discourse

	Strongly Agree	
+2.0 to +4.0	1. Environmental sustainability is fundamental to our existence.	+2.9
	32. Economic sustainability is a prerequisite for environmental sustainability.	+2.7
	28. It is important to seek community involvement early when environmental problems are being addressed.	+2.6
	25. Stakeholder discussion offers the best chance of reconciling economic and environmental objectives.	+2.3
	Strongly Disagree	
-2.0 to -4.0	34. NZ catchments are varied, and we need to decide stocking rates on a regional basis.	-3.3
	11. The unrestrained pursuit of increasing dairy production is why we face environmental degradation.	-2.6
	38. Dairy farm conversions should not proceed if they require irrigation to make them viable.	-2.6
	24. Dairy farming faces few controls; more regulation will ensure environmental sustainability.	-2.5
	30. Organic and bio-farming approaches are more environmentally sustainable than conventional farming.	-2.4
	10. The bests approach is put a price on water and nutrients and establish trading opportunities.	-2.0

.

Having concluded the summary of the five discourses that emerged from the Q-survey, I move in the next section to an evaluation of the commonalities and differences between the five discourses. The summary table, Table 42 below, presents how each discourse ranked the statements; it is from this data that the following analysis is undertaken.

Statement weighting for strongly agreed or strong disagreed statements	D1	D2	D3	D4	D5
1. Environmental sustainability is fundamental to our existence.	**+2.8**	**+3.6**		**+2.3**	**+2.9**
3. Our right to swim and fish in waterways is at risk.				**-2.0**	
4. NZ farm production needs to continue to grow in order to feed the world.	**-2.6**				
5. There is a lot of hysteria over environmental matters.			**-2.5**		
6. The flora and fauna of NZ have intrinsic value and, therefore, need protection.	**+2.2**	**+2.3**			
7. Sacrificing water quality to increase farm production is unacceptable.	**+2.2**	**+2.9**	**+2.5**		
8. NZ needs consistent national environmental standards for water, air, and soil quality.	**+2.6**				
9. Water should never be privatised; it belongs to everyone.				**+2.6**	
10. The best approach is to put a price on water and nutrients and establish trading opportunities.				**-3.0**	**-2.0**
11. The unrestrained pursuit of increasing dairy production is why we face environmental degradation.					**-2.6**
12. The links between higher rates of nitrogen use and water degradation are not scientifically established.	**-2.0**	**-3.4**	**-2.5**	**+3.3**	
13. Climate change is not some distant threat; it is happening now.	**+2.2**	**+2.0**			
15. In sensitive catchments such as the Rotorua Lakes the environment should come before the economy.				**-3.0**	
16. Voluntary approaches like the Clean Streams Accord are the best way to address dairy pollution.	**-2.2**	**-2.1**			
17. The dairy industry is committed to addressing sustainability concerns.				**+2.0**	
18. The NZ approach is an example of best practice in sustainable dairy farming.	**-2.4**				
19. A farm plan approach with input from specialists is needed to solve problems of soil nutrient overload.			**+3.5**		
20. Scientific innovation can solve the sustainability concerns facing the dairy industry.			**+2.5**		
21. Sustainability needs strong leadership, a national plan, and careful environmental monitoring.	**+2.6**	**+2.8**	**+2.0**		
23. We have to accept environmental degradation as a trade-off for a strong economy.	**-2.6**	**-2.4**	**+2.0**		
24. Dairy farming faces few controls; more regulation will ensure environmental sustainability.			**-3.5**	**-3.3**	**-2.5**
25. Stakeholder discussion offers the best chance of reconciling economic and environmental objectives.		**+2.0**	**+4.0**		**+2.3**
26. Farmers have been unfairly targeted over water quality issues.	**-2.3**	**-2.5**			

27. As there are so few wetlands left, they should be protected, not drained.		**+2.6**			
28. It is important to seek community involvement early when environmental problems are being addressed.		**+2.8**		**+2.6**	
29. Māori have much to offer with regard the holistic management of environmental resources.				**-2.3**	
30. Organic and bio-farming approaches are more environmentally sustainable than conventional farming.					**-2.4**
31. Regional councils should adopt a uniform method for monitoring the environmental impacts of agriculture.			**+2.5**		
32. Economic sustainability is a prerequisite for environmental sustainability.				**+2.0**	**+2.7**
34. NZ catchments are varied, and we need to decide stocking rates on a regional basis.				**-3.3**	
35. The primary sector is the backbone of the NZ economy, and regional councils should not interfere with this.	**-2.6**	**-2.9**			
36. Farmers should not be part of the Emissions Trading Scheme until new technologies enable them to reduce emissions.			**-4.0**		
37. Organic farming systems need to be profitable if they are to be supported as a model for NZ farming.			**+2.5**		
38. Dairy farm conversions should not proceed if they require irrigation to make them viable.				**-2.0**	**-2.6**
40. Water quality problems in rivers are overstated; only a few have nitrogen management concerns.	**-2.4**	**-3.0**		**+2.0**	
41. Māori are just another group and should not have any special say over water.	**-2.1**				
43. Environmental rules are ineffective because they do not address the cumulative impacts of farm pollution.			**+3.0**		
44. Creating protected areas on private property is an invasion of private property rights.			**+2.0**		
46. Dairy farming is highly regulated when it comes to environmental matters	**-2.6**				

Table 42: Discourse Statement Weighting

Commonalities and Differences between Discourses

As noted above, discourses 1, 2, and 3 may be seen as dark green, and discourses 4 and 5 are more reflective of a light green discourse. Table 43 presents the contrasting environmental worldviews that the discourses emulate.

Table 43: Difference in Worldviews

Environmental Worldviews	
Light Green Discourse	Anthropocentric, nature and humans separate; utilitarian, calculated self-interests; equity not a primary consideration; amelioration, react and cure; reductionist world constructed from components parts; weak precautionary approach; environmental protection optional; economisation of the environment
Dark Green Discourse	Interdependence of economy and ecology; strong precautionary principle; economic growth constrained by wise use of resources; inter- and intragenerational equity; environmental protection fundamental

Ecological Rationality versus Economic Rationality

While there was an acknowledgment that ecological sustainability was fundamental, the differences between the discourses was the support for ecological or economic values having preeminence. For the dark green discourses, ecological imperatives had preeminence, whereas economic sustainability was seen as a prerequisite for environmental sustainability in the light green discourse.

These findings indicate that there were distinct rationalities at play across the discourses. For the dark green discourses, protecting the environment came first, and trading off environmental objectives for economic goals was rejected. Water quality was not to be sacrificed for a strong economy. Humanity was viewed as being interdependent with nature. By contrast, the light green discourse reflected a more utilitarian approach to nature, with the economic sustainability of the industry being the first imperative. Economic goals had preeminence, reflecting an acceptance that there was a necessary trade-off between economic and environmental objectives. This position indicated it was acceptable that water quality could be sacrificed for a strong economy. The dark green discourse viewed humans as interdependent with nature, and, therefore, undermining nature was undermining ourselves. In contrast the light green discourse reflects a more anthropocentric and utilitarian approach to nature, with sustaining the industry being the first imperative. The statements from the survey that indicate this split between the ecological and economic rationalities are presented in Table 44 below.

Table 44: Differences in Rationalities

Rationalities	Normative Values	Discourse
Ecological	Environment sustainability is fundamental; Ecological and environmental goals should not be traded off; Flora and fauna have intrinsic value; Biodiversity values on private land trump private property rights; Wetlands should be protected; Water quality should not be further degraded by increased farm production; In sensitive catchments the environment should come before the economy.	Dark Green
Economic	Economic sustainability is a prerequisite for achieving environmental sustainability goals; We have to accept environmental degradation as a trade-off for a strong economy; In sensitive catchments the economy should come before the environment.	Light Green

Contested Science

A second point of difference between the discourses related to understandings of the causes of water decline. For the dark green discourses, the 'scientific facts' of water decline were well understood, and water decline was linked to increased leaching of nitrogen stemming from dairy growth and intensification. By contrast, the conservative dairy discourse did not attribute water decline to dairy industry growth. It questioned the science, and it recommended more research to clarify the relationship between nitrogen, water degradation, and dairy intensification. In a similar fashion, the dark green discourses accepted that climate change was a problem that needed to be addressed, while the conservative dairy discourse did not. A strong precautionary view was implicit within the dark green discourses, recommending the wise use of resources to meet present and future needs. By contrast, the conservative dairy discourse approach recommended that action should be undertaken only when scientific evidence demonstrated harm, and that this demonstration had yet to occur. The statements that indicate this split are presented in Table 45 below.

Table 45: Contested Science

Contested Science	Agree	Disagree
Water quality problems in rivers are overstated; only a few have nitrogen management concerns.	Conservative	Dark Green
The link between higher rates of nitrogen use and water degradation is not scientifically established.	Conservative	Dark Green
Climate change is happening.	Dark Green	Conservative
It may be necessary to sacrifice water quality to increase farm production.		Dark Green

What is the Sustainability Problem?

There was a further difference between the dark and light green discourses about the culpability of the dairy industry for sustainability problems and the industry's response. In the dark green discourses, it was the combination of the growth of the dairy industry, and the slow pace of the industry's response to sustainability concerns, that was the problem. It was also unacceptable that the environment should be further degraded. Conversely, the light green discourses saw the industry as genuinely committed to addressing sustainability concerns. The pragmatic discourse did not agree that increased dairy industry production was the cause of environmental degradation. From this perspective, given that the industry was the 'backbone of the economy', there was no problem with further conversions and increased irrigated agriculture. This position contrasted with the dark green discourses which accepted both limits to growth and the need for the industry to take responsibility for its impact on the environment.

Institutional Solutions

The dark green discourses agreed that sustainability required strong leadership, comprehensive monitoring, and national standards for all regions. Intergenerational equity was also seen as important. This thinking emulates the key elements of sustainable development. Participatory processes, either stakeholder discussion (discourse 2 and 3) or strong community involvement (discourses 2 and 4), were viewed as the best means to reconcile economic and environmental objectives. For the holistic ecological sustainability, and the sustainability science and policy discourse, a voluntary approach was unacceptable and more regulation was required. This view contrasted with the progressive, conservative, and pragmatic dairy discourses all of which held that the dairy industry was already highly regulated and that more rules and regulation were not required. The holistic ecological sustainability discourse viewed Māori as having a unique place in water management; in contrast, the conservative diary discourse did not see them as having a special role to play.

Overall, there was the view that an integrated approach with central government leadership was required. There were contrasting views about whether the primary relationship for managing sustainability change should be between industry and government (an ecological modernisation approach), or communities in

conjunction with government and the industry (the sustainable development approach). Bottom-up participatory processes of some form, however, were seen as necessary by four of the five discourses. Table 46 below presents how the different discourses supported the sustainable development elements articulated in the survey statements.

Table 46: Statements supporting Sustainable Development

Sustainable Development Statements	Discourse
New Zealand needs consistent national environmental standards for water, air, and soil quality.	Holistic ecological sustainability discourse and conservative dairy discourse
Sustainability needs strong leadership, a national plan, and careful environmental monitoring (measure to manage).	Dark green discourses
Stakeholder discussion offers the best chance of reconciling economic and environmental objectives.	Sustainability science and policy discourse, and progressive and pragmatic dairy discourses
It is important to seek community involvement early when environmental problems are being addressed.	Sustainability science and policy discourse, and conservative dairy discourse
Māori should have a special say over water.	Holistic ecological sustainability discourse
Intergenerational equity is important.	Dark green discourses

In summary, there was a shared view within the dark green discourses that in order to address ecological decline caused by the dairy industry, a sustainable development discursive approach was required. Overall, participatory processes including stakeholder and community engagement were important to most discourses, suggesting that a nonhierarchical, bottom-up approach was seen as necessary for reconciling competing economic and environmental objectives.

Differences among Discourses

Table 47 below summarises the differences between discourses across the statements on specific dairy farming issues. The progressive dairy discourse was quite distinctive in what it saw a necessity for sustainable dairy farming. This discourse was not so concerned with changing political systems, but rather with changing farming systems and farmer behaviour. This discourse accepted that it was the productivist approach to dairying which was causing environmental decline.

Table 47: Dairy Farming Issues

Specific Dairy Farming Issues	Agree	Disagree
Dairy farmers face few controls; regulation will ensure environmental sustainability.		Progressive, Conservative Pragmatic dairy
The primary sector is the backbone of the NZ economy and regional councils should not interfere with this.		Holistic ecological Sustainable science and policy
Farmers should not be part of the ETS until new technologies enable them to reduce emissions.		Progressive dairy
The best approach is to put a price on water nutrients and establish trading opportunities.	Progressive dairy	Conservative Pragmatic dairy
The dairy industry is committed to addressing sustainability concerns.	Conservative dairy	Holistic ecological
The unrestrained pursuit of increasing dairy production is why we face environmental degradation.		Pragmatic dairy
Farmers have been unfairly targeted over water quality issues.		Holistic ecological Sustainable science and policy
Farm conversions should not proceed if they require irrigation to make them viable		Conservative Pragmatic dairy
Environmental rules are ineffective because they do not address the cumulative impacts of farm pollution		Progressive dairy
The link between nitrogen and water quality is overstated	Conservative dairy	Holistic ecological Sustainable Science and policy; Progressive dairy

In contrast to the conservative and pragmatic dairy discourse, it viewed organic and bio-farming approaches as the most ecologically sustainable options. It also supported market mechanisms such as nutrient trading and a cost on water as mechanisms through which to protect the environment. This discourse also did not see that private property rights should usurp public rights to fresh water, or biodiversity values. By contrast, the conservative and pragmatic discourses were concerned mostly with limits linked to catchment capacity being put on dairy farmers through mechanisms such as stocking rates. They were also supportive of further intensification through increasing irrigated agriculture and farm conversions. All of the dairy discourses, however, held that farms were already highly regulated and that more regulation was not required. The holistic ecological and the sustainable science and policy discourses, by contrast, were clear that the dairy industry had not been unfairly targeted, that it needed to be regulated, and that it should not be allowed to continue to lead to harmful farming practices simply because it was an important economic actor.

Summary

The goal of the Q-sort survey, in brief, was to find where there was convergence and divergence in subjectivities within the sustainability views and values of key stakeholder groups, and in their choices of institutional solutions to enable a more sustainable dairy industry. The Q-sort results demonstrated not only that there were five distinct discourses, but also that there were convergences and divergences across and between them. As noted, the first three discourses shared a deep green worldview. In these discourses, ensuing that ecological systems are able to maintain their corrective capacity required the economy to be constrained to operate within environmental carrying capacity. Resources were seen as finite, and the impacts of dairy farming were seen as severely challenging these resources. From this perspective, sustainability required the preservation of nature and a withdrawal from the land-use approach of productivism. A balance was not sought between economic and environmental goals by the holistic ecological sustainability or sustainability science and policy discourses where the environment must come first.

For the dark green discourses and the pragmatic dairy discourse, the institutional mechanisms selected reflect those preferred within the sustainable development discourse. The best means to ensure a more sustainable dairy industry were: an integrated approach framed around a national plan; strong leadership; environmental monitoring; and, national standards. Participatory approaches and stakeholder engagement were seen as necessary by all the discourses to ensure the best sustainability outcomes. The holistic ecological sustainability discourse and the sustainable science and policy discourse did not see voluntary approaches as effective and supported a regulatory response, whereas the dairy discourses were resistant to a regulated response.

For the conservative and pragmatic discourses, elements of the technological discourse were evident. An anthropocentric and utilitarian approach was apparent, with a trade-off between economic and environmental goals being acceptable. Nature was still viewed as a free good, and the position was that economic imperatives should come before environmental imperatives. Ethical and cultural values were not prioritised for these discourses.

Conclusion

The conclusions that can be drawn from the Q-sort analysis are, first, that there were normatively two distinct sustainability worldviews at play. The first, the dark green view, normatively supported the view that ecological sustainability was fundamental. From this point of view, what was required was the minimisation of the negative impacts of the dairy industry on the environment. The maintenance of environmental quality through addressing carrying capacity was central to sustainability. The second, the light green worldview, demonstrated an instrumental view of the environment. This perspective supported the view that there was a necessary trade-off between the dairy industry's economic and environmental objectives. The normative values of the first worldview supported the ecologisation of the economy, while the normative values of the second worldview embraced the economisation of ecology.

Table 48 below positions these discourses within the discourse analytic framework that was developed in Chapter 2. What it indicates is that there is movement between discourses. The normative values and institutional mechanisms are demonstrated as being drawn from across the spectrum of sustainability discourses. It also shows that, for the holistic ecological, sustainable science and policy and progressive dairy discourses, ecological sustainability underpins why institutions need to ensure a more sustainable dairy industry. However, what seems to be missing in the framework of analysis, and within institutional practices, is a means of linking the normative expectations of the dark green worldview with institutional mechanisms or green structures that would prioritise ecological sustainability concerns (Dryzek, 1998). The reformist discourses of sustainable development and ecological modernisation are framed in different ways, with the objective of balancing economic growth and environmental sustainability. From a dark green ecological worldview, the means through which ecological sustainability should determine the direction and guide human activities in an ecologically constrained world is missing (Dryzek, 1997; Hayward, 1994; Princen, 2005). As yet, there does not seem to be an aligned institutional mechanism that would prioritise the urgency of the ecological sustainability goal which was expressed by the majority of the discourses as necessary to ensure a sustainable dairy industry. In Table 48 below, the dominant

discourse drawn on by each discourse is presented. It also shows the movement across the sustainability terrain of the five discourse groups.

Table 48: Alignment with sustainability discourses

Discourse	Technological	Ecological Modernisation	Sustainable Development
D1. Holistic ecological sustainability			**Institutional Approach** Government in conjunction with experts **Normative values** Dark green Ecological sustainability given highest priority
D2. Sustainable science and policy			**Institutional Approach** Government stakeholders and community working together **Normative Values** Dark Green Ecological sustainability given highest priority
D3. Progressive Dairy Discourse		**Institutional Approach** Farmers, industry and government **Normative Values:** Dark Green Ecological sustainability given highest priority	
D4. Conservative Dairy Discourse	**Institutional Approach** Government experts and industry Economic sustainability first **Normative Values:** light green Industry-led		
D5. Pragmatic Dairy Discourse	**Institutional Approach** Government in conjunction with stakeholders and community **Normative values:** light green Balance sought between economic and environmental goal		

This chapter has drawn on Q-methodology to make visible the different discourses currently informing sustainability and the dairy industry. The Q-sort demonstrated how subjectivity plays a central role in determining who should be involved, what institutional mechanisms are drawn on, and what values should shape institutional actions for a more sustainable environment.

What was demonstrated was that there were two overarching perspectives the first namely a dark green ecological perspective and the second a light green economic sustainability perspective. These are summarised in the text boxes below. The

elements within the discourses do not represent anything outside what I expected to find from the knowledge field of the order of discourse of the dairy industry and sustainability. However, what the Q-survey demonstrated was that many of the key elements of the institutional mechanisms which shape sustainable development were seen as necessary to support a more sustainable dairy industry. This finding seems to indicate that even as the different discourses apportion different reasons for dairy industry pollution, and the culpability of the dairy industry in this, there is a common thread about what is required for an effective solution to this problem. What is required is central government leadership and a coalition of stakeholders working together to resolve the issue of how to achieve a more sustainable dairy industry. As mentioned above, this survey seems to indicate the need for a more participatory or deliberative approach to decision-making. What both positions seem to indicate in different ways is that:

> For large classes of collective problems – wicked, complex, non-routine problems with a large potential for contingent side-effects – states simply don't have the wherewithal to design and put though effective solutions. In such cases the challenge is to bring together and sustain over considerable periods of time coalitions of stakeholders, including grassroots involvement. (Wagenaar, 2011, p. 305)

While the survey was undertaken to establish the different subjectivities that construct meaning for different stakeholder groups, the critical dimension of this research was to understand and make explicit how institutionalised relations of power can determine whose views are deemed legitimate and who, therefore, are insiders, and whose views are marginalised and, therefore, are outsiders. To conclude this chapter, I draw on the survey findings, and apply them to the changes that the government has proposed through the Fresh Start for Fresh Water package outlined in Chapter 6.

When the assumptions of the two dominant discursive perspectives are assessed against the institutional change being instigated through the Fresh Start for Fresh Water package, it becomes evident that the discursive view of the dark green ecological sustainability perspective will be further marginalised if the amendments to the RMA, and the trade-off approach to water quality indicated in the National Policy Statement Fresh Water Management is implemented by regional councils.

Table 49: Two dominant discursive perspectives

(1) Dark Green ecological sustainability discourse	***(2) Light Green economic sustainability discourse***
We think that ensuring ecological sustainability is the first priority. The environment is a public good and should not be allowed to be further degraded or traded off to support economic growth. The science is clear as to what is causing ecological unsustainability, and dairy farm practices are culpable in this decline. *We think that the solutions required are that farmers and the industry must take responsibility for their actions, but to support them, the government must take leadership of this problem. There needs to be a national plan, linked national standards for air, land, and water.* *We think to resolve this problem there needs to be bottom-up participatory processes and linked industry and government research and development. We think that the sustainable development discourse should shape the values and institutional mechanism deployed to solve the problem of sustainability and the dairy industry.*	*We think that it is not possible to be ecological sustainable unless we are economically viable. It is acceptable, therefore, to trade off the environment for a stronger economy. This position means we are supportive of irrigated agriculture and further farm conversions to support the broader NZ economy. We recognise that being seen to be green is a win-win for the industry in terms of our international consumers, but putting limits on growth through enforcing catchment limits on stocking rates or putting a price on water or expecting the agricultural sector to be part of the ETS is not acceptable if it undermines economic goals.* *We are still sceptical of the scientific facts being presented as the reasons for water decline and climate change, and think that there needs to be more research and development to prove that dairy farming practices are leading to water decline and global warming.* *We think that the dairy industry is already highly regulated, and a voluntary approach is best. Therefore, we think that solutions must be sought through government and stakeholder conversations to set the direction of change.*

The institutional approach by government would appear to also undermine the dairy industry's own stated institutional goal, as outlined in Chapter 7, which is to frame the industry within the rubric of ecological modernisation. It could also delegitimise the sustainable development process undertaken in the lakes

catchments as described in Chapter 8. For example, in their assessment of what are environmental risks within a plan variation, regional councils would not legally be allowed to assess the risks to the intrinsic value of ecosystems, or the maintenance and enhancement of amenity values, or the finite characteristics of natural and physical resources such as the lakes. Through these changes, the preferences of the economic sustainability perspective, continues to be supported. This is a weak, light green approach to sustainability which marginalises normatively and institutionally sustainable development. The government's approach seems to be swimming against the tide of the dominant sustainability view of the dairy industry, progressive farmers, communities, scientists, environmental groups, and local government actors. For these stakeholder groups, the best ecological sustainability outcomes require that the sustainable development discourse should shape environmental policy, whereas, for central government, there appears to be a further roll back towards the technological discourse.

This concludes the substantive research chapters. In Chapter 10, I bring together the research findings and the conclusions generated from the research.

Chapter 10
Conclusion

The sustainability of western societies has long been built on the foundation of a utilitarian, anthropocentric, and exploitative approach to the natural environment. The environment has been perceived as being there to serve the economic and development goals of society. From the pioneering era onwards, successive New Zealand governments have followed policies which have both reflected and reinforced this human-environment relationship. However, challenges to this approach began to emerge in the 1960s. The 1987, UN Brundtland Report, *Our Common Future,* reinforced the call for sustainable development through achieving a balance between economic development goals and environmental protection.

New Zealand, as a signatory to this document, responded in 1991 with the introduction of the RMA. The RMA was to be the mechanism through which environmental sustainability concerns would be integrated into institutional policy, processes, and practices for the natural environment. The purpose of the Act was to promote the sustainable management of natural and physical resources in order to safeguard the life-supporting capacity of air, water, soil, and ecosystems. When introduced, the RMA was viewed as world-leading environmental legislation, framed by sustainable development, and underpinned by an integrated approach to the sustainable management of the environment.

Despite this legislative commitment, New Zealand's environmental indicators continued to demonstrate significant environmental decline. This decline was particularly evident in fresh water, and was increasingly being attributed to the growth and intensification of the dairy industry. This situation indicated a policy failure of the RMA as a mechanism by which to balance continued development while protecting the environment. The overarching goal of this research was, therefore, to demonstrate through a case study of the dairy industry how and why the seeming promise of the RMA to deliver ecological sustainability had led instead to such contradictory environmental outcomes.

The research was underpinned by a critical theoretical approach to policy analysis. Such an approach is concerned with demonstrating the influence of ideologies and values within dominant institutional discourses on policy definitions and solutions. The discourses of institutions define the framework within which politics takes place. Therefore, institutions play a significant role in both stability and change in society in that they can determine the boundaries of what, or who, can be included or excluded in policy-making (March & Olsen, 1989). Furthermore, knowledge is understood to be historically and culturally specific, and how social change is managed is linked to acceptable conventions and social practices established within political institutions and political discourse over time.

The research goal was to identify and evaluate the influence of the dominant discourses of New Zealand institutions on sustainability policy definitions and solutions and how this shaped environmental outcomes. From this perspective, the making of the New Zealand environment is a social process (Pawson & Brooking, 2002) in which institutional "ideology seeks to convert culture into nature" (Quigley, 1999, p. 182). By taking a critical approach to policy analysis, the focus was to demonstrate the hidden assumptions in the taken-for-granted norms and practices within New Zealand institutions. Policy-making in New Zealand, from this critical perspective was understood not as a rational, neutral, or positivist procedure, but as being socially constructed.

In seeking to understand how sustainability practice has been constructed by the institutions charged with integrating government sustainability activities in New Zealand, scholarship on sustainability and the methodological approach of CDA were brought together in a discourse analytic framework (see Chapter 2). From a CDA view, social reality is constituted through discourse, and dominant discourses can shape power relationships through governing what can or cannot be said or done in social practices. Evidence of this dominance can be found through analysis of institutional texts, and discursive and sociocultural practices (Fairclough, 1992, 1995).

The framework encapsulated the normative values and institutional mechanisms that informed three dominant discourses – the technological, ecological modernisation, and sustainable development discourses. These discourses are

framed by different norms and institutional practices which are each summarised next. The technological discourse guided by experts emphasises rational and technical solutions to social and political problems. In this view, there is no need to evaluate the social or cultural context of environmental problems. Facts can be separated from values, and problems can be resolved by using more science and rational policy techniques. Environmental risks are viewed as best dealt with in an ad hoc, case-by-case manner in reaction to their effects on economic activity. The goal of ecological modernisation is the greening of capitalism. Driven by market competition, environmentally friendly innovations offer a win-win for business. Solutions to the environmental risks of capitalism will be found through innovation in science and technology and enhanced relationships and voluntary partnerships between the state and industry. The sustainable development discourse views environmental risks as requiring an institutional approach in which both the process and outcome are important. Expert risk assessment must be balanced with community risk perception because environmental problems are seen as ethical and political problems. A long-term view and inter- and intragenerational equity underpins sustainable development. For sustainable development, economic, sociocultural, and environmental concerns must all be considered together (See Table 2, Chapter 2).

Applied to the research data, the framework proved to be a very useful device by which to pursue the research goals. It provided the means to reveal dominant and alternative understandings of sustainability and make transparent what discourses were being drawn on in the values and practices of government institutions, the dairy industry, and communities. The framework of analysis provided a means to demonstrate how the choice of normative values and institutional mechanisms can support, or constrain, ecological sustainability outcomes. It has helped to reveal the hidden power differentials established in taken-for-granted social processes such as language conventions in texts and everyday sociocultural practices within institutions, and also shown how institutional discourse can help to maintain or change social structures and practices. As a tool, it has helped to make visible what discourse and discursive practices have shaped institutional norms, values, and institutional practices in New Zealand environmental policy over time, and how these have influenced land and land-use change for the dairy industry. It provided a means to demonstrate why ecological sustainability has been hard to

achieve because of the continued dominance of short-term economic goals and the support for the dairy industry as pivotal in achieving this goal.

Key Findings of the Study

This research has demonstrated that the dominant discourse which has historically shaped environmental change within New Zealand policy and practices was the technological discourse, and that this discourse remains influential. The research also demonstrated that, with the introduction of the RMA, the dominant discourse which has shaped institutional practices has been the ecological modernisation discourse. The dominance of the ecological modernisation discursive approach is linked to the combination of historical social processes entrenched as best practice within New Zealand institutions, the historical relationship between the dairy industry and government which had supported the dairy industry as a pivotal economic actor, and the historical understanding that environmental problems are best resolved through the application of more science and technology. In the transition to more sustainable policies and practices, the ecological modernisation discourse could most easily accommodate the hegemonic links between past discursive and sociocultural practices of the technological discourse and the more recent impetus for some form of environmental protection. The ecological modernisation discourse assumes that there is no fundamental need to reorganise institutions to resolve environmental problems. It assumes that continued economic growth is compatible with the imperative to protect the environment. It also envisages governance arrangements in which the state and industry build partnerships together to solve environmental problems, and lastly, ecological modernisation assumes that ecological problems can be resolved through the application of more science and technology. Ecological modernisation does not challenge the state-industry relationships in any fundamental way, on the assumption that the ecological crisis can be overcome by technical and procedural innovation.

The predominance of the ecological modernisation discourse became evident though the evaluation of New Zealand's institutional and environmental policy histories and a comparison of the dominant approach and the Central North Island Lakes. The robustness of this analysis is that the research was able to compare the differences across a constant set of social, political and legal conditions. This

approach enabled a much thicker analysis of environmental policy and dairy industry discourse, and the longitudinal relationship between the dairy industry and government (Coppedge, 2012). Incorporating the historical analysis also recognised that the "past does not exist separately from the present but is an integral part of it" (Wagenaar, 2011, p. 288). The historical analysis, therefore, provided the means to demonstrate how institutional discourse has influenced, shaped, and informed environmental outcomes in New Zealand. The research demonstrated that from the pioneering era, and continuing through the productivist and hyperproductivist eras (see Chapters 4 and 5), legislation and policy supported the growth and development of New Zealand through entrenching support for the dairy industry as the backbone of the economy. It illustrated how the government and the dairy industry together cemented a productivist approach to agricultural production and land use in New Zealand through the establishment of a network of institutions and legislation which supported the industrialisation of agriculture.

The success of the productivist approach was demonstrated as being underpinned by the symbiotic alliance established between cooperatives, farmers, extension workers, scientific researchers in government institutions, and government policy. The cooperative approach established by dairy farmers enabled an effective collective voice for the industry and national representation of dairy industry's concerns to government. The focus of government and the cooperatives was on improving farming systems to support the economic success of the country through support of the dairy industry.

Central to this enterprise was a utilitarian and reductive approach to the environment, individual rights to land ownership, and a commodification of nature. This approach to the environment was built on the exclusion of the indigenous worldview and the relegation of native flora and fauna to the margins. A monocultural landscape framed by the 'grasslands' approach was over time made hegemonic, and science and technology became the major ways of intervening in nature.

In such a context, environments were increasingly devoid of indigenous species and wetlands, and reliant on fertilisers and chemicals to sustain dairy industry

growth. The dominant institutional discourse was that the country's economic prosperity required economic sustainability of the dairy industry at any cost. The environmental threats of productivism included overgrazing, soil erosion, drainage of wetlands, loss of native flora and fauna, and pollution of water resources through the application of fertiliser and chemicals. Parks (2002) notes, however, that much of the environmental damage from productivism is invisible: what you cannot see. Through these changes, industrial productivist farming became the 'natural country' in New Zealand, with 'nature' becoming, enclosed paddocks with grazing cows.

Historically, a technological discourse influenced the institutions that shaped environmental practices (see Chapters 4 and 5). This discourse assumed that through technological innovation it is possible to have limitless production without consideration of ecological limits. The belief in an endless pursuit of economic growth was based on an instrumental rationality which denied the reality and relevance of the natural world. The dominant assumption was "maximising profit for the individual and economic growth for the state should be the means and ends of life" (Dann, 2002, p. 283).

The research found that the technological discourse continued to be influential in the post-1984 neoliberal reconfiguration of the state. While the power relationship between the government and the dairy industry was changed, and many of the subsidised state supports for the dairy industry were dismantled, what remained unchallenged was the continued acceptability of a utilitarian and reductive approach to the environment. The reduction in farm subsidies saw rapid conversion of land use to dairy farms, and intensification of farming systems, because dairy farming offered the best means of generating an income from land. Growth and intensification also fitted with, first, the Dairy Board, and, subsequently, Fonterra's goals to ensure stability of the industry through hyperproductive growth and becoming a global leader in dairy exports. The outcome of this approach was economic success globally and, conversely, increased environmental decline locally.

That the ideological choices of government continue to influence environmental policy was demonstrated through examples of how the technological discourse

has again become more influential within contemporary policy discourse. The latest examples of this commodification of nature to support short-term economic goals is the government's ambitions in a number of domains with critical implications for the environment: the aim to double agricultural production by 2025; the support for increased growth through the use of irrigated agriculture; the removal of democratically elected regional councillors in Christchurch; the opening up of areas within the conservation estate, on private land, and the sea for mining of gold, oil, and gas; and, the trade-off-approach which frames the National Policy Statement for Fresh Water Management and the Amendments to the RMA (see Chapter 6) (Bertram, 2010a, 2010b; Guy, 2013a, 2013c; Ministry for the Environment, 2011c, 2013d, 2014).

The research turned next to an analysis of the influence of the sustainability discourse on contemporary government policy and practices, specifically the RMA, and how this influence has contributed to change in government institutions and informed what was required for dairy farmers and dairy industry practices (see Chapter 6). The analysis demonstrated that the discourses that shaped the RMA were contradictory. While the normative values in the principles and purposes of the Act indicated that sustainable development should frame how sustainability was realised in New Zealand, in practice, the institutions established by the RMA resulted in an ecological modernisation discursive approach.

In part, this result was accomplished through implementation being devolved to regional councils. Regional council plans were required to take an effects-based and nonspatial planning approach. The effects-based approach emulates most strongly elements of the ecological modernisation discursive approach in that it continues to rely for validity on expert discourse, quantitative measures, and science and technology fixes. The focus of planning procedures and rules was to address the impacts of point-source pollution effects of farming processes on the environment. The rules, therefore, were framed to manage sustainably the environmental effects of individual activities in regions, rather than to regulate activities themselves, which meant that industry growth, biodiversity concerns, cumulative impacts of nonpoint pollution, interconnections between local ecosystems, as well as social and cultural issues could be largely left out of consideration.

The RMA established the acceptability of the ecological modernisation discourse in shaping both regional councils' and the dairy industry's response to sustainability concerns (see Chapter 7). The assumption of the RMA was that if farmers worked within the permitted activity standards established for dairying within regional plans, then what the industry did was its own business. The focus was to manage the environmental impacts of individual farms through finding technological solutions to point-source pollution problems and building best management practices into farming systems.

The ecological modernisation discourse assumes that voluntary mechanisms rather than a regulatory response are preferable and endorses a governance approach that sees government institutions and industry jointly determining the specifics of policy change. The institutional view was that, in order to address dairy industry pollution, government institutions in conjunction with Fonterra should determine what was required, and that these changes should be undertaken voluntarily by Fonterra farmers. The Clean Streams Accord gave Fonterra an influential role in shaping the water policy agenda and the timefame for change. Thus, the industry primarily responsible for environmental damage was, through the Clean Streams Accord, able to fundamentally shape the policies that were designed to manage it. Continued support for a voluntary approach is evident in the 2003 Clean Streams Accord (CSA), the 2013 Sustainable Dairying Water Accord, and various dairy industry strategies (see Chapter 7).

As Chapters 6 and 7 demonstrated, the sustainability problem was constructed, not as a national water quality issue, but as a dairy farm management problem that could be fixed through a voluntary self-management approach, and that doing so could be a win-win for the industry This situation reflects the continuation of a utilitarian and reductive approach to the environment. It assumes that environmental impacts are discrete problems which can be identified and then matched to individual farmer's behaviour. By increasing the number of farmers operating at best practice, there will be environmental improvement.

Through an assessment of the various dairy industry strategies, and Fonterra's eco-efficiency programme, the discourse analysis was also able to demonstrate an

industry transforming itself to pay attention to more than just productivity goals. The values and mechanisms established within the strategies emulate an ecological modernisation response. Ecological modernisation requires the integration of environmental concerns into organisation goals: reporting mechanisms through which to monitor achievement towards those goals; a focus on continuing improving environmental outcomes; and, the development of new technologies and new management practices to support these goals. This approach recognised that being able to demonstrate green credentials through building eco-efficiencies into supply chain systems is a win-win for business. These elements were all evident in how the dairy industry has responded to sustainability concerns.

It was also evident from the research how important the constant critique by community and other commentators has been as an important driver which has kept environmental change on the political agenda. Critics, for example, argued that the industry and government approach was insufficient, that it was just tinkering around the edges of the problem, and that what was missing was more formal protection of ecological sustainability. The following criticisms were directed towards the government and industry: that the focus has not been on improvement in water quality but on dairy farmers operating at best practice levels; that a productivist approach to land use framed by growth and intensification remained unchallenged; that economic security, not ecological sustainability, was determining how government and the industry were responding to environmental concerns. The values being expressed by community commentators emulate a dark green view. From this perspective, an ecologically rational approach is an imperative; nature has intrinsic value irrespective of its use value; and, ecological values should drive environmental decisions not choices among alternatives (Bartlett, 1986; Eckersley, 1998).

In keeping with the sustainable development discourse, the RMA articulated the need for participatory processes. For sustainable development, participation is an important mechanism by which to make public institutions accountable, and accord a voice to citizens (Kurian & Wright, 2012). Through analysis of the processes established within resource consent mechanisms, regional planning processes were demonstrated to offer only weak participatory mechanisms, which

demonstrates how procedural mechanisms can be used to support a particular discourse. Whereas the normative values within the RMA indicated that strong participatory processes were necessary, the procedural mechanisms that were established failed in any comprehensive way to include the broader community perspectives on environmental risks. This failure allowed the elision of the sociocultural dimension of sustainability required for sustainable development.

In summary, the dominant institutional approach to sustainability has relied on expert discourse and quantitative measures, and it has reinforced the view that more science and technology could fix any environmental problems. Such an approach can ignore essential aspects of environmental policy and processes such as biodiversity concerns, cumulative impacts, and connectivity between local ecosystems, as well as social and cultural concerns. The choice of ecological modernisation as the overarching discourse also enabled an elision of strong central government leadership, and national regulation, through which to facilitate an integrated and comprehensive approach towards the pursuit of sustainable development. Consequently, while the environmental impacts of the growth and intensification of the dairy industry were recognised, there was no substantive means by which to address the cumulative impacts of the dairy industry or stop dairy industry growth.

Through a comparative case study of the Central North Island Lakes the research also found there were small-scale instances of a different institutional approach, involving bottom-up initiatives and widespread community participation in decision processes, which offered an example of more environmentally sustainable policy and practice (see Chapter 8). Specifically, in the Central North Island lakes catchments, where dairying has led to a sharp decline of lake water quality, the policy response has been normatively and institutionally shaped by the sustainable development discourse. The lakes case studies demonstrated that when a different set of values and institutional mechanisms have been developed, different environmental outcomes have prevailed. What was evident in the analysis of what discourse shaped the restoration programmes for Lake Taupō and the Rotorua lakes was that the dominant discourse normatively and institutionally has been that of sustainable development. In the lakes regions, ecological sustainability of the lakes was at the heart of why action was undertaken. The

Lakes offers an example of a powerful alternative to the norm from the rest of the country in that a critical outcome is that pastoral farmers within the lakes catchments are now required to farm within the limits of the carrying capacity of these regions.

As part of the research a Q-sort survey of stakeholder views was undertaken. The survey demonstrated that there were five different discourses which spanned the technological, ecological modernisation, and sustainable development discourses. While there were contrasting values which spanned the dark green to light green world view, the survey demonstrated that there was a preference for an integrated approach with central government leadership being required. While there were contrasting views about whether the primary relationship for managing sustainability change should be between industry and government (an ecological modernisation approach), or communities in conjunction with government and the industry (the sustainable development approach), there was a general consensus that bottom-up, participatory processes of some form were necessary. This finding indicates that there is support for a more participatory approach to democracy for best sustainability outcomes in New Zealand.

One question implicitly explored in this research explored was whether ecological modernisation could lead to sustainable development. The research suggests that that the answer to this question is "no". The lakes case studies demonstrated that for sustainable development to be integrated successfully attention to sociocultural, ecological, and economic values must be considered together. For sustainable development, the added factor of community engagement, and a community-driven process, is necessary.

Significance of the Research

Through its examination of New Zealand historical and contemporary environmental policy the research has made a number of contributions to New Zealand environmental policy scholarship. Overall, it has demonstrated that the nature-society relationship in New Zealand is the outcome of power relations and power struggles shaped by political ideologies over time.

The historical analysis made visible how structural power disparity was established within legislation and practices which marginalised Māori society, its culture, traditions, and holistic approach to land use. Set in place through this silencing of the Māori worldview was a utilitarian and reductive approach to the environment, which valued the environment only as a material resource. It demonstrated how institutional discourse from the pioneering era drew on a technological discursive approach. The environment equated to the farm, and the environment could be managed through scientific means. In order for land to be valued, it had to be productive.

The case study revealed how the dairy industry has incorporated sustainability into its values and practices over the last 10 years, and demonstrated that in line with government preferences its sustainability goals and practices have been shaped by the ecological modernisation discourse.

In addition the research showed that, while the productivist discourse has been challenged by the sustainability discourse, a productivist approach to land use remains the dominant discourse shaping land and land use change. This dominance is linked to the historical relationship established between the state and the dairy industry which has long positioned the dairy industry as fundamental to the broader New Zealand economy. As a result, challenging the industry in any substantive way, such as through regulation or putting limits on growth, has been unacceptable.

The research offered an analysis of how environmental reform through the RMA has shaped environmental policy and practices. It has, therefore, contributed to a better understanding of how the sustainable development and ecological modernisation discourses have shaped environmental policy within contemporary institutional discourse in New Zealand. Most significantly it demonstrated how different sustainability discourses have had different ecological sustainability outcomes.

The research has also contributed to environmental policy analysis more generally in a number of ways. The research demonstrated the usefulness of critical methods for making more transparent opaque power relationships. The goal of

critical research methods is to demonstrate how policy is socially constructed. The combining of different research methods such as document analysis, comparative cases, stakeholder interviews, and a Q-sort survey allowed a unique insight and a robust process by which to demonstrate how environmental policy has been socially constructed in New Zealand, and the implications of the dominant institutional view on the environment over time.

Evident through the combining of these research methods was not only that the weighting given to an issue is a political decision tied up with dominant discourses, but also that there is a dialectical relationship in play between structure and agency (Fairclough, 1992, n.d). While dominant discourses can determine insiders and outsiders and determine what knowledge and conventions are supported, communities and other actors have agency and are capable of challenging institutional hegemony and renegotiating the social change processes for sustainability and land use change. This agency was evident in the constant critique of government policy and practices over time by Māori, community groups, the Parliamentary Commissioner for the Environment, and other actors, the outcome being some limited change in government policy, and in dairy industry and institutional practices (see Chapters 5, 6, and 7).

This analysis showed that if there was community and political will, there was scope within the RMA to incorporate a sustainable development approach into institutional practices, and that this can lead to better ecologically sustainability outcomes. The institutional approach that has shaped the Central North Island Lakes has demonstrated that there have been small-scale instances of a different institutional approach which offer a counter example of institutional practice (see Chapter 8). This approach was characterised by a bottom-up approach. Environmental risk management required multiple perspectives, participatory processes, local knowledge, and environmental, economic, and socio/cultural concerns being addressed together. The research, therefore, demonstrates that policy-making is a site of cultural politics (Hajer & Versteeg, 2005), and that actors can exercise power, and actively influence the definition of the sustainability problem in order to frame the sustainability discourse in a particular way.

Importantly, the research has demonstrated how power disparities can be maintained and changed within taken-for-granted approaches such as those established within rules and regulation within bureaucracies. For example, through juxtaposing an analysis of the dominant mechanisms established for sustainability within regional council planning processes against the 'variations' in the lakes case studies, what was made visible was how institutional discursive choices can differently determine ecological sustainability outcomes. Significantly, these findings demonstrated that, when different sustainability discourses are drawn on, there are different ecological sustainability outcomes, and, that the nature/society relationship is the outcome of power relations and power struggles shaped over time by political ideologies. A comparison of the findings of the larger dairy industry study and the small-scale study of the lakes reveals that despite the Resource Management Act offering the same legislative context in both instances, the ecological modernisation discourse predominates in the first instance and the sustainable development discourse in the latter case.

The Q-survey was significant in that it demonstrated how the survey participants' subjectivity played a central role in determining who in their view should be involved, what institutional mechanisms should be drawn on, and what values should shape institutional actions for a more sustainable environment. The Q-sort survey complemented textual analysis and was a very direct mechanism through which to integrate and legitimate different actors' voices, values, and opinions. The Q-sort helped to clarify stakeholders' collective preferences and concerns as to what is currently acceptable or unacceptable practice. It offered a holistic rather than reductive understanding of the linkages between values and knowledge (Watts & Stenner, 2005b). Many of the Q-sort statements were generated from interviews carried out with key stakeholders this meant that views from the dairy industry, regional council staff, scientists, and community groups were represented. The interviews were constructed in part around eliciting the stakeholders' response to the key elements of the discourse analytic framework, which meant that the statements were directly representative also of the range of views in terms of the key elements of the framework. With regard to the broader CDA, the Q-sort survey offered a feedback loop through which to evaluate agreement and disagreement as to what was socially and politically acceptable for

addressing sustainability concerns. This feedback was more inclusive of difference and diversity in that no one subjective viewpoint was privileged.

Taking a multimethods approach such as the combination of discourse analysis, and the more quantitative approach of Q-sort, therefore, added rigour to the research findings. In addition, Q-sort surveys have a particular relevance for policy analysis as the results can form the basis for policy recommendations.

In summary, the RMA has in many ways failed to achieve the outcomes promised by the normative values that underpin it. The research demonstrated that the legislation did, however, draw a line in the sand which rearticulated how the environment should be valued. While the outcome of this rearticulation remains fragile and contested, the RMA continues to be the pivotal legislative totem around which ongoing concern for addressing the collision of economic and environmental priorities is being played out in New Zealand.

Reflections on the Research

This research demonstrated that the dominant discourses of government are continuing to colonise the landscape, and determine the nature-society relationship in New Zealand. It provided a means to demonstrate why ecological sustainability has been hard to achieve because of the continued dominance of short-term economic goals and the support for the dairy industry pivotal to achieving this goal. The study established that sustainability was about management of competing interests, rather than ensuring wise use of resources. It showed that the ideological appropriation of the sustainability discourse into social practices did not solve the ecological sustainability problem, but did enable the continued economic growth and intensification of the dairy industry. This more limited interpretation of sustainability relied on instrumental goals and more technically efficient dairy farming systems as the dominant means for addressing sustainability concerns with the result that the biodiversity concerns, connectivity between local ecosystems, and social and cultural values all necessary for sustainable development could be largely ignored.

Such a policy approach leaves much to be desired if the outcome required is ecological sustainability. What is missing in this approach is that for environmental policy to lead to ecological sustainability it must be able to have "the capacity to correct tendencies to damage or reduce life-support systems" (Plumwood, 1998, p. 561). Unfortunately, as Plumwood reminds us, shallow forms of democratic politics provide only weak forms of ecological rationality (Plumwood, 1998, p. 569), and undoing 150 years of institutional support for landscape reconstruction framed by industrial modes of production will not be easy. That the dominant approach is not hegemonic and that there is the possibility for an institutional response that puts ecological sustainability and the community at the centre of environmental policy change were demonstrated through the lakes case study. These regions provide a blueprint for the normative values and institutional mechanisms necessary to achieve sustainable development. Given the concern that regional council staff, scientists, progressive dairy farmers, and other community actors have presented in interviews, the Q-sort survey, the media, and in the community response to central government changes to the RMA, the hope is that the approach undertaken in the lakes region "will" become the blueprint for sustainable farming in the future. But as the research has demonstrated such an outcome is vulnerable to the political, economic and social contexts that shape institutional ideology in New Zealand.

Recommendations for Future Research

This research has pointed to a number of areas of possible future research. Tracking how effective the current government and dairy industry's response to sustainability is remains important. For example, will the National Policy Statement for Fresh Water Management, the possible amendments to the RMA, and the dairy industries Water Accord achieve the stated goal of improving ecological sustainability outcomes? An important linked concern for sustainability which has not been explored in this research is climate change policy. An analysis of the effectiveness of the government's policy response to climate change is, therefore, very important.

Another possible area of research would be to examine and evaluate in more depth the lakes' catchments, and other areas where more community-driven sustainable development institutional approaches are emerging, for example in the

comanagement of the Waikato River. Research might focus on whether increased representation of *iwi* (tribe) and *hapu* (subtribe) and other stakeholders is influencing a more holistic approach to the environment, and whether *iwi* presence in local government is affecting more sustainability practices. Furthermore, the lakes regions also offer opportunities to evaluate the sociocultural and environmental implications of farmers' integrating more sustainable farming practices.

The transition to more sustainable agriculture and sustainable development is not just a national problem but a global problem, and the research has demonstrated how difficult the achievement of sustainable agriculture is, particularly when it intersects with a country's economic goals. In light of this problem, a comparative analysis of New Zealand environmental policy and agricultural practices with other dairy producing regions and countries is important. This could help to demonstrate what has hindered or been effective for this transition globally to more sustainable agriculture, and facilitate shared lessons for realising a more ecologically sustainable approach to the environment. This understanding is also important because of the linked problem of climate change policy.

I found the Q-survey a very valuable tool for understanding the complexity of institutional, industry, and community discourse. The application of this survey method for further environmental policy research into the subjectivities of different regional councils, different farming sectors, other industries, businesses or communities' goals and practices would be useful. Given the small percentage of New Zealand businesses which currently undertake environmental reporting, employing this method could help them understand the barriers to change.

Lastly, testing the robustness and generalisability of the discourse analytic framework by applying it to an analysis of other environmental policy areas such as climate change, environmental security, waste-management, or other science and technology areas would be valuable. Such studies would demonstrate the usefulness of the framework and critical approaches to environmental research.

References

Abell, J., Hamilton, D., & Paterson, J. (2011). Reducing the external environmental costs of pastoral farming in New Zealand: Experiences from the Te Arawa lakes, Rotorua. *Australasian Journal of Environmental Management, 18*(3), 139-154.

Abell, J., Özkundakci, D., & Hamilton, D. (2010. 28-29 October, 2010). *Relationships between land use and nutrients in New Zealand's lakes: A national perspective on a global problem*. Paper presented at the New Zealand Freshwater Sciences Society Conference, Chistchurch New Zealand.

Abell, J., Özkundakci, D., Hamilton, D., Miller, P., & Steven, D. (2011). Relationships between land use and nitrogen and phosphorus in New Zealand lakes. *Marine & Freshwater Research,* 62(2) 162-175.

Anastasiadis, S., Nauleau, M., Kerr, S., Cox, T., & Rutherford, K. (2011. August 25-26, 2011). *Water quality management in Lake Rotorua: A comparison of regulatory approaches using the Nmanager model*. Paper presented at the NZAE Conference, Nelson, New Zealand.

Andersen, M., & Massa, I. (2000). Ecological modernization, origins, dilemmas and future direction. *Journal of Environmental Policy & Planning, 2*(4), 337-345.

Anglim, J. (2007). *Cluster analysis and factor analysis*. Power point. Melbourne, Australia: University of Melbourne. Retrieved October 15, 2013 from http://jeromyanglim.googlepages.com/

Annan, K. (2002, 25 February 2002). *Sustainability is not a pious invocation but a call to concrete action.* Lecture at the London School of Economics and Political Science. Retrieved November 14, 2010 from, http://www.un.org/jsummit/html/documents/documents.html

Atkinson, N. (2003). *Adventures in democracy: A history of the vote in New Zealand*. Dunedin, New Zealand: University of Otago Press.

Auditor General (2011). *Government planning and support for housing on Māori land.* Wellington, New Zealand: New Zealand Government. Retrieved Novembr 12, 2012 from http://www.oag.govt.nz/2011/housing-on-maori-land/appendix.htm.

Baachi, C. (1999). *Women the construction of policy problems: Policy and politics*. London, UK: Sage Publications.

Baber, W., & Bartlett, R. (2005). *Deliberative Green Politics: Democracy and Ecological Rationality*. Massachusetts US: Cambridge MA: MIT Press.

Baber, W., & Bartlett, R. (2011). The role of international law in global governance. In J. Dryzek, R. Norgaard & D. Schlosberg (Eds.), *The Oxford handbook of climate change and society* (pp. 654-668). Oxford UK: Oxford University Press.

Baker, K. (2007). The 'commons' versus the 'commodity': After-globalization, anti-privatization and the human right to water in the global south. *Antipode, 39*(3), 430-455.

Barber, L. (1978). *The view from Pirongia: The history of Waipa County*. Auckland, New Zealand: Richards Publishing.

Barnett, J., & Pauling, J. (2005). The environmental effects of New Zealand's free-market reforms. *Environment, Development and Sustainability, 7*, 271-289.
Barry, J. (2003). Ecological modernisation. In E. Page & J. Proops (Eds.), *Environmental thought* (pp.191-214). Cheltenham, UK: Edward Elgar
Barry, J. (2005). Ecological modernisation. In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader* (2nd ed.) (pp. 303-322). Oxford, UK: Oxford University Press.
Barry, J., & Paterson, M. (2004). Globalisation, ecological modernisation and New Labour. *Political Studies, 52*, 767-784.
Barry, J., & Proops, J. (1999). Seeking sustainability discourses with Q methodology. *Ecological Economics, 28*, 337-345.
Bartlett, R. (1986). Ecological rationality: Reason and environmental policy. *Environmental Ethics, 8(3)* 221-239.
Bartlett, R. (2005). Ecological Reason in Administration: Environmental Impact Assessment and Green Politics. In R. Paehlke & D. Torgerson (Eds.), *Managing Leviathan: Environmental Politics and the Administrative State* (2nd ed., pp. 47-58). Ontario CA: Broadway Press.
Bartlett, R., & Kurian, P. (1999). The theory of environmental impact assessment: Implicit models of policy making. *Policy & Politics, 27*(4), 415-433.
Bartlett, R., Kurian, P., & Malik, M. (1995). International environmental policy: Redesigning the agenda for theory and practice? In R. Bartlett, P. Kurian, & M. Malik (Eds.) *International Organizations and Environmental Policy* (pp. 1-18).Westport, CT: Greenwood Press.
Bassett, M. (1969). *Depression of the Thirties*. Auckland, New Zealand: Heinemann Educational Books Ltd.
Batterbury, S., & Fernando, J. (2006). Rescaling governance and the impacts of political and environmental decentralization: An introduction. *World Development, 34*(11), 1851-1863.
Bawden, R. (1991). Systems thinking and practice in agriculture. *Journal of Dairy Science, 74*, 2362-2373.
Bay of Plentry Regional Council. (2008). *Bay of Plenty Regional Council position statement: Land use change in the Lake Rotorua catchment.* Whakatane, New Zealand: Bay of Plenty Regional Council. Retrieved August 18, 2013 from http://www.lakeswaterquality.co.nz/docs/BOPRC%20Position%20Statement%20on%20Land%20Use%20Change_draft.pdf.
Bay of Plentry Regional Council. (2012). *Rotorua Lakes action plans: What is an action plan.* Retrieved August 20, 2013 from http://www.boprc.govt.nz/environment/water/rotorua-lakes/rotorua-lakes-action-plans/.
Bay of Plenty Regional Council. (2008). *Operative Bay of Plenty regional water and land plan*. (Strategic Policy Publication 2008/06). Whakatane, New Zealand: Bay of Plenty Regional Council.
Bay of Plenty Regional Council. (2010). *2009/2010 Rotorua lakes TLI update*. (Environmental Publication 2010/18). Whakatane, New Zealand: Bay of Plenty Regional Council.
Bay of Plenty Regional Council. (2013). *Rule 11*. Retrieved August 15, 2013 from. *www.rotorualakes.co.nz/vdb/document/162.*
Bay of Plenty Regional Council, Rotorua District Council, & Te Arawa Lakes Trust. (2011). *State of the Rotorua/Te Arawa lakes 2009-2010.* http://www.boprc.govt.nz/media/33625/RotoruaLakes-100827-

FULLREPORT.pdf .Rotorua, New Zealand: Bay of Plenty Regional Council.
Bayfield, B. (2011). *Slaying the monster: Meeting the challenge of fixing Lake Rotorua* (April 18, 2011). Paper presented at the Lakes Water Quality Symposium 2011, Rotorua, New Zealand.
Beck, U. (1992). *Risk society*. Beverley Hills, CA: Sage.
Beck, U. (1995). *Ecological politics in the age of risk*. Cambridge, UK: Polity Press.
Beck, U. (1998). From industrial society to the risk society: Questions of survival, social structure, and ecological enlightenment. In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader* (1st ed., pp. 327-346). Oxford, UK: Oxford University Press.
Beckstead, J. (2002). Using hierarchical cluster analysis in nursing research. *Western Journal of Nursing Research, 24*(3), 307-319.
Belich, J. (1986). *The New Zealand Wars and the Victorian interpretation of racial conflict*. Auckland, New Zealand: Penguin.
Belich, J. (2009). Riders of the whirlwind: Tribal peoples and European settlement booms, 1790s-1900s. In R. Boast & R. Hill (Eds.), *Raupatu: The confiscation of Maori land* (pp145-167). Wellington, New Zealand: Victoria University Press.
Bell, C. (1996). *Inventing New Zealand: Everyday myths of Pākehā identity*. Auckland, New Zealand: Penguin.
Bell, S., & Morse, S. (2008). *Sustainability indicators measuring the immeasurable?* (2nd ed.). London, UK: Earthscan.
Benn, S., & Dunphy, D. (2005). Towards new forms of governance for issues of sustainability: Renewing relationships between corporates, government and community. *Electronic Journal of Radical Organisation Theory, 9*(1), 1-29.
Berg, B., & Lune, H. (2012). *Qualitative research methods for the social sciences* (8th ed.). Boston, MA: Pearson.
Berger, G., Flynn, A., Hines, F., & Johns, R. (2001). Ecological modernisation as a basis for environmental policy: Current environmental discourse and policy and the implications on environmental supply chain management. *Innovation 14*(1), 55-74.
Bertram, G. (2010a). Conservation land and the social covenant. Wellington, New Zealand: Forest and Bird.
Bertram, G. (2010b). Valuing mineral resources. Wellington, New Zealand: Forest and Bird.
Bewley, J. (1970). A survey of changes in production, manufacturing and marketing in the New Zealand dairy industry, 1947-48 to 1967-68. *New Zealand Geographer, 26*(1), 36-49.
Birchall, M., & Paterson, J. (2011). The Okaro catchment lake restoration group farm and catchment accountability: What are we achieving? Rotorua, New Zealand: Retrieved March 15, 2013 from http://www.massey.ac.nz/~flrc/workshops/11/Manuscripts/Birchall_2011.pdf.
Blanche E. Baughan (1870-1958). (1960). A bush section. In A. Curnow (Ed.), *The Penguin book of New Zealand verse*. (p. 104) Auckland, New Zealand: Blackwood & Janet Paul.
Blommaert, J. (2005). *Discourse*. Cambridge, UK: Cambridge University Press.
Boast, R., & Hill, R. (Eds.). (2009). *Raupatu: The confiscation of Māori land*. Wellington New Zealand: Victoria University Press.

Bobrow, D., & Dryzek, J. (1987). *Policy analysis by design*. Pittsburg, PA: University of Pittsburg.

Bohman, J. (2013). Critical theory. In E. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Spring 2013 ed.). Stanford, CA: http://plato.stanford.edu/archives/spr2013/entries/critical-theory/>.

Bookchin, M. (1998). Society and ecology. In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader* 415-428 Oxford, UK: Oxford University Press.

Boston, J., Martin, J., Pallot, J., & Walsh, P. (1996). *Public management: The New Zealand model.* Auckland, New Zealand: Oxford University Press.

Botha, N. (2012). Social impact of Variation 5 on the Taupo community Taupo NZ: Taupo monitor farm management committee. Retrieved September 16, 2013 from *www.beeflambnz.com/.../Farm/Social%20impact%20of%20variation%2*

Bourdieu, P. (2012). Dictionary of anthropology. Retrieved May 15 2012, from http://www.anthrobase.com/Dic/eng/pers/bourdieu_pierre.htm

Brand, R., & Karvonen, A. (2007). The ecosystem of expertise: Complementary knowledges for sustainable development. *Sustainability, Science, Practice & Policy, 3*(2), 21-31.

Brodnax, R. (2006). Nutrients, the environment and the Resource Management Act: Nutrient management in the Waikato region. Hamilton, New Zealand: DairyNZ.

Brooking, T. (1992). "Busting up" the greatest estate of all: Liberal Maori land policy 1891-1911. *New Zealand Journal of History, 26*(1), 58-79.

Brooking, T., Hodge, R., & Wood, V. (2002). The grasslands revolution reconsidered. In E. Pawson & T. Brooking (Eds.), *Enviromental histories of New Zealand* (pp. 169-182). Oxford, UK: Oxford Unversity Press.

Brown, P. (2008). A review of the literature on case study research. *Canadian Journal for New Scholars in Education,* 1(1), 1-13.

Bührs, T. (2003). From diffusion to defusion: The roots and effects of environmental innovation in New Zealand. *Environmental Politics, 12*(3), 83-101.

Bührs, T. (2009). *Environmental integration: Our common challenge*. Albany, NY: State University of New York.

Bührs, T., & Bartlett, R. (1993). *Environmental policy in New Zealand: The politics of clean and green?* Auckland, New Zealand: Oxford University Press.

Bührs, T., & Bartlett, R. (1997). Strategic thinking and the environment: Planning the future in New Zealand? *Environmental Politics, 6*(2), 72-100.

Bührs, T., & Christoff, P. (2007). Greening the Antipodes? Environmental policy and politics in Australia and New Zealand. *Australian Journal of Political Science, 41*(2), 225-240.

Bulkeley, H. (2001). No regrets? Economy and environment in Australia's domestic climate change policy process. *Global Environmental Change,* 11, 155-169.

Burke, P. (2012, December 4,). Environment is farmers' first priority, *Rural News,* p. 15.

Burns, N., & Bryers, G. (2000). Protocol for monitoring trophic levels of New Zealand lakes and reservoirs. Wellington, New Zealand: Ministry for Environment.

Burns, N., Rutherford, J., & Clayton, J. (1999). A monitoring and classification system for New Zeland lakes and reservoirs. *Journal of Lake and Reservoir Management 15*(4), 255-271.
Burns, P. (1989). *Fatal success: A history of the New Zealand Company*. Auckland, New Zealand: Heinemann Reed.
Burr, V. (1995). *An introduction to social constructionism*. London, UK: Routledge.
Burton, F., & Calen, P. (1979). *Offical discourse: On discourse analysis, government publications, ideology and the State*. London, UK: Routledge.
Butler, J. (1990). *Gender trouble: Feminism and the subversion of identity*. New York, NY: Routledge.
Butler, J. (1997). *Excitable speech: Toward a politics of performance*. New York, NY: Routledge.
Buttel, F. (2000). Ecological modernization as social theory. *Geoforum, 31*, 57-65.
Cahill, M. (2002). *The environment and social policy*. London, UK: Routledge.
Caldwell, L. (1972). *In defense of Earth: International protection of the biosphere*. Bloomington,US: Indiana University Press.
Callaghan, F. (Ed.). (1957). *Science in New Zealand*. Wellington, New Zealand: A.H & A.W Reed.
Cameron, M., Barrett, P., Cochrane, B., & McNeill, K. (2008). Implications of agricultural change in the Waikato region: Current trends and future scenarios. Hamilton, New Zealand: Environment Waikato.
Cameron, M., & Bell, K. (2008). *Dairying in the Waikato region of New Zealand: An overview of historical statistics*. Working Paper in Economics, 13 September 2008. Commissioned Research for Creating Futures Project funded by FORST under contract to ENVW0601 Environment Waikato. The University of Waikato, Hamilton New Zealand.
Carter, D. (2011). *Budget 2011: Lifting investment in irrigation*. (9 May, 2011). Wellington New Zealand: New Zealand Government. Retrieved May 20, 2014 from http://www.beehive.govt.nz/release/budget-2011-lifting-investment-irrigation.
Carter, N. (2007). *The politics of the environment: Ideas, activism, policy* (2nd ed.). Cambridge, UK: Cambridge University Press.
Carter, S. (2010). Enacting internal coherence: As a path to quality in qualitative inquiry. In J. Higgs, N. Cheery, R. Macklin, & R. Ajjawi (Eds.), *Research practice: A discourse on qualitative methodologies* (pp. 143-151). Rotterdam, The Netherlands: Sense.
Charteris-Black, J. (2005). *Politicians and rhetoric the persuasive power of metaphor*. New York, NY: Palagrave MacMillan.
Chisnall, K. (2013). Residents against proposed Fonterra mine. Retrieved September 26, 2013 from http://www.3news.co.nz/Residents-against-proposed-Fonterra-mine/tabid/423/articleID/311296/Default.aspx#ixzz2fzLtpN1I.
Chopra, R. (2011). *Factors that informed the New Zealand government's decision to implement an emission trading scheme as New Zealand's climate policy* (unpublished master's dissertation). Auckland University of Technology, Auckland, New Zealand,
Chug, K. (2011, September, 25). Scientist warns of mass extinction. *Dominion Post*. Retrieved April 20, 2014 from http://www.stuff.co.nz/environment/5192316/Scientist-warns-of-mass-extinction,.

Clark, H. (2008). *Announcement of major government funding for restoration project for Rotorua lakes.* Available at: http://www.beehive.govt.nz/node/32586. Wellington, New Zealand: New Zealand Government.

Clemons, R., & McBeth, M. (2009). *Public policy praxis: A case approach for understanding policy and analysis* (2nd ed.). New York, NY: Pearson Longman.

Cloke, P., & Le-Heron, R. (1994). Agricultural deregulation: The case of New Zealand. In P. Lowe, T. Marsen, & S. Whatmore (Eds.), *Reregulating agriculture* (pp. 104-126). London, UK: David Fulton.

Clover, K. (Ed.). (2004a). *The people of "The Plains": Some early memories of those who have lived on or been associated with the Hauraki Plains* (Vol. 3). Hamilton, New Zealand: Historical Society of the Hauraki Plains (Inc.).

Clover, K. (Ed.). (2004b). *The people of "The Plains": Some early memories of those who have lived on or been associated with the Hauraki Plains* (Vol. 1). Hamilton, New Zealand: Historical Society of the Hauraki Plains (Inc.).

Cocklin, C., Dibden, J., & Mautner, N. (2006). From market to multifunctionality? Land stewardship in Australia. *The Geographical Journal, 172*(3), 197-205.

Cohen, M. (2006). Ecological modernization and its discontents: The American environmental movement's resistance to an innovation-driven future. *Futures 38*, 528-547.

Collins, E., Lawrence, S., & Roper, J. (2007). Sustainability practices of New Zealand businesses in 2006. Retrieved from *https://www.mngt.waikato.ac.nz/.../Sustainability*

Conforte, D., Garnevska, E., Kilgour, M., Locke, S., & Scrimgeour, F. (2008). The key elements of success and failure in the New Zealand dairy industry. Christchurch, New Zealand: Agribusiness and Economics Research Unit Lincoln University.

Consedine, R., & Consedine, J. (2001). *Healing our history: The challenge of the Treaty of Waitangi*. Auckland, New Zealand: Penguin.

Coombes, B. (2003). Ecospatial outcomes of neoliberal planning: Habitat management in the Auckland region, New Zealand. *Environment and Planning B: Planning and Design 30*, 201-218.

Coppedge, M. (2012). *Decomoratization and research methods*. Oxford: Oxford University Press.

Coriolus Consultants. (2010). Fonterra and the New Zealand dairy industry options going forward: A discussion document. Auckland, New Zealand: Coriolus Consultants.

Coromandel Watchdog. (2010). Schedule 4 explained. Retrieved August 10, 2013 from http://watchdog.org.nz/info/schedule-4-explained/.

Cottman, J. (1996). Farmer perspectives on sustainable farming. *New Zealand Grassland Association, 75*, 27-30.

Cottrell, B. (2012). *History of the Taupo Lake Care Group. Revealing the Realities of Implementing and Operating under a Nutrient Management Cap - The Lake Taupo Catchment Experience*. (2012. February 18-20, 2012). Paper presented at the Fertiliser and Lime Research annual wokshops Massey University, Palmerston North New Zealand

Craddock-Henry, N. (2008). Exploring perceptions of risks and vulnerablity to climate change in New Zealand agriculture. *Political Science, 60*(1), 151-155.
Creswell, J. (1994). Research design: Qualitative and quantitative approaches. London, UK: Sage.
Cumberland, K. (1944). *Soil erosion in New Zealand: A geographic reconnaissance*. Wellington, New Zealand: Soil Conservation and Rivers Control Council.
Curnow, A. (Ed.). (1960). *The Penguin Book of New Zealand verse*. Auckland, New Zealand: Blackwood & Janet Paul.
Curran, C. (2009). Ecological modernisation and climate change in Australia. *Environmental Politics, 18*(2), 201-217.
Daily Mail. (2013, August 6, 2013). New Zealand's green claims are pure manure: Country's food scares and poor environmental record at odds with '100% Pure' slogan, *Daily Mail*. Retrieved April 20, 2014 from http://www.dailymail.co.uk/news/article-2385632/Green-New-Zealand-Food-scares-environmental-record-odds-100-Pure-slogan.html.
Dairy Environment Leadership Group. (2013). Sustainable dairying: Water accord. Hamilton, New Zealand. Retrieved from http://www.dairynz.co.nz/what-we-do/advocacy-and-policy/environment/sustainable-dairying-water-accord/
Dairy Insight. (2006). *Dairy industry strategy for sustainable environmental management: Report of the Dairy Environment Review Group*. Wellington, New Zealand: Dairy Insight.
DairyNZ. (2009a). Dairy New Zealand's strategy for New Zealand dairy farming 2009-2020. Hamilton, New Zealand: DairyNZ.
DairyNZ. (2009b). Strategy for New Zealand dairy farming: Dairy New Zealand. Hamilton, New Zealand: DairyNZ.
DairyNZ. (2012). New Zealand dairy statistics 2011/2012. Hamilton, New Zealand:
DairyNZ.
DairyNZ. (2013a). Go dairy: The big picture. Retrieved July 16, 2013 from http://www.godairy.co.nz/the-big-picture/facts-and-figures
DairyNZ. (2013b). Making dairy farming work for everyone: Strategy for sustainable dairy farming 2013-2020: Background supplement. Hamilton, New Zealand: DairyNZ.
DairyNZ. (2013c). Strategy for sustainable dairy farming 2013-2020. Hamilton, New Zealand. Retrieved July 16, 2013 from http://www.dairynz.co.nz/page/pageid/2145855626/About_DairyNZ.
DairyNZ. (2013d). Sustainable dairy accord: Questions and answers. Hamilton, New Zealand: DairyNZ.
DairyNZ, DCANZ, & Federated Farmers. (2009). Strategy for New Zealand dairy farming 2009/2020. Hamilton, New Zealand: DairyNZ.
Daly, A. (1998). Sustainable growth: An impossibility theorem. In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader,* 285-289. Oxford, UK: Oxford University Press.
Danaher, G., Schirato, T., & Webb, J. (2000). *Understanding Foucault*. Sydney: Australia: Allen & Unwin.
Dann, C. (2002). Losing ground? Environmental problems and prospects at the beginning of the twenty-first century. In E. Pawson & T. Brooking (Eds.), *Environmental histories of New Zealand* (pp. 275-287). Oxford, UK: Oxford University Press.

Darier, E. (1999). Foucault and the environment: An introduction. In E. Darier (Ed.), *Discourses of the environment* (pp. 1-33). Oxford, UK: Blackwell.
Davis, C., & Michelle, C. (2011). Q methodology in audience research: Bridging the qualitative/quantitative 'divide'? *Participations: Journal of Audience and Reception Studies, 8*(2), 559-593.
DCANZ Dairy Companies Association NZ. (2013). About NZ dairy industry. Retrieved July 12, 2013 from http://www.dcanz.com/
de-Jong, J. (2011). *Lake Taupo: A multi-sector collaborative partnership towards sustainable development* (unpublished master's dissertation). University of Waikato, Hamilton, New Zealand.
de-Wit, N. (2014). The evolution of freshwater management under the RMA. Retrieved June 16, 2014 from http://sciblogs.co.nz/waiology/tag/resource-management-act/
Dean, M. (1994). *Critical and effective histories: Foucault's methods and historical sociology*. London, UK: Routledge.
Deans, N., & Hackwell, K. (2008). Dairying and declining water quality: Why has the dairying and clean streams accord not delivered cleaner streams? Wellington, New Zealand: Fish and Game New Zealand.
Department of Prime Minister and Cabinet. (2003). *New Zealand sustainable development programme of action*. Wellington, New Zealand: New Zealand Government.
Dibley, D. (2009). *Dirty dairying: What are the processes responsible for eutopohication within the Lake Rotorua catchment and what stategies can be implemented to alleviate these?* Research Paper. Geography. University of Waikato, Hamilton, New Zealand.
Dobson, A. (1990). *Green political thought*. New York, NY: Harper Collins.
Dresser, M. (2008). Sustainable land management research: Update. Hamilton, New Zealand: Landcare Trust.
Dresser, M. (2009). Gaps in sustainable land management research and options for land use change in relation to the nutrient load on the Rotorua lakes. Hamilton, New Zealand: Landcare.
Dryzek, J. (1987). *Rational ecology: Environmental and political economy*. New York, NY: Basil Blackwell.
Dryzek, J. (1997). *The politics of the Earth: Environmental discourses* (1st ed.). Oxford, UK: Oxford University Press.
Dryzek, J. (1998). Political and ecological communication. In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader* (1st ed.). (pp. 584-596). Oxford, UK: Oxford University Press.
Dryzek, J. (2006). *Deliberative Global Politics: Discourse and Democracy in a Divided World*. Oxford UK: Polity Press.
Dryzek, J. (2010). *The foundations and frontiers of deliberative governance*. Oxford UK: Oxford University Press.
Dryzek, J., & Berejikian, J. (1993). Reconstructive democratic theory. *The American Political Science Review, 87*(1), 48-60.
Dryzek, J., & Dunleavy, P. (2009). *Theories of the Democratic State*. London UK: Palgrave MacMillan.
Dryzek, J., & Niemeyer, S. (2008). Discursive representation. *American Political Science Review, 102*(4), 481-492.
Dryzek, J., Norgaard, R., & Schlosberg, D. (2013). *Climate-Challenged Society*. Oxford UK: Oxford University Press.

Dryzek, J., & Schlosberg, D. (Eds.). (1998). *Debating the Earth: The environmental politics reader* (1st ed.). Oxford, UK: Oxford University Press.

Dryzek, J., & Stevenson, H. (2011). Global democracy and earth system governance. *Ecological Economics, 70*(11), 1865-1874. doi: http://dx.doi.org/10.1016/j.ecolecon.2011.01.021

Duhon, M., Young, J., & Kerr, S. (2011, 25-26 August). *Nitrogen trading in Lake Taupo: An analysis and evaluation of an innovative water management strategy*. Paper presented at the New Zealand Agriculture and Resource Economics Society Conference (NZARES) Nelson, New Zealand. http://www.nzares.org.nz/conferences.aspx

Duncan, G. (1933). *The New Zealand dairy industry: The formation, administration, accounts, finance, costing and statistics of dairy factory companies*. Palmerston North, New Zealand: H.L. Young Limited.

Duncan, S., & Reutter, L. (2006). A critical policy analysis of an emerging agenda for home care in one Canadian province. *Health and Social Care in the Community, 14*(3), 242–253.

Durie, M. (1998). *Te mana, te kaawanatanga: The politics of Maori self-determination*. Auckland, New Zealand: Oxford University Press.

Durning, D. (2005). *Using Q-methodology to resolve conflicts and find solutions to contentious policy issues.* (2005. December 5-7, 2005). Paper presented at the Network of Asia-Pacific Schools and Institutes of Public Administration and Governance (NAPSIPAG), Beijing. Retrieved from http://www.napsipag.org/pdf/Q-Methodology.pdf

Eckersley, R. (1998). Ecocentrism explained and defended. In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader* (pp. 374-397). New York, NY: Oxford University Press.

Ecologic. (2013). Our history. Retrieved August 20, 2013 from http://www.ecologic.org.nz/?id=74.

Edgar, N. (1999). Land use in the Taupo catchment. *New Zealand Journal of Marine and Freshwater Research, 33*, 375-383.

Edgar, N. (2009). Icon lakes in New Zealand: Managing the tension between land development and water resource protection. *Societies and Natural Resources, 22*, 1-11.

Environment Bay of Plenty. (2004). *The Rotorua lakes protection and restoration programme: Outline of project structure and timeline*. (June 2004/08). Whakatane, New Zealand: Environment Bay of Plenty.

Environment Bay of Plenty. (2010). Review of the Rotorua lakes strategy. Whakatane, New Zealand: Environment Bay of Plenty.

Environment Bay of Plenty. (2013). *Trophic level index: Lakes facts*. Rotorua, New Zealand: Environment Bay of Plenty. Retrieved October 18, 2013 from http://www.rotorualakes.co.nz/vdb/document/139.

Environment Bay of Plenty, Rotorua District Council, & Te Arawa Lakes Trust. (2005). Lakes quality assessment and action plan prioritisation. Whakatane, New Zealand: Rotorua Lakes Joint Managment Group.

Environment Bay of Plenty, Te Arawa Lakes Trust, & Rotorua Disctric Council. (2006). Lake Okaro action plan. Whakatane, New Zealand: The Lake Rotorua Protection and Lake Restoration Action Programme.

Environment Waikato. (2003). *Protecting Lake Taupo: A long term strategic partnership*. Hamilton, New Zealand: Environment Waikato. Retrieved October 19, 2013 from http://www.waikatoregion.govt.nz/PageFiles/7058/strategy.PDF.

Environment Waikato. (2007a). *The conditions of rural water and soil in the Waikato region: Risks and opportunities*. Hamilton, New Zealand: Environment Waikato.
Environment Waikato. (2007b). Environment Waikato clean streams project: Survey of farmers: June 2007. Hamilton, New Zealand: Environment Waikato.
Environment Waikato. (2007c). *Proposed Waikato Regional Plan Variation 5: Lake Taupo catchment*. Hamilton, New Zealand: Environment Waikato.
Environment Waikato. (2007d). *Proposed Waikato Regional Plan Variation 5: Lake Taupo catchment (Hearings Committee recommendations version): Evaluation of alternatives, benefits and costs under section 32 of the RMA: Explanation of the approach taken in the variation*. Hamilton, New Zealand: Environment Waikato.
Environment Waikato. (2010). Environmental monitoring: 2009 data report. Hamilton, New Zealand: Environment Waikato.
Environmental Defence Society. (2013). Resource Managment Act for the community. *Regional Policy Statements.* Retrieved August 1, 2013 from http://www.rmaguide.org.nz/rma/plandocs/regpolicystmts.cfm.
Ericksen, N., Crawford, J., Berke, P., & Dixon, J. (2001). R*esource management, plan quality, and governance: A report to government*. Retrieved April 16, 2011 from www.waikato.ac.nz/igci/pucm. Hamilton, New Zealand: International Global Change Institute, University of Waikato.
Erickson, N. (2003). *Planning under cooperative mandates: The legend of the RMA: A trilogy*. (2003. September 24-25, 2003). Paper presented at the Bright Star RMA Conference, Wellington, New Zealand.
Evans, L. (2004). *Structural reform: The dairy industry in New Zealand*. (2004. September 8-9, 2004). Paper presented at the APEC High Level Conference on Structural Reform, Tokyo, Japan.
Evans, N., Morris, C., & Winter, M. (2001). Conceptualising agriculture: A critique of post-productivism as the new orthodoxy. *Progress in Human Geography.* http://eprints.worc.ac.uk/85/1/PIHG prepub.pdf.
Fairclough, I., & Fairclough, N. (2012). *Political discourse analysis: A method for advanced students*. London, UK: Routledge.
Fairclough, N. (1989). *Language and power*. London, UK: Longman.
Fairclough, N. (1992). *Discourse and social change*. Cambridge, UK: Polity Press.
Fairclough, N. (1995). *Critical discourse analysis: The critical study of language*. London, UK: Routledge.
Fairclough, N. (1996). Critical discourse analysis. *Semiotics*. Retrieved January 15, 2014 from http://semiotics.nured.uowm.gr/pdfs/THEORY_FAIRCLOUGH.pdf.
Fairclough, N. (2003). *Analysing discourse: Textual analysis for social research*. Milton Park, UK: Routledge.
Fairclough, N. (n.d.). *The dialectics of discourse*. Lancaster, UK: Lancester University.
Falconer, B. (2011). *Primary growth partnership.* Retrieved December 10, 2013 from http://www.mpi.govt.nz/portals/0/documents/agriculture/assist-funding/pgp/speech-bill-falconer-agriculture-summit-2011 Wellington, New Zealand July 2011.
Feindt, P., & Oels, A. (2005). Does discourse matter? Discourse analysis in environmental policy-making. *Journal of Environmental Policy and Planning, 7*(3), 1-13.

Fickling, D. (2013). Fonterra scare affected all New Zealand's exports, Key says. *Bloomberg News,* (August 12, 2013, n.p.). Retrieved October 20, 2013 from http://www.bloomberg.com/news/2013-08-11/new-zealand-ministers-to-visit-china-over-fonterra-contamination.html.

Firth, R. (1959). *Economics of the New Zealand Maori* (2nd ed.). Wellington, New Zealand: R. E. Owen.

Fischer, D., & Freudenburg, W. (2001). Ecological modernisation and its critics: Assessing the past and looking toward the future. *Society and Natural Resources, 14,* 701-709.

Fischer, D., Fritsch, O., & Anderson, M. (2009). Transformations in environmental governance and participation In A. Mol, A. Sonnenfeld, & G. Spaargaren (Eds.), *The ecological modernisation reader: Environmental reform in theory and practice* (pp. 141-155). New York, NY: Routledge.

Fischer, F. (1990). *Technocracy and the politics of expertise*. London,UK: Sage

Fischer, F. (1995). *Evaluating public policy*. Chicago, IL: Nelson-Hall.

Fischer, F. (2003). *Reframing public policy: Discursive politics and deliberative practices*. Oxford, UK: Oxford University Press.

Fischer, F. (2005). Environmental regulation and risk-benefit analysis: From technical to deliberative policy making. In R. Paehlke & D. Torgerson (Eds.), *Managing Leviathan: Environmental politics and the administrative state* (2nd ed., pp. 59-80). Ontario, Canada: Broadview Press.

Fischer, F. (2009). *Democracy and expertise: Reorienting policy inquiry*. Oxford, UK: Oxford University Press.

Fischer, F., & Forester, J. (1993). *The argumentative turn in policy analysis and planning*. London, UK: UCL Press.

Fish & Game New Zealand. (2013. September 11, 2013). Fish & Game hails Maori Party, United Future RMA stance. Retrieved October 15, 2013 from http://www.fishandgame.org.nz/newsitem/fish-game-hails-rma-opposition.

Fish & Game New Zealand. (2013). Dairy accord no longer 'clean streams'. Wellington, New Zealand: Fish & Game New Zealand. Retrieved October 15, 2013 from http://www.fishandgame.org.nz/newsitem/dairy-accord-no-longer-clean-streams

Fonterra. (2006). *Fonterra annual report 2006*. Auckland, New Zealand: Fonterra.

Fonterra. (2009). Sustainability indicators. Retrieved May 6, 2012 from *https://www.fonterra.com/wps/wcm/.../Sustainabilty+Report_v16.pdf?*

Fonterra. (2010). *Fonterra annual report 2010.* Auckland, New Zealand: Fonterra.

Fonterra. (2012). *Fonterra annual report 2012.* Auckland, New Zealand: Fonterra.

Fonterra. (2013a). Our governance. Retrieved July 25, 2013 from http://www.fonterra.com/cn/en/About/Our+Governance

Fonterra. (2013b). Our heritage. Retrieved August 25, 2013 from http://www.fonterra.com/cn/en/About/Our+History

Fonterra. (2013c). *Supply Fonterra: Our path to a sustainable future*. Auckland, New Zealand: Fonterra.

Fonterra, Local Government New Zealand, Ministry for the Environment, & Ministry of Agrictulture and Forestry. (2003). *Dairying and clean streams accord*. Wellington, New Zealand: Ministry for Environment.

Fookes, T. (2000). Environmental assessment under the Resource Management Act 1991. In P. Memon & H. Perkins (Eds.), *Environmental planning and management in New Zealand* (pp 80-93). Palmerston North, New Zealand: Dunmore Press.

Forbis, J. (Ed.). (1974). *Trail blazers of New Zealand*. Wellington, New Zealand: Duf Syndications Limited.

Foster, C., & Kivell, M. (2009). *Environment Bay of Plenty: Regional water and land plan: Review of efficiency and effectiveness of Rule 11*. Whakatane, New Zealand: Environment Bay of Plenty Regional Council.

Foucault, M. (1995). *Discipline and punish: The birth of the prison*. New York, NY: Vintage.

Fraser, N. (1989). *Unruly practices: Power, discourse and gender in contemporary social theory*. Minneapolis: University of Minnesota Press.

Fraser, T. (2011). Improving water quality in the Rotorua lakes. Retrieved February 5, 2014, from http://www.ourfuture.net.nz/Stories/127.

Freeman, C. (2004). Sustainable development from rhetoric to practice? A New Zealand perspective. *International Planning Studies, 9*(4), 307-326.

Freudenburg, W., Gramling, R., & Davidson, D. (2008). Scientific certainty argumentation methods (SCAMs): Science and the politics of doubt. *Sociological Inquiry, 78*(1), 2-38.

Freudenburg, W., William, R., & Young, T. (1999). Institutional failure in environmental management: Toward a fuller understanding of social problems and public policy. *Research in Social Problems and Public Policy, 7*, 3-18.

Galbreath, R. (1998). *Making science work: DSIR for New Zealand*. Wellington, New Zealand: Victoria University Press.

Gartner, D., & Coulter, G. (2002). *Partnership in lake management: The Taupo experiment(* 2002. 8-9 November, 2001). Paper presented at International Symposium on Building Partnerships between Citizens and Local Governments for Sustainable Lake Management, Kusata: Japan. http://www.unep.or.jp/ietc/publications/Freshwater/FMS3/copyright.asp

George, C. (2007). Sustainable development and global governance. *Environment and Development, 3*(16), 103-122.

George, S. (1999). *A short history of neo-liberalism: Twenty years of elite economics and emerging opportunities for structural change*. (1999. March 24-26, 1999). Paper presented at the Conference on Economic Sovereignty in a Globalising World, Bangkok, Thailand. Retrieved from http://www.globalexchange.org/resources/econ101/neoliberalismhist

Gibbs, M., Rutherford, J., & Hawes, I. (2002). Lake Taupo long-term monitoring programme 2000-2001: With a review of accumulated data since 1994. Hamilton, New Zealand: NIWA.

Giddens, A. (1984). *The constitution of society*. Cambridge, UK: Polity Press.

Gilling, B. (2009). Raupatu: The punitive confiscation of Maori land in the 1860's In R. Boast & R. Hill (Eds.), *Raupatu: The confiscation of Maori Land* (pp. 13-30). Wellington, New Zealand: Victoria University Press.

Gillroy, J. (Ed.). (1993). *Environmental risk, environmental values, and political choices: Beyond efficiency trade-offs in public policy analysis*. Boulder: CO: Westview Press.

Gleeson, B. (2000). The politics of consent notification. In A. Memon & H. Perkins (Eds.), *Environmental planning and management in New Zealand* (pp. 115-122). Palmerston North, New Zealand: Dunmore Press.

Gleeson, B., & Grundy, K. (1997). New Zealand's planning revolution five years on: A prelimanary assessment. *Journal of Environmental Planning and Management, 40*(3), 293-313.
Gleeson, S. (2010. February18, 2010, p.1). Environment court rules in favour of contentious Opito Bay subdivision, *Coromandel Peninsular Post*. *www.thepaperboy.com/*
Goldsmith, E., Allen, R., Allaby, M., Davoll, J., & Lawrence, S. (1972). A blueprint for survival. *The Ecologist, 2*, 1-43.
Gonzalez, S., & Healey, P. (2005). A sociological institutionalist approach to the study of innovation in governance capacity. *Urban Studies, 42*(11), 2055-2069.
Goodin, R. (1992). *Green political thought*. Cambridge, UK: Polity.
Gorman, P., & Watkins, T. (2010). ECan councillors sackedhttp://www.stuff.co.nz/the-press/news/3526047/ECan-councillors-sacked, *The Press*.
Gouin, D. (2006). Agricultural sector adjustment following removal of government subsidies in New Zealand. Research Report (2006/284) for Agribusiness & Economics Research Unit Lincoln University Christchuch New Zealand. Retrieved from www.lincoln.ac.nz/.../2332 *Report284.*
Gouin, D., Jean, N., & Fairweather, J. (1994). New Zealand agricultural rural policy performance and impact on the farm sector: Detailed historical analysis addressing the issue of the specificity of the farm sector. Research report (1994/230) for Agribusiness & Economics Research Unit Lincoln University. Christchuch New Zealand. Retrieved from *https://researcharchive.lincoln.ac.nz/bitstream/10182/.../aeru_rr_230.pdf*
Gouldson, A., & Murphy, J. (1997). Ecological modernisation: Economic restructuring and the environment. *The Political Quarterly, 68*(5), 74-86.
Gouldson, A., & Murphy, J. (1998). *Regulatory realities: The implementation and impact of industrial environmental regulation.* London, UK: Earthscan.
Gray, S., & Le-Heron, R. (2010). Globalising New Zealand: Fonterra co-operative group, and shaping the future. *New Zealand Geographer, 66*, 1-13.
Green Party. (2010). Greens celebrate Mackenzie decision. Retrieved July 29, 2010 from https://www.greens.org.nz/press-releases/greens-celebrate-mackenzie-decision
Green Party. (2011a, August 15, 2011). Experts debunk National policy statement on freshwater. Retrived from *blog.greens.org.nz/2011/.../experts-debunk-national-policy-statement-on.*
Green Party. (2011b). MAF statistics show Green's irrigation charge affordable. Retrieved November 15, 2013 from https://www.greens.org.nz/press-releases/maf-statistics-show-green-s-irrigation-charge-affordable.
Green Party. (2011c, 9 May 2011). Minister pulls teeth from clean water rules: Green Party media release. Retrieved May 9, 2011 from https://www.greens.org.nz/press-releases/minister-pulls-teeth-clean-water-rules.
Green Party. (2013a, 16 July 2013). 61% of monitored sites on NZ rivers now unsafe for swimming [Press Release]. Retrieved 19 July, 2013 from http://www.scoop.co.nz/stories/PA1307/S00422/61-of-monitored-sites-on-nz-rivers-now-unsafe-for-swimming.htm
Green Party. (2013b). Dam bad decision for rivers. *Press Release*. Wellington, New Zealand: Green Party.
Greenhalgh, S. (2011). Regional council insights for fresh water management. In S. Russell, B. Frame, & J. Lennox (Eds.), *Old problems new solutions:*

Integrated research supporting natural resource governance (pp 30-38). New Zealand Landcare Research: University of Otago. Dunedin New Zealand. Retrieved from, *www.landcareresearch.co.nz/.../researchpubs/opns_nat.*

Greenpeace New Zealand. (2009). *The changing face of New Zealand farming: Why boom and bust is not working*. Auckland, New Zealand: Green Peace New Zealand.

Group One. (2011). A brief history of solid fertiliser in New Zealand. Retrieved October18, 2011 from http://www.groupone.co.nz/Fertiliser/SolidFertilisers.aspx

Grundy, K. (2000). Purpose and principles: Interpreting Section 5 of the Resource Management Act. In P. Memon & H. Perkins (Eds.), *Environmental planning and management in New Zealand* (pp. 64-73) Palmerston North, New Zealand: Dunmore Press.

Guy, N. (2013a). *Irrigation investment company established*. Wellington, New Zealand: New Zealand Government. Retrieved January 14, 2014 from http://www.beehive.govt.nz/release/irrigation-investment-company-established.

Guy, N. (2013b, July 3, 2013,C3). Nathan Guy: Kick start for farming will be a boost for all: Opinion. *The New Zealand Herald*. Retrived from http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=10894272AD

Guy, N. (2013c). *Speech notes for the launch of strategy for sustainable dairy farming 2013-2020 and sustainable dairying: Water accord*. Wellington, New Zealand: New Zealand Government.

Hajer, M. (1995). *The politics of environmental discourse: Ecological modernization and the policy process*. Oxford, UK: Oxford University Press.

Hajer, M. (2009). Ecological modernisation as cultural politics. In A. Mol, D. Sonnenfeld, & G. Spaargaren (Eds.), *The ecological modernisation reader: Environmental reform in theory and practice* (pp. 246-268). London, UK: Routledge.

Hajer, M., & Versteeg, W. (2005). A decade of discourse analysis of environmental politics: Achievements, challenges, perspectives. *Journal of Environmental Policy & Planning, 7*(3), 175-184.

Hamill, K., & McBride, G. (2003). River water quality trends and increased dairying in Southland, New Zealand. *New Zealand Journal of Marine and Freshwater Research, 37*, 323-332.

Hamilton, D. (2006). Lake Rotoiti choking in algal grip. *The New Zealand Herald*. Herald feature; Conservation and environment (March, 2006) Retrived from http://www.waikato.ac.nz/php/research.php?mode=parent&doc=The+New+Zealand+Herald%2C+March+26.

Hamilton, D. (2011). *Fix the lakes: Where we are and what can be done?* Paper presented at the Lakeswater Quality Symposium 2011 (April 8, 2011). Rotorua, New Zealand.

Hamilton, D., & McBride, C. (2013). *Monitoring and modelling to support management and policies for Lake Rotorua*. Hamilton, New Zealand: LERNZ. Retrieved from http://www.lernz.co.nz/.

Hardi, P., & Zdan, T. (1997). Assessing sustainable development: Principles in practice Winnipeg, Canada:The International Institute for Sustainable Development (IISD). *www.csin-rcid.ca/downloads/bellagio.PDF*

Hardin, G. (1998). The tragedy of the commons. In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader* (pp. 23-34). Oxford, UK: Oxford University Press.
Harding, R. (2007). Muddying the waters: Managing agricultural water quality in New Zealand. *Policy Quarterly, 3*(3), 16-24.
Hartstock, N. (1999). Foucault on power: A theory for women? In L. Nicholson (Ed.), *Feminism/postmodernism*. London, UK: Routledge.
Harvard University's Center for International Development. (2013). The sustainability science progamme. Retrieved February 20, 2014 from http://www.hks.harvard.edu/centers/mrcbg/programs/sustsci/about-us.
Harvey, D. (1996). *Nature and the geography of difference*. London, UK: Blackwell.
Harvey, D. (2005). *A brief history of neoliberalism*. Oxford, UK: Oxford University Press.
Hay, R. (2005). Becoming ecosynchronous, Part 1: The root causes of our unsustainable way of life. *Sustainable Development, 13*, 311-325.
Hayward, J. (2011). Appendix: Interpretation of the principles of the Treaty of Waitangi. In *Effective Exclusion: Parks Report Wai 262* (pp. 475-494) Waitangi Tribunal Report Wellington, New Zealand:New Zealand Government. *www.justice.govt.nz/tribunals/waitangi-tr.*.
Hayward, T. (1994). *Ecological thought: An introduction*. Cambridge, UK: Polity Press.
Hean, T. (2002). Mining the quarry. In E. Pawson & T. Brooking (Eds.), *Environmental histories of New Zealand* (pp. 84-99). Melbourne, Australia: Oxford University Press.
Heath, C. (2011). Sustainable land use and behavioural change: How to support and develop new practices for farmers and lifestylers: A literature review. Bay of Plenty Regional Council: Whakatane New Zealand. *www.rotorualakes.co.nz/vdb/document/180*
Hediger, W. (1999). Reconciling 'weak' and 'strong' sustainability. *International Journal of Social Economics*, *26*(7-9), 1120-1143.
Higgs, J. (2010). Demystifying data analysis: A kaleidoscope of decisionmaking, congruence and evolution. In J. Higgs, N. Cherry, R. Macklin, & R. Ajjawi (Eds.), *Researching practice: A discourse on qualitative methodologies* (pp. 165-172). Rotterdam, The Netherlands: Sense.
Higgs, J., Cherry, N., Macklin, R., & Ajjawi, R. (Eds.). (2010). *Researching practice: A discourse on qualitative methodologies*. Rotterdam, The Netherlands: Sense.
Higgs, J., & Trede, F. (2010). Philosophical frameworks and research communities. In J. Higgs, N. Cherry, R. Macklin, & R. Ajjawi (Eds.), *Researching practice: A discourse on qualitative methodologies* (pp. 31-36). Rotterdam, The Netherlands: Sense.
Hill-Young & Cooper. (2006). Improving the management of freshwater resources: Issues and opportunities. Wellington, New Zealand: Ministry for the Environment.
Hill, R., Couchman, P., & Gidlow, B. (1990). Work and technology. In P. Green (Ed.), *Studies in New Zealand Social Problems* (pp. 213-233). Palmerston North, New Zealand: Dunmore Press.
Holden, E., & Linnerud, K. (2007). The sustainable development area: Satisfying basic needs and safeguarding ecological sustainability. *Sustainable Development, 15*, 174-187.

Holdom, J. (1998). *Schooling for 'lesser beings': The political culture, and historiography of schooling for Maori te kopua native/Maori school: A biography* (unpublished master's dissertation). Hamilton, New Zealand, The University of Waikato.

Hopkins, A., & Wilson, R. (2006). Temperate grassland: Key developments in the last century and future perspectives. *Journal of Agricultural Science, 144*, 503-523.

Horizons Regional Council. (2012). *Dairying and clean streams accord: Regional action plan for the Manawatu-Wanganui region 2010-11: Progress report*. Wanganui, New Zealand: Horizons Regional Council.

Howard-Williams, C., Davies-Colley, R., Rutherford, K., & Wilcock, R. (2010. 12-17 Septmber, 2010). *Diffuse pollution and freshwater degradation: New Zealand perspectives.* Paper presented at the 14th International Conference IWA Diffuse Pollution Specialist Group: Québec Canada.

Howarth, D. (1995). Discourse theory. In D. Marsh & G. Stoker (Eds.), *Theory and methods in political science* (pp. 116-133). London, UK: MacMillan Press Ltd.

Howarth, D. (2004). Hegemony, political subjectivities, and radical democracy. In S. Crtichley & O. Marchart (Eds.), *Laclau: A critical reader*.(pp. 256-276). New York, NY: Routledge.

Howarth, D., Norval, A., & Stavrakakis, Y. (Eds.). (2000). *Discourse theory and political anlaysis: Identities, hegemonies and social change*. Manchester, UK: Manchester University Press.

Howes, M., McKenzie, M., Gleeson, B., Gray, R., Byrne, J., & Daniels, P. (2009). A preliminary assessment of the potential to adapt ecological modernisation to the Australian context. *Urban Research Program* (pp. 1-16). Brisbane, Australia: Griffiths University.

Howlett, M., & Ramesh, M. (1995). *Studying public policy: Policy cycles and policy subsystems*. Oxford, UK: Oxford University Press.

Huber, J. (1982). *Die Verlorene Unschuld der Okologie. Neue Technologien und Superindustrielle Entwicklung* (The lost innocence of ecology: New technologies and super industrial development). Frankfurt, Germany: Fischer.

Huber, J. (2000). Towards industrial ecology: Sustainable development as a concept of ecological modernization. *Environmental Policy and Planning, 2*, 269-285.

Huber, J. (2008). Pioneer pountries and the global diffusion of environmental innovations: Thesis from the viewpoint of ecological modernisation theory. *Global Environmental Change, 18*, 360-367.

Huber, J. (2009). Ecological modernisation: Beyond scarcity and bureaucracy. In A. Mol, D. Sonnenfeld, & G. Spaargaren (Eds.), *The ecological modernisation reader: Environmental reform in theory and practice* (pp. 42-56). New York, NY: Routledge.

Hudson, R. (2005). Towards sustainable economic practices, flows and spaces: Or is the necessary impossible and the impossible necessary? *Sustainable Development, 13*, 239-252.

Hull, Z. (2008). Sustainable development: Premises, understanding and prospects. *Sustainable Development, 16*, 73-80.

Human Rights Commission. (2013). Human rights and the Treaty of Waitangi: Te Arawa – Rotorua lakes restoration programme. Retrieved November 4, 2013 from http://www.hrc.co.nz/human-rights-and-the-treaty-of-

waitangi/crown-tangata-whenua-engagement/te-arawa-rotorua-lakes-restoration-programme.

Husemann, M. (2004). The failure of eco-efficiency to guarantee sustainability: Future challenges for industrial ecology. *Environmental Progress, 23*(4), 264-270.

Hutman, J. (2007). The Polanyian way? Voluntary food labels as neoliberal governance. *Antipode, 39*(3), 456-478.

Isern, T. (2002). Companions, stowaways, imperalists, invaders: Pests and weeds in New Zealand. In E. Pawson & T. Brooking (Eds.), *Environmental histories of New Zealand* (pp.233-245). Oxford, UK: Oxford University Press.

Jabareen, Y. (2004). A knowledge map for describing variegated and conflict domains of sustainable development. *Journal of Environmental Planning and Management, 47*(4), 623-642.

Jackson, T., & Dixon, J. (2007). The New Zealand Resource Management Act: An exercise in delivering sustainable development through an ecological modernisation agenda. *Environment and Planning B: Planning and Design, 34*, 107-120.

Jänicke, M. (1985). Preventive environmental policy as ecological modernisation and structural policy. *Discussion Paper IIUG dp 85-2*. Berlin, Germany: Internationales Institut Für Umwelt und Gesellschaft, Wissenschaftszentrum.

Jänicke, M. (2009). On ecological and political modernization. In A. Mol, A. Sonnenfeld, & G. Spaargaren (Eds.), *The ecological modernisation reader: Environmental reform in theory and practice*.(pp. 28-41). London, UK: Routledge.

Jänicke, M., & Jorgens, H. (2009). New approaches to environmental governance. In A. Mol, A. Sonnenfeld, & G. Spaargaren (Eds.), *The ecological modernisation reader: Environmental reform in theory and practice* (pp. 156-189). London, UK: Routledge.

Jaworski, A., & Coupland, N. (Eds.). (1999). *The discourse reader*. London, UK: Routledge.

Jay, M. (2003). *Production, environment and biodversity: Conflicting dairy discourses?* (July 6-11, 2003) Paper presented at the New Zealand Geographical Society, 22nd Conference University of Auckland: Auckland, New Zealand.

Jay, M. (2004a). Productivist and post-productivist conceptualisations of agriculture from a New Zealand perspective. In G. Kearsley & B. Fitzharris (Eds.), *Glimpses of a Gaian world: Essays in honour of Peter Holland* (pp. 151-170). Dunedin, New Zealand: University of Otago.

Jay, M. (2004b). *Symbolic order and material agency: A cultural ecology of native forest remnants on Waikato dairy farms* (unpublished doctoral dissertation). The University of Waikato, Hamilton, New Zealand.

Jay, M. (2007). The political economy of a productivist agriculture: New Zealand dairy discourses. *Food Policy, 32*, 266-279.

Jay, M., & Morad, M (2005) *A critical appraisal of the concept of ecological modernisation: A case study from New Zealand's diary industry* (December 12-15, 2005). Paper presented at the MODSIM 2005 International Congress on Modelling and Simulation Society of Australia and New Zealand. Melbourne: Australia.

Joy, M. (2012). The scientfic evidence against intensive dairying and how it is affecting our freshwater systems. How do you see it? Retrieved March 25,

2014 from http://www.interest.co.nz/rural-news/61408/mike-joy-details-scientific-evidence-against-intensive-dairying-and-how-it-affecting
Kates, R. (2011). What kind of a science is sustainability science? Proceedings of National Academy of Sciences (December 6, 2011). 108(49), 19449-19450. doi: 10.1073/ *www.rwkates.org/pdfs/a2011.03.pdf.*
Kathlene, L. (2006). *Water in 2025: Beliefs and values as a means for cooperation*. Colorado: Colorado Institute of Public Policy. Retrieved from,*www.academia.edu/.../Water_in_2025_Beliefs_and_Values_as_a_Means.*
Keeley, J., & Scoones, I. (1999). *Understanding environmental policy processes: A review*. Sussex, UK: University of Sussex.
Keene, H. (2013, November 19, p. 11). Water standards in community's hands, *Straight Furrow*. http://www.straightfurrow.co.nz.
Kelsey, J. (1989). *The principles of the Treaty of Waitangi*. Wellington, New Zealand: Ministry for the Environment.
Kelsey, J. (1995). *The New Zealand experiment: A world model for structural adjustment*. Auckland, New Zealand: Bridget Williams Books & Auckland University Press.
Kesting, S., Courvisanos, J., & Wells, P. (2010). *Political aspects of innovation in the New Zealand dairy industry* (June 16-18, 2010). Paper presented at the Opening Up Innovation: Strategy, Organization and Technology, Imperial College London Business School. London: England.
Kilvington, M. (1998). *A multi-stakeholder approach to sustainable catchment management: Report on the approach*. Hamilton, New Zealand: Enviroment Waikato.
Kingdon, J. (1995). *Agendas, alternatives and public policies*. London, UK: Longman.
Kingi, T. (2011). *The pastoral sector's contribution to water quality improvement in Lake Rotorua.* Paper presented at the Rotorua Lakes Symposium 2011 (April 8, 2011), Rotorua, New Zealand.
Kirk, R., Morgan, R., Single, M., & Fahey, B. (1999). Applied physical geography in New Zealand. *Progress in Physical Geography,* 23, 525-540.
Kirsch, S. (2009). Sustainable mining. *Dialectical Anthropology*, 1-7.
Kitchen, L., & Marsden, T. (2009). Creating sustainable rural development through stimulating the eco-economy: Beyond the eco-economic paradox? *European Society for Rural Sociology, 49*(3), 273-294.
Korhonen, J. (2008). Reconsidering the economics logic of ecological modernization. *Environment & Planning A, 40*, 1331-1346.
Kumar, R. (2000). Contradictory discourses, state ideology and policy interpretations: A feminist evaluation of the reproductive and child health programme in Kerala, India: (unpublished doctoral dissertation). The University of Waikato, Hamilton, New Zealand.
Kurian, P. (2000). *Engendering the environment? Gender in the World Bank's environmental policies*. Burlington,VT: Ashgate-Aldershot.
Kurian, P., & Bartlett, R. (2011). Environment and development. In R. Denemark (Ed.), *International studies encyclopedia.* Blackwell Online: Blackwell.
Kurian, P., & Wright, J. (2012). Science, governance, and public participation: An analysis of decision making on genetic modification in Aotearoa/New Zealand. *Public Understanding of Science, 21*(4), 447-464.
Laclou, E., & Mouffe, C. (1985). *Hegemony and socialist strategy: Towards a radical democratic politics*. London, UK: Verso.

Lafferty, W. (1999). Introduction: The pursuit of sustainable development: Concepts, policies and arenas. *International Political Science Review, 20,* 123-128.

Lafferty, W. (2004a). From environmental protection to sustainable development: The challenge of decoupling through sectoral integration. In W. Lafferty (Ed.), *Governance for sustainability: The challenge of adapting form to function* (pp. 191–220). Cheltenham, UK: Edward Elgar.

Lafferty, W. (Ed.). (2004b). *Governance for sustainability: The challenge of adapting form to function*. Cheltenham, UK: Edward Elgar.

Lake Taupo Forest Trust. (2004). *Identification of Maori land (multiple titles) within the Lake Taupo catchment: Report to Environment Waikato* Taupo, New Zealand: Lake Taupo Forest Trust.

Lake Taupo Protection Trust. (2007). *Strategic plan 2008-2011*. Taupo, New Zealand: Lake Taupo Protection Trust.

Lake Taupo Protection Trust. (2013). About us. Retrieved November 4, 2013 from http://www.laketaupoprotectiontrust.org.nz/page/5-Home.

Lakes Water Quality Society. (2010). Lakes news. *Lakes News*. Retrieved November 14, 2013 from http://www.lakeswaterquality.co.nz/index.php?option=com_content&view=article&id=78&Itemid=82

Langhelle, O. (1999). Sustainable development: Exploring the ethics of our common future. *International Political Science Review, 20,* 129-148.

Langhelle, O. (2000). Why ecological modernization and sustainable development should not be conflated. *Journal of Environmental Policy & Planning* 2(4), 303-322.

Larner, W. (1997). "A means to an end". Neoliberalism and state processes in New Zealand. *Studies in Political Economy 52*, 7-38.

Larner, W. (2000). Neo-liberalism, policy, ideology, governmentality. *Studies in Political Economy, 63*, 5-26.

Laugesen, R. (2010, Feb 27-5 March 2010). Sneaking into paradise, *New Zealand Listener*. Retrieved March 12, 2012 from, APN http://www.listener.co.nz/issue/3642/features/14963/sneaking_into_paradise.html1'.

Lawrence, S., & Arunachalam, M. (n.d.). *Community involvement in business decision making: Towards a sustainable future*. Waikato Management School, University of Waikato. Hamilton, New Zealand. Retrieved from https://research.mbs.ac.uk/hsc/Portals/0/docs/TaupoNZ.pdf

Ledgard, S. (2009). *Section 42 report of Dr Stewart Francis Ledgard on behalf of Horizons Regional Council concering water quality.* Submissions concerning the proposed One Plan notified by the Manawatu-Wanganui Regional Council. Wanganui, New Zealand: Manawatu-Wanganui Regional Council.

Ledgard, S., Sprosen, M., Redding, M., Ghani, A., Smeaton, D., & Webby, R. (2007). Practical mitigation options to reduce nitrogen and phosphorus losses from farms into Rotorua lakes. Hamilton, New Zealand: AgReseach Hamilton.

Lee, K. (1998). The Columbia river basin: Experimenting with sustanability. In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader* (pp. 96-109). Oxford, UK: Oxford Univesity Press.

LERNZ. (2012). Linking lake restoration research with end users to achieve outcomes. Retrieved November 15, 2012 from, http://www.lernz.co.nz/index.html.

Levy, B. (1970). *The grasslands of New Zealand*. Wellington, New Zealand: Government Printer.
Levy, N. (1999). Foucault's unnatural ecology. In E. Darier (Ed.), *Discourses of the environment* (pp 203–16). Oxford, UK: Blackwood.
Lipschutz, R. (2004). *Global environmental politics: Power, perspectives, and practice*. Washington, DC: CQ Press.
Littig, B., & Griebler, E. (2005). Social sustainability: A catchword between political pragmatism and social theory. *International Journal Sustainable Development, 8*(1/2), 65-79.
Liu, Y., Gupta, H., Springer, E., & Wagener, T. (2008). Linking science with environmental decision making: Experiences from an integrated modeling approach to supporting sustainable water resources management. *Environmental Modelling & Software, 23*, 846-858.
Livestock Improvement Corporation. (2009). *100 Years of herd testing 1909-2009*. Hamilton, New Zealand: Livestock Improvement Corporation Ltd.
Lock, K., & Kerr, S. (2008). Nutrient trading in Lake Rotorua: Overview of a prototype system. *Motu Economic and Public Policy Research*: Motu Working Paper MWP0802. Retrieved August 20, 2013 from, http://www.motu.org.nz/publications/detail/nutrient trading in lake Rotorua overview of a prototype system.
Longhurst, R., & Smeaton, D. (2008). *Improving nutrient efficiency through intergrated catchment management in the Little Waipa and Waipapa*. Hamilton, New Zealand: Environment Waikato.
Lord Bledisloe. (1932). A conspectus of recent agricultural research with some reflections there on. In C. Institute (Ed.), *Cawthron Lecture*. Nelson, New Zealand: Cawthron Institute.
Lovelock, J. (1988). *The ages of Gaia: A biography of our living Earth*. Oxford, UK: Oxford University Press.
Luke, T. (2005). Neither sustainable nor development: Reconsidering sustainability in development. *Sustainable Development, 13*, 228-238.
Lundqvist, L. (2004). Management by objectives and results: A comparison of Dutch, Swedish and EU strategies for realising sustainable development. In W. Lafferty (Ed.), *Governance for sustainable development: The challenge of adapting form to function* (pp. 95-127). Cheltenhan, UK: Edward Elgar.
MacDonald, C. (2003). The value of discourse analysis as a methodlogical tool for understanding a land reform programme. *Policy Science, 36*, 151-173.
Mackay, M., Perkins, H., & Espiner, S. (2009). The structure of rural change from a social science perspective. Christchurch, New Zealand: Lincoln University.
MAF (1997). *Impacts of dairy conversions in the Taupo district*. Wellington, New Zealand: New Zealand Government.
Manderson, A. (2006). A systems based framework to examine the multi-contextual application of the sustainability concept. *Environment Development and Sustainability, 8*, 85-97.
Maori Party, & United Future. (2013). Māori Party, United Future: RMA Changes Strike a Rock. Retrieved Novmber, 14 2013 from http://www.scoop.co.nz/stories/PA1309/S00195/maori-party-united-future-rma-changes-strike-a-rock.htm.
March, J., & Olsen, J. (1989). *Rediscovering institutions: The organisational basis of politics*. New York, NY: The Free Press Macmillan.

Marr, C. (1997). Public works: Taking of Maori land 1840-1981. *Rangahaua Whanui Series*. Wellington, New Zealand: Waitangi Tribunal.
Marsden, M. (1992). Kaitiakitanga: A definitive introduction to the holistic world view of the Maori, paper prepared for the Ministry for the Environment (November *1992*). New Zealand Government: Wellington New Zealand.
Martin, M. (2011, July, 21). Farmers sign deal to clean Lake Rotorua, *The Rotorua Daily Post*. Retrieved from http://www.nzherald.co.nz/rotorua-daily-post/rural/news/article.cfm?c_id=1503433&objectid=11035683
McAloon, J. (2002). Resource frontiers, environment, and settler capitalism:1769-1860. In E. Pawson & T. Brooking (Eds.), *Environmental histories of New Zealand* (pp. 52-68). Oxford, UK: Oxford University Press.
McCarthy, J., & Prudham, S. (2004). Neoliberal nature and the nature of neoliberalism. *Geoforum, 35*, 275-283.
McCaskill, L. (1973). *Hold this land: A history of soil conservation in New Zealand*. Wellington, New Zealand: Reed.
McCrone, J. (2011, September 10, 2011). Who controls our water? *Waikato Times*, p. B6.
McGregor, L. (1988). *Seed of a country: A story of the life and times of John and Janet McGregor*. Privately published.
McGuinness, W. (2005). A national sustainable development strategy: How New Zealand Measures up against International Commitments. *Discussion Paper 1*. Wellington, New Zealand: Sustainable Future Limited.
McKenzie, S. (2004). The Resource Managment Act 1991 and the practice of environmental governance in New Zealand: The example of Lake Taupo. *New Zealand Geographer, 60*(1), 18-24.
McKinlay Douglas Limited. (2004). *Government funding of Rotorua lakes restoration*. Tauranga, New Zealand: Environment Bay of Plenty.
McMeekan, G. (1964). *Grass To milk: A New Zealand philosophy*. Wellington, New Zealand: The New Zealand Dairy Exporter.
McNicholas, M. (2013, November 3, 2013). Critics slam 'innovative' water regime as weak. *Farmers Weekly*. Retrieved January 15, 2014 from http://agrihq.co.nz/article/critics-slam-innovative-water-regime-as-weak?p7
Meadowcroft, J. (2004). Participation and sustainable development: Modes of citizen, community and organisational involvement. In W. Lafferty (Ed.), *Governance for sustainable development: The challenge of adapting form to function* (pp 162-190). Cheltenham, UK: Edward Elgar.
Meadows, D., Meadows, D., Randers, J., & Behrens, W. (1972). *The limits to growth.* New York, NY: Universe Books.
Memon, P. (2000). Freshwater management policies in New Zealand. In P. Memon & H. Perkins (Eds.), *Environmental planning and management in New Zealand*. Palmerston North, New Zealand: Dunmore Press.
Merchant, C. (1980). *The death of nature: Women, ecology, and the scientific revolution*. San Francisco, US: Harper & Row.
Milanez, B., & Bührs, T. (2007). Marrying strands of ecological modernisation: A proposed framework. *Environmental Politics, 16*(4), 784-803.
Miller, C. (2003). *Rotorua lakes water quality research: A bibliography* (unpublished master's dissertation). Victoria University, Wellington, New Zealand.
Ministry Agriculture and Forestry (MAF). (2003 (c)). *Clean streams accord between Fonterra Co-operative Group, Regional Councils, Ministry for the Environment, Ministry of Agriculture and Forestry (MAF) and*

Ministry For Environment (MFE). Wellington, New Zealand: New Zealand Government. Retrieved July 28, 2010 from www.mfe.govt.nz/issues/land/rural/dairying-accord-may03.pdf.

Ministry Agriculture and Forestry (MAF). (2007). *Sustainable land managment and climate change: Plan of action* www.maf.govt.nz/mafnet.rural-nzn. Wellington, New Zealand: New Zealand Government.

Ministry for the Environment. (1997). *Towards sustainability: Environment 2010 and the green package*. Wellington, New Zealand: New Zealand Government. Retrieved March 25, 2010 from http://www.mfe.govt.nz/publications/ser/ser1997/html/chapter4.9.html.

Ministry for the Environment. (2001). *Valuing New Zeland's clean green image*. (ME405 August, 2001). Wellington, New Zealand: New Zealand Government.

Ministry for the Environment. (2003a). *Dairying and clean streams accord between Fonterra Co-operative Group, Regional Councils, Ministry for the Environment, and Ministry of Agriculture and Forestry.* Wellington, New Zealand: New Zealand Government. Retrieved August 4, 2010 from http://www.mfe.govt.nz/issues/land/rural/dairying-accord-may03.pdf.

Ministry for the Environment. (2003b, 6 January 2009). *Report to the Minister for the Environment on Lake Rotoiti and other Rotorua lakes.* Retrieved January 20, 2013 from http://www.mfe.govt.nz/issues/water/rotorua-lakes/minister-report.html.

Ministry for the Environment. (2003c). *Sustainable development for New Zealand: Programme of action*. Wellington, New Zealand: New Zealand Government.

Ministry for the Environment. (2004a). *The dairying and clean streams accord: Snapshot of progress: 2003/2004.* Wellington, New Zealand: New Zealand Government. Retrieved August 6, 2010 from, http://www.mfe.govt.nz/publications/land/dairying-clean-stream-accord/.

Ministry for the Environment. (2004b). Water programme of action: The effects of rural land use on water quality. Wellington, New Zealand: Ministry for the Environment.

Ministry for the Environment. (2006a). *Appendix 4: Glossary of RMA terms: Your guide to the Resource Managment Act*. (Ref. ME7662). Wellington, New Zealand: New Zealand Goverenment.

Ministry for the Environment. (2006b). *Freshwater for the future: A supporting document*. (ME 722). Wellington, New Zealand: New Zealand Government.

Ministry for the Environment. (2007). *Environment New Zealand 2007*. Wellington, New Zealand: New Zealand Government. Retrieved April 10 2012 from http://www.mfe.govt.nz/publications/ser/enz07-dec07/environment-nz07-dec07.pdf.

Ministry for the Environment. (2009a). *Backgrounder on 'New Start for Fresh Water' Cabinet paper*. Wellington, New Zealand: New Zealand Government. Retrieved October 15, 2012 from, http://www.mfe.govt.nz/issues/water/freshwater/new-start-fresh-water.html.

Ministry for the Environment. (2009b). *New start for freshwater*. (Cabinet paper). Wellington, New Zealand: New Zealand Government. Retrieved October 15, 2012 from http://www.mfe.govt.nz/issues/water/freshwater/new-start-for-fresh-water-paper.html.

Ministry for the Environment. (2009c). *Reporting on New Zealand's environment: How the National Environmental Reporting Programme works*. (ME 921). Wellington, New Zealand: New Zealand Government..
Ministry for the Environment (2011). The Environment Court: Awarding and securing costs. *An everyday guide to the Resource Management Act: Series 6.3.* Retrieved February 24, 2011 from, http://www.mfe.govt.nz/publications/rma/everyday/court-costs/.
Ministry for the Environment. (2011a). *Fresh start for fresh water reforms 2011*. Wellington, New Zealand: New Zealand Government. Retrieved March 17, 2014 from, http://www.mfe.govt.nz/issues/water/freshwater/fresh-start-for-fresh-water/index.html.
Ministry for the Environment. (2011b). Guidance on consents process. *Planning guide: Guidance on consents process.* Retrieved February 14, 2011 from http://www.qualityplanning.org.nz/consents/notify.php#definitions.
Ministry for the Environment. (2011c). *National policy statement for freshwater management 2011*. Wellington, New Zealand: New Zealand Government.
Ministry for the Environment. (2011d). National policy statement for freshwater management 2011: Implementation Guide. Wellington, New Zealand: Ministry for Environment.
Ministry for the Environment. (2011e). Regulatory impact and compliance cost statement: Proposed national policy statement on freshwater management. *Resource Management Act: Improving and implementing the RMA.* Retrieved February 28, 2011from, *https://www.mfe.govt.nz/rma/central/.../regulatory-impact-statement.html*
Ministry for the Environment. (2013a). Freshwater reform 2013 and beyond. *Regulated National Objectives Framework.* Retrieved November 27, 2013 from, http://www.mfe.govt.nz/issues/water/freshwater/freshwater-reform-2013/index.html.
Ministry for the Environment. (2013b). *Freshwater reform 2013 and beyond*. (ME1109). Wellington, New Zealand: New Zealand Government.
Ministry for the Environment. (2013c). *Improving our resource management system. A discussion document*. (ME1103). Wellington, New Zealand: New Zealand Government. Retrieved May 14, 2014 from, http://www.mfe.govt.nz/publications/rma/improving-our-resource-management-system-discussion-document.pdf.
Ministry for the Environment. (2013d). *Improving our resource management system: A discussion document.* (February 2013.). Wellington, New Zealand: New Zealand Government. Retrieved May 16, 2014 from, http://www.mfe.govt.nz/publications/rma/improving-our-resource-management-system-discussion-document.pdf.
Ministry for the Environment. (2014). *2013 RMA amendments: Section 32*. Wellington, New Zealand: New Zealand Government. Retrieved May 16, 2014 from, http://www.mfe.govt.nz/rma/reform/phase-two/2013-rma-amendments.html.
Ministry of Primary Industries. (2012). *The New Zealand dairy herd improvement industry transfer of the core database and review of regulatory settings*. (MPI Discussion Paper No: 2012/26). Wellington, New Zealand: NZ Government. Retrieved Date from http://www.mpi.govt.nz/Portals/0/Documents/news-resources/consult/nz-dairy-herd-discussion-paper.pdf.
Ministry of Primary Industries. (2013). *Irrigation acceleration fund*. Retrieved Febuary14, 2014 (http://www.mpi.govt.nz/environment-natural-

resources/funding-programmes/irrigation-acceleration-fund). Wellington, New Zealand: New Zealand Government.
Ministry Primary Industries. (2013). Sustainable farming fund. Retrieved December 12,, 2013 from http://www.mpi.govt.nz/environment-natural-resources/funding-programmes/sustainable-farming-fund.
Mirovitskaya, N., & Asher, W. (Eds.). (2001). *Guide to sustainable development and environmental policy*. Durham, UK: Duke University.
Mitcalfe, K. (2002). Valuing our environment: The costs of the RMA. Wellington, New Zealand: Forest and Bird.
Moe-Lobeda, C. (2002). A review of critical social theory: Prophetic reason, civil society, and Christian imagination by Gary Simpson. *Journal of Lutheran Ethics, 2*(4). Online journal 2:4 (April 22, 2002).
Mokyr, J. (2004). Long-term economic growth and the history of technology. In P. Aghion & S. Durlau (Eds.), *Handbook of economic growth,* Retrieved July 24, 2011 from http://mauricio.econ.ubc.ca/pdfs/Mokyr1.pdf.
Mol, A. (1995). The refinement of production: Ecological modernization theory and the chemical industry. The Hague, The Netherlands.
Mol, A. (1996). Ecological modernisation and institutional reflexivity: Environmental reform in the late modern age. *Environmental Politics, 5*(2), 302-323.
Mol, A. (2000). The environmental movement in an era of ecological modernisation. *Geoforum, 31*, 45-56.
Mol, A., & Spaargaren, G. (2000). Ecological modernisation theory in debate: A review. *Ecological Politics, 9*(1), 17-49.
Moller, H., MacLeod, C., y, J. H., Rosin, C., Blackwell, G., Perley, C., Gradwohl, M. (2008). Intensification of New Zealand agriculture: Implications for biodiversity. *New Zealand Journal of Agricultural Research, 51*, 253-263.
Morgan, G., & Simmons, G. (2014. January 15, 2014, n.p.). Dairy doing dirty on our environment. *The New Zealand Herald*. Retrieved February 16, 2014 from http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11186378
Morgan, R. (2000). The practice of environmental impact assessment in New Zealand: Problems and prospects. In P. Memon & H. Perkins (Eds.), *Environmental Planning and Management in New Zealand* (pp.94-104). Palmerston North, New Zealand: Dunmore Press.
Morris, N. (1965). *Early days in Franklin*. Auckland, New Zealand: Franklin County Council.
Murphy, J., & Gouldson, A. (2000). Environmental policy and industrial innovation: Integrating environment and economy through ecological modernisation. *Geoforum, 31*, 33-44.
Nayga, R., & Mtong, P. (1994). A structural analysis of the New Zealand dairy industry. *Journal of Food Distribution Research, February 1994*, 69-74.
Neale, A. (1997). Organising environmental self-regulation: Liberal governmentality and the pursuit of ecological modernisation in Europe. *Environmental Politics, 6*(4), 1-24.
Neems, J. (2010. June 10, 2010, p. 7). Lakes crying out for care. *Waikato Times*. Hamilton, New Zealand.
New Zealand Dairy Board (1974). Dairy industry information at a glance. Wellington, New Zealand: New Zealand Dairy Board.

New Zealand Farm Environment Trust. (2013). Balance farm environment awards. Retrieved August 24, 2013 from, http://www.nzfeatrust.org.nz/ballance_farm_environment_awards.
New Zealand Farmers Union. (1902). *Some reasons why every farmer should join the New Zealand Farmers' Union*. Wellington, New Zealand: Colonial Council.
New Zealand Government. (2003). *The origins of the Māori seats*. Retrieved March 15, 2013 from http://www.parliament.nz/resource/0000111521. Wellington, New Zealand: New Zealand Government.
Te Arawa Lakes Settlement Act 2006, Public Act 2006 No 43 New Zealand Government. (2006).
New Zealand Heritage. (1973). The grasslands revolution. In R. Knox (Ed.), *New Zealand heritage: The making of a nation* (Part 80, pp. 2157-2163). Wellington, New Zealand: Paul Hamlyn Limited.
New Zealand History NetOnline. (2013). Treaty facts and questions:Why are there Treaty of Waitangi claims? Retrieved August 12, 2013 from, *www.nzhistory.net.nz › Politics and government › Treaty of Waitangi*
The New Zealand Settlements Act, No. 8 Stat. (1863). Retrieved from http://www.legislation.govt.nz/bill/.
Newport, J. (1977). *Sovereign butter: Seventy five years of production*. Blenheim, New Zealand: Express Printing Works.
NIWA. (2010a). *Freshwater quality monitoring by Environment Southland, Taranaki Regional Council, Horizons Regional Council and Environment Waikato*. (NIWA Project OAG11501). Wellington, New Zealand: New Zealand Government.
NIWA. (2010b). *How clean are our rivers?* (1 July 2010). Hamilton, New Zealand: New Zealand Government. Retrieved October 15, 2013 from, http://www.niwa.co.nz/publications/wa/water-atmosphere-1-july-2010/how-clean-are-our-rivers.
Norman, R. (2007. August 20, 2013). RMA needs national policy statements and environmental standards. Retrieved October, 15 2013 from, http://blog.greens.org.nz/2007/07/15/rma-needs-national-policy-statements-and-environmental-standards/.
NZ Farmers Weekly. (2012, March 12, p. 14). *NZ Farmers Weekly*. Retrieved from www.farmersweekly http://viewer.zmags.com/publication/b50b90bc#/b50b90bc/24.
O'Malley, V., Stirling, B., & Penetito, W. (2010. *The Treaty of Waitangi companion: Maori and Pākehā from Tasman to today*. Auckland, New Zealand: Auckland University Press.
O'Riordan, T. (1971). *Perspectives on resource management*. London, UK: Pion.
O'Riordan, T. (1976). *Environmentalism*. London, UK Pion.
O'Riordan, T. (1999). Ecocentrism and technocentrism. In M. Smith (Ed.), *Thinking about the environment: A reader*. London, UK: Routledge.
OECD. (2001a). Policies to enhance sustainable development. *Sustainable Development*. Paris, France: OECD.
OECD. (2001b). Sustainable development: Critical issues: Organisation for Economic Co-operation and Development. Paris, France: OECD.
OECD. (2002). Improving policy coherence and integration for sustainable development. *PUMA*. Paris, France: OECD.
OECD. (2006). *Good practices in the national sustainable development strategies of OECD countries*. Paris, France: OECD.

Office of the Minister for Environment. (2011). *New start for fresh water*. (Cabinet report). Wellington, New Zealand: New Zealand Government.
Oil Free Wellington. (2014). March against deep-sea drilling; Protestors sign trespass notice. Wellington, New Zealand: Retrieved March 15 2014 from, *Wellington*.scoop.co.*nz » March against deep-sea drilling 639.*
Oliver, W. (1991). *Claims to the Waitangi Tribunal*. Wellington, New Zealand: Waitangi Tribunal Divison & Daphne Brasell Associates Press.
Oman, C. (1996). The policy challenges of globalisation and regionalisation Policy Brief No. 11, OECD Development Centre, Paris:OECD.
Omundsen, A. (2013, September 6). 2013 RMA Reform Act endangers democracy and environment. *Wellington Scoop.co.nz* Retrieved February 15, 2014 from, http://www.scoop.co.nz/stories/HL1309/S00073/2013-rma-reform-act-endangers-democracy-and-environment.htm.
Oram, R. (2013a). Fonterra's mining issue. Retrieved March 15, 2014 from, http://www.stuff.co.nz/business/opinion-analysis/9161719/Oram-Fonterras-burning-issue.
Oram, R. (2013b). A naked power grab. Retrieved March 15, 2014 from, http://www.stuff.co.nz/business/opinion-analysis/8400307/Oram-A-naked-power-grab.
Orange, C. (1987). *The Treaty of Waitangi*. Wellington, New Zealand: Allen & Unwin.
Paehlke, R. (1998). Environmental values for a sustainable society: The democratic challenge. In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader* (pp. 147-161). Oxford, UK: Oxford University Press.
Palmer, G. (2013). *Protecting New Zealand's environment: An analysis of the Government's proposed freshwater management and Resource Managment Act 1991 reforms*. Wellington, New Zealand: Fish & Game New Zealand.
Palmer, M. (2001). The Treaty of Waitangi legislation. *The New Zealand Law Journal*, June 2001, 207-212.
Park, G. (2001). Effective exclusion?: An exploratory overview of Crown actions and Māori responses concerning the indigenous flora and fauna, 1912-1983. *Waitangi Tribunal (Wai 262)*. Wellington, New Zealand: Waitangi Tribunal.
Park, G. (2002). 'Swamps which might doubtless easily be drained'? Swamp drainage and its impact on the indigenous. In E. Pawson & T. Brooking (Eds.), *Enviromental histories of New Zealand* (pp.151-165). Oxford, UK: Oxford University Press.
Park, S., & MacCormick, P. (2011). *Rotorua benchmarking challenges and progress*. Whakatane, New Zealand: Bay of Plenty Regional Council.
Parkyn, S., Matherson, F., Cooke, J., & Quinn, J. (2002). *Review of the environmental effects of agriculture on freshwaters: A report prepared by National Insitute of Water and Atmospheric Research (NIWA) for Fish & Game New Zealand*. Hamilton, New Zealand: NIWA.
Pawson, E. (2010). *An environmental history of New Zealand agriculture.* http://www.edsconference.com/content/docs/papers/Pawson,%20E.pdf. Paper presented at the Environmental Defence Society Conference (June 2-3, 2010): Auckland, New Zealand.
Pawson, E., & Brooking, T. (Eds.). (2002). *Environmental histories of New Zealand*. Oxford, UK: Oxford University Press.

PCE. (2002). *Creating our future sustainable development for New Zealand*. Wellington, New Zealand: Office for Parliamentary Commissioner for the Environment.
PCE. (2004). *Growing for good: Intensive farming, sustainability and New Zealand's environment*. Wellington, New Zealand: Office for Parliamentary Commissioner for the Environment .
PCE. (2006). *Restoring the Rotorua lakes: The ultimate endurance challenge*. Wellington, New Zealand: Office for Parliamentary Commissioner for the Environment.
PCE. (2010). *How clean is New Zealand? Measuring and reporting on the health of our environment*. Wellington, New Zealand: Retrieved March 16, 2011 from http://www.pce.parliament.nz/assets/Uploads/How-clean-is-New-Zealand.pdf: Office for Parliamentary Commissioner for the Environment.
PCE. (2012). *Water quality in New Zealand: Understanding the science*. Wellington, New Zealand: Office for Parliamentary Commissioner for the Environment.
PCE. (2013a). *Improving our resource management system: A discussion document: Submission to the Minister for the Environment*. (2 April 2013). Wellington, New Zealand: Office for Parliamentary Commissioner for the Environment.
PCE. (2013b). Water quality in New Zealand: Land use and nutrient pollution. Wellington, New Zealand: Office for Parliamentary Commissioner for the Environment.
PCE. (2014). *Submission on proposed amendments to the national policy statement for freshwater management 2011*. Wellington, New Zealand: Retrieved May 20, 2014 from http://www.pce.parliament.nz/assets/Uploads/PCE-NPS-Freshwater-NOF-2014.pdf: Office for Parliamentary Commissioner for the Environment.
Pearce, D., Markandya, A., & Barbier, E. (1989). *Blueprint for a green economy*. London, UK: Earthscan.
Peck, J., & Tickell, A. (2002). Neoliberalising space. *Antipode*, *34*(3), 380-404.
Peet, J. (2006). *Sustainability in New Zealand: Lifting the game*. Wellington, New Zealand: Parliamentary Commission for the Environment.
Penlington, W. (1948). *Science of dairying: A text-book for the use of secondary and technical schools* (2nd ed.). London, UK: Macmillan & Co Limited.
Pepper, D. (1996). *Modern environmentalism: An introduction*. London, UK: Routledge.
Pepper, D. (1998). Sustainable development and ecological modernization: A radical homocentric perspective. *Sustainable Development, 6*(1), 1-7.
Percy, P. (2013, 10 July 2013). Government irrigation company tips RMA playing field. Retrieved November 15, 2013 from http://perceptionplanning.co.nz/government-irrigation-company-tips-rma-playing-field/.
Perkins, H., & Thorns, D. (2001). A decade on: Reflections on the Resource Managment Act 1991 and the practice of urban planning in New Zealand. *Environment, Planning and Design, 28*, 639-654.
Petch, T., Young, J., Thorrold, B., & Vant, B. (2003). *Protecting an icon: Managing sources of diffuse nutrient inflow to Lake Taupo, New Zealand* (August 17-21, 2003). Paper presented at the Diffuse Pollution Conference, Dublin, Ireland.
Peters, M. (1999). Neoliberalism. In M. Peters, P. Ghiraldelli, B. Žarnić & A. Gibbons (Eds.), *The encyclopedia of educational philosophy and theory*.

Retrieved from, http://www.ffst.hr/ENCYCLOPAEDIA/doku.php?id=neoliberalism.
Peters, M. (2001). National education policy constructions of the 'knowledge economy': Towards a critique. *Journal of Educational Enquiry, 2*(1), 1-22.
Peters, M., & Fitzsimons, P. (1999). Neo-liberalism and 'social capital': Reinventing community. *Sites, 37*, 32-48.
Peterson, T. (1997). *Sharing the Earth: The rhetoric of sustainable development*.Columbia, SC: University of South Carolina Press.
Petrie, H. (2002). *Colonization and the evolution of the Maori economy* (July 22-26, 2002). Paper presented at the World Congress of Economic History, Beunos Aires, Argentina.
Pezzoli, K. (1997). Sustainable development: A transdisciplinary overview of the literature. *Journal of Environmental Planning and Management, 40*(5), 549-574.
Phillips, C. (2000). *Waihou journeys: The archaeology of 400 years of Maori settlement*. Auckland, New Zealand: Auckland University Press.
Philpott, H. (1937). *A history of the New Zealand dairy industry 1840-1935*. Wellington, New Zealand: Government Printer.
Pile, S., & Thrift, N. (Eds.). (1995). *Mapping the subject: Geographies of cultural transformation*. New York, NY: Routledge.
Plumwood, V. (1998). Inequality, ecojustice and ecological rationality In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader* (2nd ed.) (pp. 559-583). Oxford, UK: Oxford University Press.
Plunket, H. (1970). *Land development by government 1945-69*. Christchurch, New Zealand: Lincoln College Agricultural Economics Research Unit.
Pohlen, I. (1957). The history of soil science. In F. Callaghan (Ed.), *Science in New Zealand*. Wellington, New Zealand: A.H & A.W Reed.
Pool, I. (1991). *Te iwi Maori: A New Zealand population, past, present and projected*. Auckland, New Zealand: Auckland University Press.
Primary Sector Water Partnership. (2008). Primary sector water partnership: Summary of the plan of action. Wellington, New Zealand: Minstry for the Environment.
Primary Sector Water Partnership. (2010). *Annual report 2009-2010.* http://www.fedfarm.org.nz/f184,17642/17642_Water_Partnership.pdf: Primary Sector Water Partnership. Wellington New Zealand: Ministry for the Environment.
Primary Sector Water Partnership. (2011). *Primary sector water partnership annual report 2011*. Retrieved September 15, 2012 from http://www.fedfarm.org.nz/f3508,137278/137278_PSWP_annual_report.pdf. Wellington New Zealand: Ministry for the Environment
Princen, T. (2005). *The logic of sufficiency*.Cambridge, MA: MIT Press.
Quigley, P. (1999). Nature as dangerous space. In E. Darier (Ed.), *Discourses of the environment* (pp.217-240). Oxford, UK: Blackwell.
Randford, J (n.d). *Pākehā its origin and meaning.* Retrived July 24, 2014 from http://maorinews.com/writings/papers/other/pakeha.htm
Redclift, M. (1987). *Sustainable development: Exploring the contradictions*. London, UK: Routledge.
Research and Development Group of the Bio Dynamic Farming and Gardening Association. (2004). *A review of New Zealand and international organic land management research.*Wellington, New Zealand: Biodynamic Farming and Garding Association.

Ribot, J., Agrawal, A., & Larson, A. (2006). Recentralizing while decentralizing: How national governments reappropriate forest resources. *World Development, 34*(11), 1864-1886.

Richardson, A. (2012). *Existing landowner.* Paper presented at the Revealing the Realities of Implementing and Operating under a Nutrient Management Cap: The Lake Taupo Catchment Experience Forum (June7, 2012). Taupo, New Zealand: Beef + Lamb New Zealand and Lake Taupo Monitor Farm Programme Steering Committee. Retrieved from *www.beeflambnz.com/.../The%20Lake%20Taupo%20catchment%20exp.*

Richie, H. (2008). *Review of the research on practices to reduce N and P loss from farms in the Rotorua lakes catchments: A report for the Land Use Futures Board*. Hamilton, New Zealand: Environment Bay of Plenty.

Riddet, W. (1957). Science in the dairy industry. In F. Callaghan (Ed.), *Science in New Zealand*. Wellington, New Zealand: A.H & A.W Reed.

Rigg, T. (1945). The contributions of the Cawthron Institute to science and New Zealand agriculture. In C. Institute (Ed.), *Silver Jubilee Commemoration Lecture* (Vol. Oct 20 1945). Nelson, New Zealand: Cawthron Institute.

Rist, G. (2002). *The history of development: From western origins to global faith* (2nd ed.). London, UK: Zed Books.

Roche, M. (2002). The State as conservationist, 1920-1960: 'Wise use' of forests, lands, and water. In E. Pawson & T. Brooking (Eds.), *Environmental histories of New Zealand* (pp. 183-199). Oxford, UK: Oxford University Press.

Rosenbaum, D. (2011). Sustainability science: Linking research-based knowledge with action. *Environment@Harvard.*(Fall/Winter, March 2, 2011). Retrieved from, http://environment.harvard.edu/sustainabilityscience.

Rosin, C. (2013). Food security and the justification of productivism in New Zealand. *Journal of Rural Studies, 29*, 50-58. doi: http://dx.doi.org/10.1016/j.jrurstud.2012.01.015

Rotorua Lakes Land Innovation. (2011). *Rotorua land innovation catchment information*. Rotorua, New Zealand: Retrieved October 20, 2012 from, http://www.rotorualakes.co.nz/vdb/document/411.

Rudd, C. (1990). The role of the State in the New Zealand economy. In M. Holland & J. Boston (Eds.), *The Fourth Labour Government: Politics and policy in New Zealand* (2nd ed.) (pp. 83-100). Auckland, New Zealand: Oxford University Press.

Rudestam, K., & Newton, R. (2007). *Surviving your dissertation: A comprehensive guide to content and process* (3rd ed.). London, UK: Sage.

Ruru, J. (2004). Indigenous peoples' ownership and management of mountains: The Aotearoa/New Zealand experience. *Indigenous Law Journal, 3,111-137*.

Ryan, A. (1990). Ideology, hegemony and inequality. In P. Green (Ed.), *Studies in New Zealand social problems* (pp. 97-127*).* Palmerston North, New Zealand: Dunmore Press.

Rydin, Y. (1999). Can we talk ourselves into sustainability? The role of discourse in the environmental policy process. *Environmental Values,* 8(4), 467–84.

Sage, E. (2013). Voluntary water accord no substitute for binding standards. Retrieved September 10, 2013 from file:///C:/Documents%20and%20Settings/User/Desktop/Voluntary%20water%20accord%20no%20substitute%20for%20binding%20standards.htm.

Salmon, G. (2010). *At the interface of research and implementation: An assessment of the work of the Nutrient Trading Study Group (NTSG)*: *A*

report prepared for Motu Economic and Public Policy Research. Wellington, New Zealand: Ecologic Foundation.
Salmond, A. (1991). *Two worlds: First meetings between Maori and European 1642-1772*. Auckland, New Zealand: Viking.
Salmond, A. (1997). *Between worlds: Early exchanges between Maori and Europeans 1773-1815*. Auckland, New Zealand: Viking.
Sandström, J. (2002). *Organisational approaches to greening: Techcnocentrism and beyond.* (unpublished doctoral dissertation). Umeå University Sweden, Umeå, Sweden.
Sen, A. (n.d.). Sustainable development and human freedom. Retrieved August, 20, 2011from The Institut Veolia Environnement http://www.institut.veolia.org/en/documents/CDB0Mg3X1p660TGJErhq.aspx.
Sharp, L., & Richardson, T. (2001). Reflections on Foucaultian discourse anlaysis in planning and environmental policy research. *Environmental Policy and Planning, 3*, 193-109.
Shiva, V., & Moser, I. (Eds.). (1995). *Biopolitics: A feminist and ecological reader on biotechnology*. London, UK: Zed.
Simmonis, U. (1989). Ecological modernization of industrial society: Three strategic elements. *International Social Science Journal 121*, 347-361.
Sinclair, A. (1946). *Guaranteed prices for dairy produce: A record of promise versus performance.* Wellington, New Zaland: Whitcombe & Tombs Limited.
Smallfield, P. (1970). *The grasslands revolution*. Auckland, New Zealand: Hodder & Stoughton.
Smith, W., & Montgomery, H. (2004). Revolution or evolution? New Zealand agriculture since 1984. *Geojournal, 59*(2), 107-118.
Sneddon, C., Howarth, R., & Norgaard, R. (2006). Sustainable development in a post-Brundtland world. *Ecological Economics, 57*, 253-268.
Solow, R. (1992). *An almost practical step toward sustainability*. Washington, DC: Resources for the Future.
Statistics New Zealand. (2012). *Agricultural production statistics: June 2012 (final)*. Wellington, New Zealand: New Zealand Government.
Statistics New Zealand. (2013). *Agricultural production statistics: June 2013 (provisional). Media Release*. Wellington, New Zealand: New Zealand Government. Retrieved March 20, 2014 from http://www.stats.govt.nz/browse_for_stats/industry_sectors/agriculture-horticulture-forestry/AgriculturalProduction_MRJun13prov.aspx.
Stenner, P., & Stainton-Rogers, R. (2004). Q methodology and qualiquantology: The example of discriminating between emotions. In Z. Todd, B. Nerlich, S. McKeown, & D. Clarke (Eds.), *Mixing methods in psychology: The integration of qualitative and quantitative methods in theory and practice* (pp. 157-189). New York, NY: Taylor & Francis.
Stephens, P., & Clark, I. (1970). *Co-operatives in New Zealand agriculture*. Wellington, New Zealand: New Zealand Department of Agriculture.
Steven, R. (1989). Land and white settler colonialism: The case of Aotearoa. In D. Novitz & B. Willmott (Eds.), *Culture and identity* (pp. 21-34). Wellington, New Zealand: GP Books.
Steward, R. (1997). Politics in New Zealand from beginning to breakthrough. *Synthesis/Regeneration 13,Spring, 1997*. Retrieved from http://www.greens.org/s-r/13/13-03.html

Stewart, C., Johnson, D., Rosen, M., & Boyce, W. (2000). *Public involvement in environmental management of Lake Taupo: Preliminary results of the 1999 survey*. Palmerston North, New Zealand: New Zealand Institute of Geological and Nuclear Sciences.

Stokes, E. (2002). Contesting resources: Maori, Pākehā, and a tenurial revolution. In E. Pawson & T. Brooking (Eds.), *Enviromental histories of New Zealand* (pp. 35-51). Oxford, UK: Oxford University Press.

Stone, D. (2002). *Policy paradox the art of political decision-making*. New York, NY: W.W Norton and Company.

Stott, P., & Sullivan, S. (Eds.). (2000). *Political ecology, science, myth and power*. London, UK: Arnold Publications.

Straight Furrow. (2013, February 26, p. 29). Farmers agree on a collaborative approach to restore Lake Rotorua, *Straight Furrow* www.NZFarmer.co.nz

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). London, UK: Sage.

Stringleman, H. (2013). Uncontrolled conversion behind our water woes, *Farmers Weekly*. Retrieved December 14, 2013 from http://agrihq.co.nz/article/uncontrolled-conversion-behind-our-water-woes?p=7.

Suppression of Rebellion Act, No.7 Stat. (1863). Retrieved from http://atojs.natlib.govt.nz/cgi-bin/atojs?a=d&d=AJHR1864-I.2.1.2.1

Swaffield, S. (2008). *Sustaining the country: Ideals, opportunities and imperatives for future rural landscapes* (June 11-12, 2008). Paper presented at the Conflict in Paradise: The Transformation of Rural New Zealand, Auckland, New Zealand.

Swaffield, S., & O'Connor, K. (1986). *Perceiving, conceiving, protecting and using New Zealand landscape systems* (September 2-7, 1986). Paper presented at the International Conference on Landscape of the Southern Hemisphere, Adelaide, Australia.

Taptiklis, N. (2009). *Submission on Resource Management (Simplifying and Streamlining) Amendment Bill*. (RMA Simplifying and Streamlining Amendment Bill: Submissions). *www.parliament.nz/resource/0000106369*:N Taptiklis.

Taranaki Regional Council. (1993). *Management of riparian margins in Taranaki: Implementation strategy*. (February, 1993). New Plymouth, New Zealand: Taranaki Regional Council. Retrieved date from: http://www.trc.govt.nz/assets/taranaki/environment/land/pdfs/riparian+strategy.pdf.

Taranaki Regional Council. (2014). Riparian management. Retrieved January 10, 2014 from http://www.trc.govt.nz/riparian-management.

Taupo-nui-a-Tia Joint Managment Group. (2004). 2*020 Taupo-nui-a Tia action plan: An integrated sustainable development strategy for the Lake Taupo catchment*. Taupo, New Zealand: Taupo-nui-a-Tia Joint Managment Group.

Taupo-nui-ā-Tia Joint Managment Group. (2007). *2006/07 annual report of the 2020 Taupo-nui-a-tia Joint Managment Group*. Taupo, New Zealand: Taupo-nui-ā-Tia Joint Management Group.

Taupo District Council. (2007). *Taupo district plan (operative)*. Taupo, New Zealand: Taupo District Council. Retrieved from, http://www.taupodc.govt.nz/our-council/policies-plans-and-bylaws/district-plans/current-version/Documents/Text/1%20INTRODUCTION.pdf.

Te Ara. (2010a). New Zealand Company: Second New Zealand Company. *Te Ara, The encyclopedia of New Zealand.* Retrieved October 18, 2012 from, http://www.teara.govt.nz/en/1966/new-zealand-company/2.

Te Ara. (2010b). *NZ history net*. Wellington, New Zealand: New Zealand Government. Retrieved October 18, 2012 from, http://www.teara.govt.nz/en/the-new-zealanders/12/1.

Te Ara. (2011). Superphosphate. *Te Ara, The encyclopedia of New Zealand.* Retrieved October 18, 2012 from, http://www.teara.govt.nz/en/superphosphate/1.

Te Ara. (2013a). *Maori enterprise 1849-1860*. Wellington, New Zealand: Retrieved July 20, 2013 from, http://www.teara.govt.nz/en/te-maori-i-te-ohanga-maori-in-the-economy/page-3.

Te Ara. (2013b). *Police cordon Bastion Point.* Wellington, New Zealand: New Zealand Government. Retrieved July 20, 2013 from, http://www.teara.govt.nz/en/photograph/2622/police-cordon-bastion-point.

Te Ara. (2013c). *Ruakura Research Station*. Wellington, New Zealand: New Zealand Government. Retrieved October, 19, 2012 from, http://www.teara.govt.nz/en/photograph/19653/ruakura-research-station.

Te Ara. (2013d). *Story: French*. Wellington, New Zealand: New Zealand Government. Retrieved July 25, 2013 from, http://www.teara.govt.nz/en/french.

Te Arawa Lakes Trust. (2000). 2020 Taupo-nui-a-Tia action plan: An integrated sustainable development stategy for the Lake Taupo catchment. Rotorua, New Zealand: Te Arawa Maori Trust Board.

Te Arawa Maori Trust Board, Environment Bay of Plenty, & Rotorua District Council. (2000a). *Strategy for the lakes of the Rotorua district*. Rotorua, New Zealand: Environment Bay of Plenty.

Te Arawa Maori Trust Board, Environment Bay of Plenty, & Rotorua District Council. (2000b). *Strategy for the lakes of the Rotorua district Te Kaupapa mo Nga Taonga o Rotorua: Protecting the jewels in the crown of the lakes of the Rotorua district*. Whaktane, New Zealand: Environment Bay of Plenty.

Tellis, W. (1997a). Application of a case study methodology. *The Qualitative Report*, http://www.nova.edu/ssss/QR/QR3-3/tellis2.html, *3*(3) Missing page information?.

Tellis, W. (1997b). Introduction to case study. *The Qualitative Report* http://www.nova.edu/ssss/QR/QR3-2/tellis1.html,*3*(2) n.p

Threadgold, T. (2003). Cultural studies, critical theory and critical discourse analyis: Histories, remembering and futures. *Linguistik Online* http://www.linguistik-online.de/1403/threadgold.html, *14*(2/03) n.p.

Tipa, G., & Nelson, K. (2008). Introducing cultural opportunities: A framework for incorporating cultural perspectives in contemporary resource management. *Journal of Environmental Policy & Planning, 10*(4), 313-337.

Tocker, A. (2012, Tuesday July 31, p. 13). 'Key Player' helps farmers future-proof the dairy industry. Farmer, *Waikato Times* Hamilton New Zealand.

Torgerson, D. (1990). Limits of the administrative mind: The problem of defining environmental problems. In J. Dryzek & D. Schlosberg (Eds.), *Debating the Earth: The environmental politics reader*. (pp. 115–161). Oxford, UK: Oxford University Press.

Torgerson, D. (1994). Strategy and ideology in sentimentalism: A decentered approach to sustainability. *Industrial and Environmental Crisis Quarterly, 8*, 295-321.

Torgerson, D. (2005). The ambivalance of discourse: Beyond the administrative mind? In R. Paehlke & D. Torgerson (Eds.), *Managing Leviathan: Environmental politics and the administrative state* (2nd ed., pp. 97-124). Ontario, Canada: Broadview Press.

Torgerson, D., & Paehlke, R. (2005). Environmental administration: Revising the agenda of inquiry and practice. In R. Paehlke & D. Torgerson (Eds.), *Managing Leviathan: Environmental politics and the administrative state* (2nd d., pp. 3-10). Ontario, Canada: Broadview Press.

Trede, F., & Higgs, J. (2010). Critical inquiry. In J. Higgs, N. Cherry, R. Macklin, & R. Ajjawi (Eds.), *Researching practice: A discourse on qualitative methodologies* (pp. 247-255). Rotterdam, The Netherlands: Sense Publishers.

Tukukino, H. (n.d.). *Waitangi Tribunal, WAI 100: Synopsis of submissions on behalf of the claimants Hauraki iwi*. (HWC 0101-Ho1 Opening Week - Synopsois of Iwi Evidence C9809453.fm). Wellington, New Zealand: New Zealand Government.

TV One News. (2013, November, 10). Farm couple Face $73,000 fine for draining wetland. Retrieved November 14, 2013 from, http://tvnz.co.nz/national-news/farm-couple-face-73-000-fine-draining-wetland-4681633.

Twentyman, M. (2012, January, 11). Farmer fined $73,000 for draining wetland. *Waikato Times*. Retrieved February 7, 2011 from http://www.stuff.co.nz/waikato-times/news/6238135/Farmer-fined-73-000-for-draining-wetland.

United Nations. (1992). *Agenda 21*. New York, NY: United Nations.

United Nations. (2002). *World summit on sustainable development*. Johannesburg, South Africa: United Nations.

United Nations. (2005). *Kyoto protocol*. New York, NY: United Nations.

United Nations. (2009). *United Nations framework convention on climate change: Copenhagen Agreement.* Copenhagen, Denmark: UNEDP.

United Nations Environment Programme. (1972). *Declaration of the United Nations Conference on the Human Environment* (1972. 5-16 June, 1972). Paper presented at the The United Nations Conference on the Human Environment, Stockholm, Sweden.

United Nations Environment Programme. (2013). *Agenda 21: Promoting sustainable agriculture and rural development* (Vol. 2013). New York, NY: UNEP.

University of Otago. (2011). Dairy and clean streams accord (2011) *GEOG397 Topics* Retrieved November 12, 2012 from,, http://geog397.wiki.otago.ac.nz/DairyandCleanStreamsAccord. Dunedin, New Zealand: University of Otago.

Upton, S. (1991). *Third reading debate on Resource Management Bill* (Debate 516). Welligton, New Zealand: New Zealand Government.

Valentine, I., Hurley, E., Reid, J., & Allen, W. (2007). Principles and processes for effecting change in environmental management in New Zealand. *Journal of Environmental Management, 82*, 311-318.

Valentine, I., & Kemp, P. (1999). Sustainability of pastures and crops. In J. White & J. Hodgson (Eds.), *New Zealand pasture and crop science* (pp. 293-305) Auckland, New Zealand: Oxford University Press.

Van-Der-Heijden, H. (1999). Environmental movements, ecological modernisation and political opportunity structures. *Environmental Politics, 8*(1), 199-221.
Van-Dijk, T. (1998). Discourse and ideology. *Discourse and Society, 9*, 307-308.
Van-Tatenhove, J., & Leroy, P. (2009). Environment and participation in a context of political modernisation. In A. Mol, D. Sonnenfeld, & G. Spaargaren (Eds.), *The ecological modernisation reader: Environmental reform in theory and practice* (pp. 190-206). London, UK: Routledge.
Van-Zeijl-Rozema, A., Corvers, R., Kemp, R., & Martens, P. (2008). Governance for sustainable development: A framework. *Sustainable Development, 15*(5), 410-421.
Van-Excel, N., & deGraaf, G. (2005). Q methodlogy: A sneak preview. Retrieved May 14, 2010 www.jobvanexcel,nl,http://www.qmethod.org/howto.php.
Vant, B. (1999). *Sources of nitrogen and phosphorus in several major rivers in the Waikato region*. (Technical Report No 1999/10). Hamilton, New Zealand: Environment Waikato.
Vant, B. (2001). *A method for estimating the load of nitrogen still to come from the current extent and intensity of pastoral land use in the catchment of Lake Taupo.* (Document No. 699155). Hamilton, New Zealand: Environment Waikato.
Vant, B. (2011). *Water quality of the Hauraki rivers and southern Firth of Thames, 2000-09.* Hamilton, New Zealand: Waikato Regional Council.
Vant, B., & Huser, B. (2000). *Effects of intensifying catchment land use on the water quality of Lake Taupo.* Proceeding of the The New Zealand Society of Animal Production. 60: pp.261-264.
Wagenaar, H. (2011). *Meaning in action:Interpretation and dialogue in policy analysis*. London, UK: Sharp.
Waikato Regional Council. (2011). *Waikato regional plan: Variation No 5: Lake Taupo catchment OPERATIVE version1* (Doc: 1905233). Hamilton, New Zeland: Waikato Regional Council. http://www.waikatoregion.govt.nz/PageFiles/3918/V5%20Operative%20Version.pdf.
Waikato Regional Council. (2013a). *Permitted activity guide 1*. Hamilton, NZ: Waikato Regional Council.
Waikato Regional Council. (2013b). *Permitted activty registration*. Hamilton, New Zealand: Waikato Regional Council. Retrived November 15, 2013 from, http://www.waikatoregion.govt.nz/PageFiles/3027/Farm%20dairy%20PA.pdf.
Waikato Regional Council. (2014). Media algal blooms. Retrieved February 4, 2014 from http://www.waikatoregion.govt.nz/Forms/Searches/Media-releases-search/.
Waitangi Tribunal. (2010). *Chapter 1:The 1840s debate on the 'waste' lands.* Wellington, New Zealand: New Zealand Government. Retrived from http://www.waitangitribunal.govt.nz/doclibrary/public/researchwhanui/theme/c/Chapt01.pdf.New.
Walford, N. (2003). Productivism is allegedly dead, long live productivism: Evidence of continued productivist attitudes and decision-making in South-East England. *Journal of Rural Studies, 19*. pp. 491-502.
Ward, A. (1975). *A command of cooperatives. The development of leadership, marketing and price control in the cooperative dairy industry of New Zealand*. Wellington, New Zealand: The New Zealand Dairy Board.

Ward, A. (1999). *An unsettled history: Treaty claims in New Zealand today*. Wellington, New Zealand: Bridgett Williams Books.
Ward, A. (2009). A 'Savage War of Peace'?: Motives for government policies towards the Kingitanga 1857-1863. In R. Boast & R. Hill (Eds.), *Raupatu: The confiscation of Maori land* (pp, 67-108). Wellington, New Zealand: Victoria University Press.
Ward, N. (1993). The agricultural treadmill and the rural environment in the post-productivist era. *Sociologia Ruralis, 33*, 348-364.
Warr, E. (1988). *From bush-burn to butter: A journey in words and pictures*. Wellington, New Zealand: Butterworths.
Watts, S., & Stenner, P. (2005). Doing Q methodology: Theory method and interpretation. *Qualitative Research in Psychology, 2*, 67-91.
WCED. (1987). *Our Common Future*. Oxford, UK: Oxford University Press.
Webler, T., Danielson, S., & Tuler, S. (2009). Using Q method to reveal social perspectives in environmental research. Retrieved March 18, 2010 from, www.serius.org/pubs/Qprimer.pdf.
Weidner, H. (2002). Capacity building for ecological modernization. *The American Behavioural Scientist, 45*(9), 1340-1369.
Wheen, N. (2002). A history of New Zealand environmental law. In E. Pawson & T. Brooking (Eds.), *Enviromental histories of New Zealand* (pp. 261-274). Oxford, UK: Oxford University Press.
White, E. (1983). Lake eutrophication in New Zealand: A comparison with other countries of the Organisation for Economic Cooperation and Development. *New Zealand Journal of Marine and Freshwater Research, 17*, 434-444.
White, M. (2007). Fat cows and filthy streams. *North & South*, 52-63.
Wikipedia. (2013). 2008 Chinese milk scandal: Wikepedia. Retrieved Apil 18 2014 from http://en.wikipedia.org/wiki/2008_Chinese_milk_scandal.
Wilcock, R. (1986). Agricultural run-off: A source of water pollution in New Zealand? *New Zealand Agricultural Science, 20*, 98-103.
Williams, C., & Millington, A. (2004). The diverse and contested meanings of sustainable development. *The Geographical Journal, 170*(2), 99-104.
Willis, B. (2013, November 19). Keep it clean speech. Retrieved Mach 16, 2014 from, http://www.scoop.co.nz/stories/BU1311/S00628/keep-it-clean-federated-farmers.htm.
Willis, R. (2001). Farming. *Asia Pacific Viewpoint, 42*(1), 55-65.
Wilson, G. (2001). From productive to post-productivism...and back again? Exploring the (un)changed natural and mental landscapes of European agriculture. *Royal Geographical Society, 26*(1), 77-102.
Winder, G. (2009). Grassland revolutions in New Zealand: Disaggregating a national story. *New Zealand Geographer, 65*, 187-200.
World Commission on Environment and Development (WCED). (1987). Brundtland report: Our common future. Oxford, UK:WCED
World Wide Fund for Nature (WWF). (2008). Living planet report. Retrieved Januay 14, 2010 fom http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/living_planet_report_timeline/lpr_2008 WWF international, Switzerland
World Wildlife Fund. (2013). New Zealand Government report to UN projects massive increase in NZ emissions. *Press Release*: World Wildlife Fund. Retrieved October, 15, 2013 from, *http://wwf.panda.org/wwf_news/*
Wright, J. (2006). *Science, politics, and genetic engineering: A discourse analysis of the worldviews framing the Environmental Risk Management Authority*

(ERMA) of New Zealand. (unpublished master's dissertation). The University of Waikato, Hamilton, New Zealand.
Wright, J., & Kurian, P. (2010). Ecological modernisation vs. sustainable development: The case of genetic modification regulation in New Zealand. *Sustainable Development, 18,* 398-412.
WWF. (2012). *Living planet report 2012*: Retrived from *wwf.panda.org/about our earth/all.../living planet report/*:WWF.
Wynn, G. (2002). Destruction under the guise of improvement? The forest, 1840-1920. *Environmental histories of New Zealand*. Melbourne, Australia: Oxford University Press.
Wynne, B. (1982). *Rationality and ritual: The Windscale Inquiry and nuclear decisions in Britain*. Chalfont St. Giles, UK: British Society for the History of Science.
Wynne, B. (2001). *Expert discourses of risk and ethics in genetically manipulated organisms: The weaving of public alienation*. Wellington, New Zealand: New Zealand Government. Retrived from, http://www.pce.parliament.nz/assets/Uploads/Reports/pdf/key_lessons.pd.
Yencken, D., & Wilkinson, D. (2001). Resetting the compass: Australia's journey towards sustainability. Melbourne, Australia: *CSIRO*.
Yerex, D. (1989). *Empire of the dairy farmers*. Carterton, New Zealand: Ampersand Publishing Associates Ltd.
Yerex, S. (2009). Protecting Lake Taupo: The strategy and the lessons. Hamilton, New Zealand:Kellog Rural Leadership Programme.
Yin, R. (1994). *Case study research: Design and methods*. Thousand Oaks, CA: Sage.
Yin, R. (2003a). *Applications of case study research* (2nd ed.). London, UK: Sage.
Yin, R. (2003b). *Case study research: Design and methods*. London, UK: Sage.
Young, J., & Kaine, G. (2009). Application of the policy choice framework to Lake Taupo catchment. Hamilton, New Zealand: Environment Waikato.

Appendix I

Bellagio Principles

1. Guiding Vision and Goals

Assessment of progress toward sustainable development should:

- be guided by a clear vision of sustainable development and goals that define that vision

2. Holistic Perspective

Assessment of progress toward sustainable development should:

- include review of the whole system as well as its parts
- consider the well-being of social, ecological, and economic sub-systems, their state as well as the direction and rate of change of that state, of their component parts, and the interaction between parts
- consider both positive and negative consequences of human activity, in a way that reflects the costs and benefits for human and ecological systems, in monetary and non-monetary terms

3. Essential Elements

Assessment of progress toward sustainable development should:

- consider equity and disparity within the current population and between present and future generations, dealing with such concerns as resource use, over-consumption and poverty, human rights, and access to services, as appropriate
- consider the ecological conditions on which life depends
- consider economic development and other, non-market activities that contribute to human/social well-being

4. Adequate Scope

Assessment of progress toward sustainable development should:

- adopt a time horizon long enough to capture both human and ecosystem time scales thus responding to needs of future generations as well as those current to short term decision-making
- define the space of study large enough to include not only local but also long distance impacts on people and ecosystems
- build on historic and current conditions to anticipate future conditions - where we want to go, where we could go

Assessing Sustainable Development: Principles in Practice

5. Practical Focus

Assessment of progress toward sustainable development should be based on:

- an explicit set of categories or an organizing framework that links vision and goals to indicators and assessment criteria
- a limited number of key issues for analysis
- a limited number of indicators or indicator combinations to provide a clearer signal of progress
- standardizing measurement wherever possible to permit comparison
- comparing indicator values to targets, reference values, ranges, thresholds, or direction of trends, as appropriate

6. Openness

Assessment of progress toward sustainable development should:

- make the methods and data that are used accessible to all

- make explicit all judgments, assumptions, and uncertainties in data and interpretations

7. Effective Communication

Assessment of progress toward sustainable development should:

- be designed to address the needs of the audience and set of users
- draw from indicators and other tools that are stimulating and serve to engage decision-makers
- aim, from the outset, for simplicity in structure and use of clear and plain language

8. Broad Participation

Assessment of progress toward sustainable development should:

- obtain broad representation of key grass-roots, professional, technical and social groups, including youth, women, and indigenous people –to ensure recognition of diverse and changing values
- ensure the participation of decision-makers to secure a firm link to adopted policies and resulting action

9. Ongoing Assessment

Assessment of progress toward sustainable development should:

- develop a capacity for repeated measurement to determine trends
- be iterative, adaptive, and responsive to change and uncertainty because systems are complex and change frequently
- adjust goals, frameworks, and indicators as new insights are gained
- promote development of collective learning and feedback to decision-making

10. Institutional Capacity

Continuity of assessing progress toward sustainable development should be assured by:

- clearly assigning responsibility and providing ongoing support in the decision-making process
- providing institutional capacity for data collection, maintenance, and documentation
- supporting development of local assessment capacity (Hardi & Zdan, 1997, pp. 2-4)

Appendix II

Interview Documentation

A. Request for Interview

Dear

I am a doctoral student examining questions of environmental sustainability related to the dairy industry. I am writing to request an interview given your expertise and grounded understanding of this issue.

The sustainability of production systems is an important goal for the industry, but there is some disagreement on how it might be achieved, making this a complex policy challenge. My research is aimed at meeting this challenge. Finding an acceptable balance between economic and environmental goals is critical as both are pivotal to our future wellbeing.

A primary objective of the research is to identify common ground among stakeholders. This will avoid a tendency for key spokespeople to talk past each other, as doing so undermines much of the hard work to address sustainability concerns currently being done by government, the dairy industry and community groups. In my view, it is important to understand and take seriously the different views of all stakeholders when developing policy for sustainability.

The interviews will also contribute to the development of a Q survey which will subsequently be used with a broader group of stakeholders. Q surveys are an innovative research tool that will allow me to explore in an in-depth way the values and perspectives of stakeholders, and to identify where there is common ground to forge policy initiatives. Your anonymity is guaranteed.

I would, therefore, be most grateful for the opportunity to interview you as a part of my research. The interview will take approximately 50 minutes. I have attached an interview schedule, and information sheet, and hope you can fit me in to your busy schedule in the time allocated for these interviews prior to Christmas. I look forward to hearing from you.

Yours faithfully,

Jeanette M Wright
PhD Candidate

Jmw6@waikato.ac.nz

B. Information for Interview Candidates

Environmental Policy, Practices, Processes and the Dairy Industry

The sustainability of production systems is an important goal for the dairy industry, but there is some disagreement on how it might be achieved, making this a complex policy challenge. My research is aimed at meeting this challenge. Finding an acceptable balance between economic and environmental goals is critical as both are pivotal to our future wellbeing.

A primary objective of the research is to determine where there is common ground among stakeholders, and to avoid what is a tendency for key spokespeople to talk past each other, as doing so undermines much of the hard work to address sustainability concerns currently being done by government, the dairy industry and community groups. In my view, it is important to understand and take seriously the different views of all stakeholders when developing policy for sustainability.

As a key informant in your industry sector or community, you are invited to participate in a research interview. The interview will take up to one hour and can be conducted at a time and venue that suits you.

A digital sound recording will be made of your insights; notes may be also being taken. These will be securely stored by myself and will only be accessed by me and my supervisors.

You have the right to withdraw your consent to be interviewed at any time. Further, you have the right to withdraw from participation in this project for up to seven days after the interview.

The data from the interviews will be used as part of my PhD research, and help in the construction of a stakeholder Q-sort survey.

The research has been approved by the Human Research Ethics Committee of the Faculty of Arts and Social Sciences at the University of Waikato. Any questions you have about ethical conduct may be directed to the Committee Secretary by email at fass-ethics@waiakto.ac.nz

PLEASE RETAIN THIS SHEET FOR YOUR INFORMATION
A CONSENT FORM WILL BE PROVIDED FOR YOU TO SIGN AT YOUR
INTERVIEW

C. Consent Form for Interview Candidates

Respondent's name…

Organisation:
……

Role…

Contact email…

Contact Phone…

I agree to participate in an interview as a key informant for the above research. I acknowledge the following:

- I have read and understood the Information Sheet relating to this interview which includes contact details for the Secretary of the FASS Human Research Committee at the University of Waikato, and the Research Coordinator;
- I have been provided with a copy of this consent form;
- I have had an opportunity to ask any questions about the research and have had these answered to my satisfaction;
- I have the right to withdraw my consent to participate in the interview at any stage, and I can withdraw my interview for up to seven days after it takes place;
- I understand that I will not be named in the research

Signed: (Respondent)

Date:

Signed :……(Researcher)

D. Sample of Interview Questions

Note: this is a sample of the broad questions developed to guide the interview process. The questions were changed and adapted for each interviewee to better elicit information about their particular organisations discourse and/or the specific actors role and understanding of sustainability.

My hope with these interviews is in a sense to get a snapshot of institutional, industry and community actor's views and interpretations of sustainability; and how sustainability is being interpreted by the dairy industry and the community and institutional and industry actors with oversight of government environmental policy. Could you tell me a little about your role and the work you do here, with regard resource management issues?

SUSTAINABILITY

- Many commentators talk about the concept of sustainability, what is your understanding of sustainability?
- Sustainability balance is often encapsulated as a balance being needed between economic, environmental and social/cultural sustainability I want to focus next on these three strands

ECONOMIC SUSTAINABILITY

- Some say **economic** survival of farms has meant intensification was necessary, do you think that economic growth is related to a farmer's ability to pursue sustainable practices? ,
- what can you say about that, can you think of examples where that is happening

ENVIRONMENTAL SUSTAINABILITY

- Included in environmental legislation are concepts such as intrinsic value – and environmental wellbeing, do you think there is any merit in looking after land and water and flora and fauna simply for their own sake? Even if it affects societies economic profitability? Do you see the relationship between the farmer, water and land being one of stewardship?

SOCIAL - CULTURAL SUSAINABILITY

- Some say there is too much public involvement in resource management issues such as resource consents, others too little? What is your view?
- Do you think communities have too big a say on determining what environmental risks are? What do you think?
- Have you any experiences or observations of positive and negative public involvement in dairy farming concerns?

LEGISLATION

- From your observation what impact does environmental legislation such as the RMA have on farm practice?
- Do you think it is, or has been adequate? Is it effective as a means of ensuring long term sustainability goals? If yes, why? If no, why not?

GOVERNMENT vs. GOVERNANCE

- Implementation of sustainability goals has been devolved to the regional level; do you have a view as to whether this has been effective?

- There are many examples now of co-management agreements between local council, government, community, Māori and the dairy industry, do you think this is the best approach for managing sustainability concerns? Have you any examples of this?
- Do you think national oversight and national regulation would provide more certainty for institutions such as yours, for farmers and for communities

TECHNOLOGY

- One view is that sustainability change will evolve through the development of new technologies being designed to solve environmental problems; do you have a view on technology as a driver of sustainability change?
- Historically in NZ there was a close almost symbiotic relationship between public good science, and farm extension, do you think the user pays commercial model is being effective in enabling new technologies to be rapidly taken up on farm?

E. Example of Interview Summary

Discourse Element	Regional Council staff/ academic "Quotes"	Discourse Assessment
Normative value statement-sustainability	The two most common ones are the concept of ***providing for the needs and aspirations of future generations;*** the other strand of limits, ***working within the planets limits***	SD normatively described
Democratic process	***It's always a difficult one to say how much public involvement there should be you've got on one hand want to move policy through quickly and effectively, and the more public consultation you have, the greater the time and the greater the cost involved with that, that needs to balance against interests in democracy and having people having input into the decisions who are likely to be affected by them,*** what I see at local government level is the opportunity being provided for people to be involved if they want to but it is not always presented in a way that makes it attractive or convenient for people.	Participatory processes seen as important Hierarchical approach to resource management and participation; managed by experts. Constraints the time taken for participatory processes. Understood how expert discourse can disenfranchise community involvement.
Institutional approach	Since the RMA was implemented and devolved power more particularly to district and city level I think that there has been a recognition that there hasn't been sufficient national guidance,	lack of national guidance as problematic
Implementation mechanisms	A lot of plans, such as district plan, regional plans, your regional policy statements and so forth are really are on the money, and they have some excellent objectives, excellent policy directions and ***it seems to be the actual implementation when there is a problem,*** we've got a vision where going but we don't seem to get there I think often it is very ***easy to have aspirational objectives and policies that everyone agrees with*** it, they are looking like they are balancing economic and environmental concerns very well, ***people can agree on those, a lot more easily than they can agree on rules***, so for example when working on district plan review a ***lot easier to get consensus on bigger picture and policy and objectives,*** but big argument when rules, ***where rubber hits the rules and putting constraints on various land owners and occupiers***, there has been ***a lot of debate around appropriate level of regulation*** whether implemented through regulation or other alternative means	Recognised the fraught political reality of introduction of stronger regulation to constrain economic growth Implementation processes the sticking point

Appendix III

Q-sort Documentation

A. Q-sort Statements

	Statements Q-sort Survey
1	Environmental sustainability is fundamental to our existence.
2	It has been necessary to intensify production to maintain profitability on dairy farms.
3	Our right to swim and fish in waterways is at risk
4	New Zealand farm production needs to continue to grow in order to feed the world.
5	There is a lot of hysteria over environmental matters.
6	The flora and fauna of NZ have intrinsic value and therefore need protection.
7	Sacrificing water quality to increase farm production is unacceptable.
8	NZ needs consistent national environmental standards for water, air, and soil quality.
9	Water should never be privatised, it belongs to everyone.
10	The best approach is to put a price on water and nutrients and establish trading opportunities.
11	The unrestrained pursuit of increasing dairy production is why we face environmental degradation.
12	The link between higher rates of nitrogen use and water degradation is not scientifically established.
13	Climate change is not some distant threat, it is happening now.
14	The wider public's views must be given priority when assessing any environmental risk.
15	In sensitive catchments such as the Rotorua Lakes the environment should come before the economy.
16	Voluntary approaches like the Clean Streams Accord are the best way to address dairy pollution.
17	The dairy industry is committed to addressing sustainability concerns
18	The NZ approach is an example of best practice in sustainable dairy farming.
19	A farm plan approach with input from specialists is needed to solve problems of soil nutrient overload.
20	Scientific innovation can solve the sustainability concerns facing the dairy industry.
21	Sustainability needs strong leadership, a national plan, and careful environmental monitoring.
22	Farmers need consistent rules if they are to invest in expensive sustainable farming systems.
23	We have to accept environmental degradation as a trade-off for a strong economy.
24	Dairy farming faces few controls more regulation will ensure environmental sustainability.

25	Stakeholder discussion offers the best chance of reconciling economic and environmental objectives.
26	Farmers have been unfairly targeted over water quality issues.
27	As there are so few wetlands left, they should be protected, not drained.
28	It is important to seek community involvement early when environmental problems are being addressed.
29	Māori have much to offer with regard the holistic management of environmental resources.
30	Organic and bio-farming approaches are more environmentally sustainable than conventional farming.
31	Regional Councils should adopt a uniform method for monitoring the environmental impacts of agriculture.
32	Economic sustainability is a pre-requisite for environmental sustainability.
33	Dairy farmers are good stewards of the land
34	NZ catchments are varied, and we need to decide stocking rates on a regional basis.
35	The primary sector is the backbone of the NZ economy, and Regional Councils should not interfere with this.
36	Farmers should not be part of the ETS until new technologies enable them to reduce emissions.
37	Organic farming systems need to be profitable if they are to be supported as a model for NZ farming.
38	Dairy farm conversions should not proceed if they require irrigation to make them viable.
39	Large scale farm irrigation schemes enable the most efficient use of water.
40	Water quality problems in rivers are overstated only a few have nitrogen management concerns.
41	Māori are just another group and should not have any special say over water.
42	Less intensive, low input farm systems are easier to manage and more profitable.
43	Environmental rules are ineffective because they do not address the cumulative impacts of farm pollution.
44	Creating protected areas on private property is an invasion of private property rights.
45	Farmers need to be given fully-funded incentives to restore and maintain ecosystems.
46	Dairy farming is highly regulated when it comes to environmental matters.

B Information Sheet Survey

Environmental Policy, Sustainability and the Dairy Industry

This doctoral project on sustainability and the dairy industry in New Zealand uses a Q-sort survey to identify and incorporate the views of key industry stakeholders into the research. The aim of the survey is to identify areas of agreement and shared values around sustainable land management policy for the dairy sector in New Zealand.

The survey has a set of 46 statements. These statements incorporate a broad sweep of the opinion domain for this issue. You need to decide which of the statements you most strongly agree or disagree with, or which you think are the most important or least important challenges and problems. There are no right or wrong answers. The goal is to find out your opinion or view with regard to these issues and concerns. But you are required to prioritise the statements.
The brief follow-up questions allow you to explain why you have done the sort as you have, with attention to the items at the extreme end of the continuum. The survey should take about 20 minutes to complete.
Your contribution to the survey is important as having the full range of stakeholder views on this important topic will provide the best evidence of current views. You may respond to the survey individually and not as a representative of any organization. I guarantee that you will not be identified in any report or publication.

If you complete the survey it will be assumed that you have consented to participate. You have the right to:
- Refuse to answer any particular question, and to withdraw from the study at any time.
- Ask any question about the study that occurs to you during your participation.
- Be given access to a summary of the findings from the study when it is concluded.

Please note that once the completed survey is submitted, it will not be possible to withdraw the responses from the study.
Research findings will be presented at academic conferences both nationally and internationally, and may be published as articles in academic journals.
If you have any questions about the survey, please contact me on jmw6@waikato.ac.nz. Alternatively, you may contact my supervisors, Associate Professor Priya Kurian (pkurian@waikato.ac.nz) or Dr Patrick Barrett (pbarrett@waikato.ac.nz).
I look forward to your contribution to this important research.

Jeanette Wright
PhD Candidate
Political Science & Public Policy
University of Waikato

The research has been approved by the Human Research Ethics Committee of the Faculty of Arts and Social Sciences at the University of Waikato. Any questions you have about ethical conduct may be directed to the Committee Secretary by email at fass-ethics@waikato.ac.nz

C. Introductory letter for Online Survey

Welcome to the survey on Environmental Policy, Sustainability and the Dairy Industry

This Q-sort survey is part of a PhD research project called 'Environmental Policy, Sustainability and the Dairy Industry.' The research is funded by the Lake Ecosystem Restoration NZ (LERNZ) Research Fund and a University of Waikato Doctoral Scholarship. In this survey, I am seeking to understand the views of key industry stakeholders. The findings will contribute to identifying areas of agreement and shared values around sustainable land management policy for the dairy sector in New Zealand.

You have been asked to participate because I am interested in hearing your perspective on issues of sustainability and the dairy sector in New Zealand.

The survey method is known as Q Sort. Q sort is a research tool that can identify sets of shared values among the representatives of different stakeholder groups. You will be presented with a set of 46 statements and asked to rank them from those you most agree with to those you least agree with. This requires you to prioritise the statements. More instructions are given on each page.

The survey should take about 20 minutes to complete. You are guaranteed anonymity, and your participation will not be made public.

Thank you for taking the time to participate in this important research.

If you have any questions about the survey, please contact me or my supervisory panel. Jeanette Wright

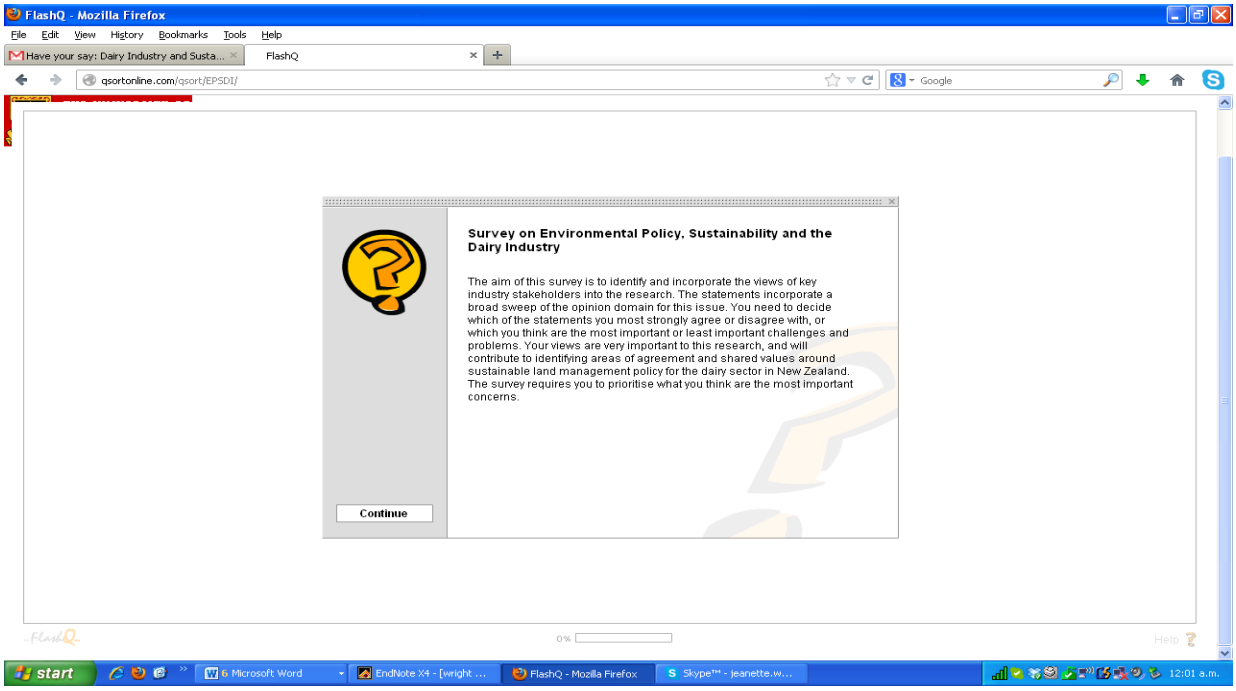
Jeanette Wright, PhD Candidate, Political Science & Public Policy, The University of Waikato, Hamilton 3240; email: jmw6@waikato.ac.nz

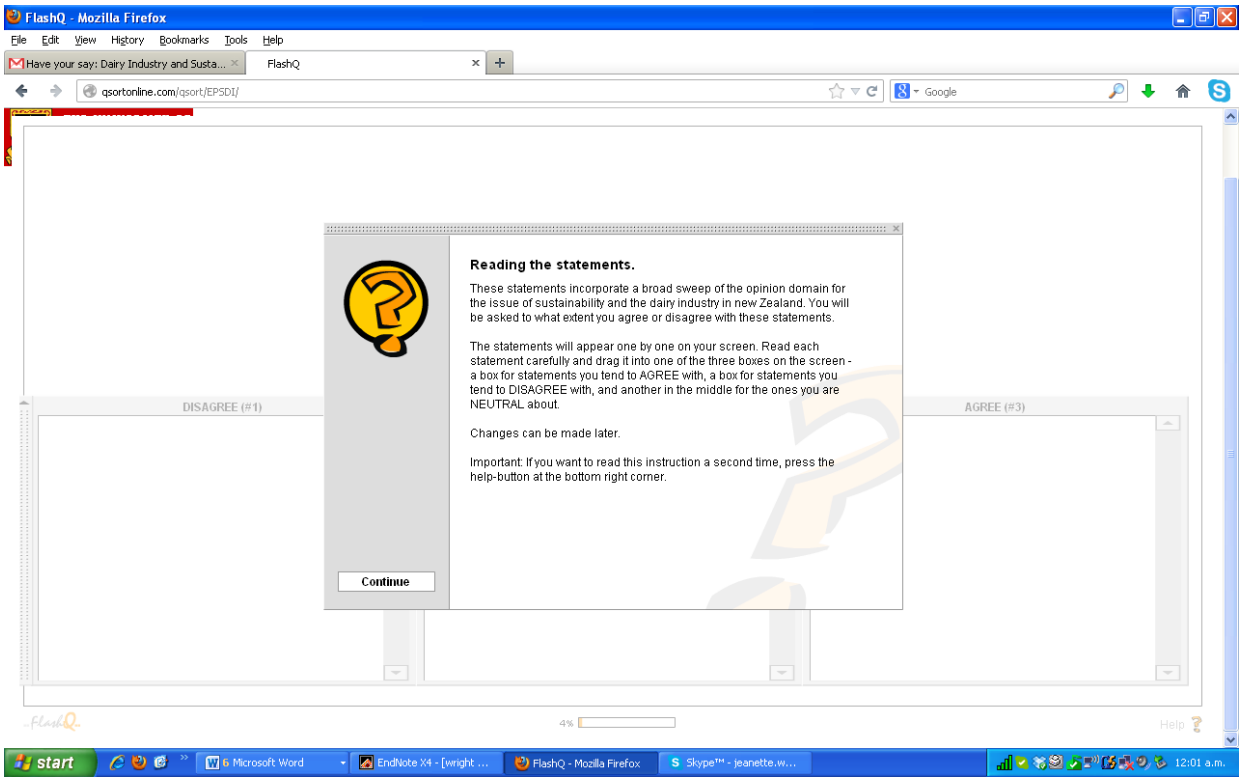
Dr Priya Kurian, Associate Professor, Political Science & Public Policy, The University of Waikato, Hamilton 3240; email: pkurian@waikato.ac.nz

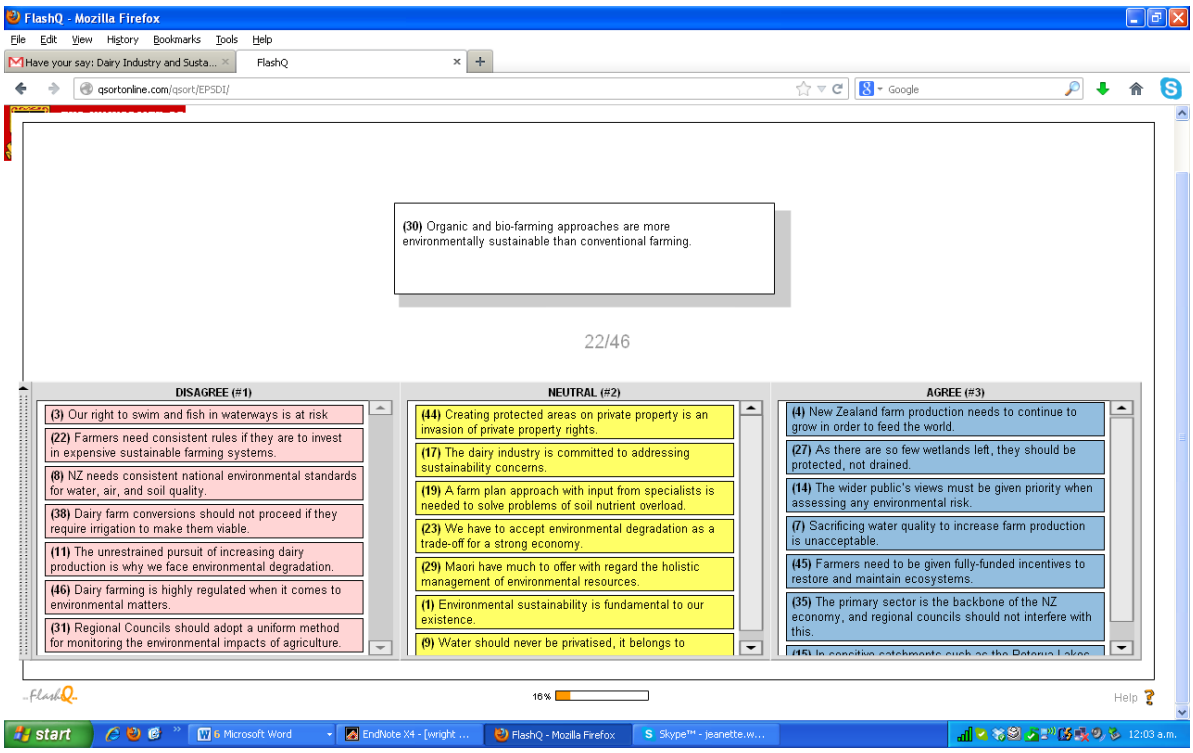
Dr Patrick Barrett, Senior Lecturer, Political Science & Public Policy, The University of Waikato, Hamilton 3240; email: pbarrett@waikato.ac.nz<

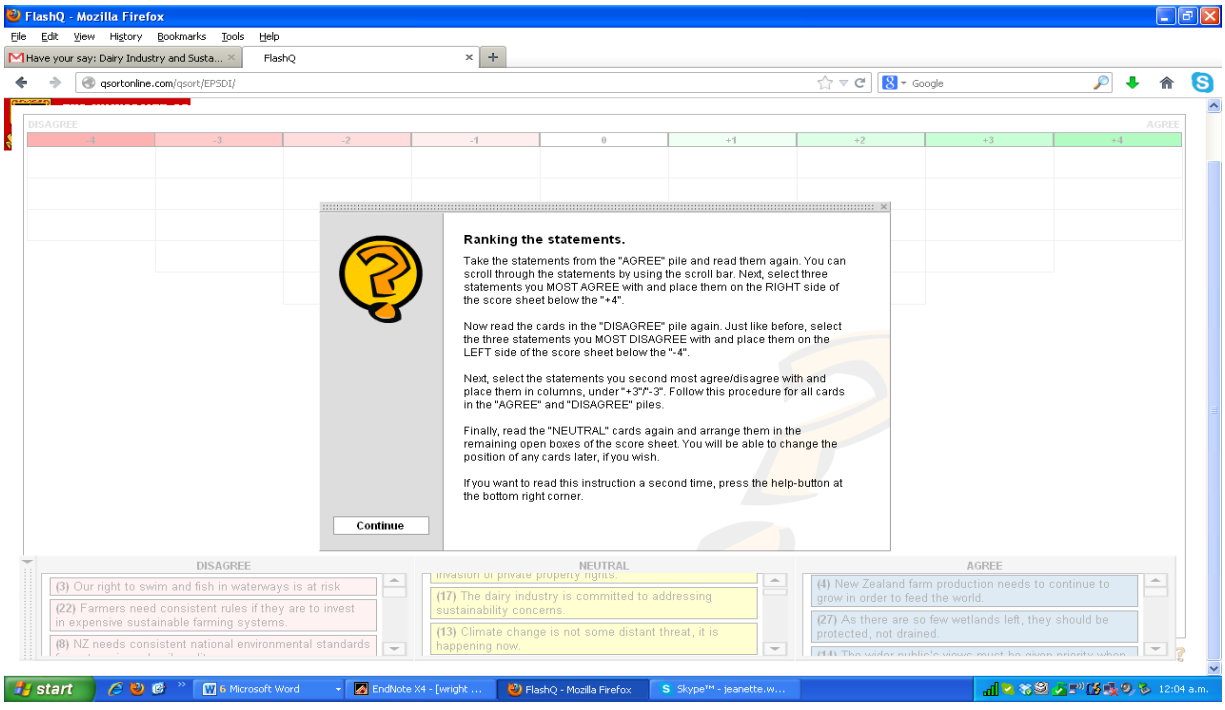
By clicking the "Next" button, you confirm that you have read the information about this study and have had a chance to ask any questions you have about the study. You also confirm that you agree to be in the study.

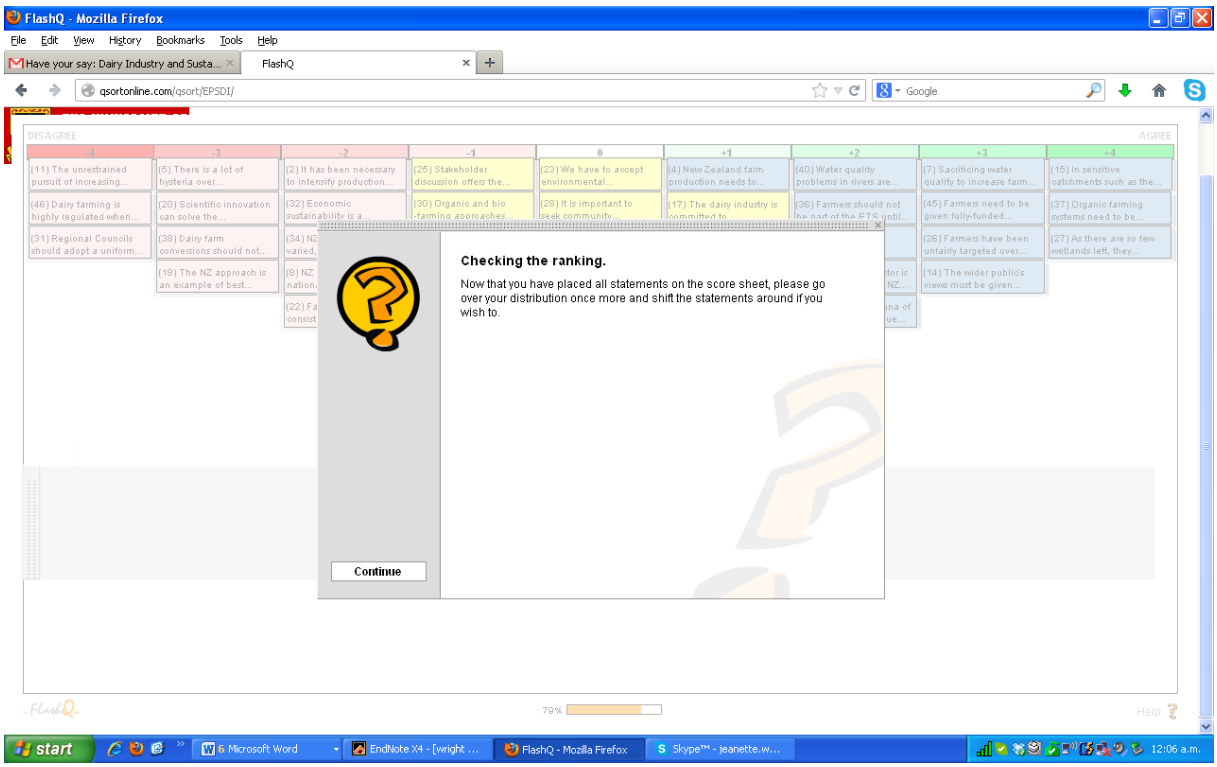
D. Sample of Screenshots from Q-sort Survey






FlashQ - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Have your say: Dairy Industry and Susta...
FlashQ
qsortonline.com/qsort/EPSDI/
(30) Organic and bio-farming approaches are more environmentally sustainable than conventional farming.
22/46
DISAGREE (#1)
(3) Our right to swim and fish in waterways is at risk
(22) Farmers need consistent rules if they are to invest in expensive sustainable farming systems.
(8) NZ needs consistent national environmental standards for water, air, and soil quality.
(38) Dairy farm conversions should not proceed if they require irrigation to make them viable.
(11) The unrestrained pursuit of increasing dairy production is why we face environmental degradation.
(46) Dairy farming is highly regulated when it comes to environmental matters.
(31) Regional Councils should adopt a uniform method for monitoring the environmental impacts of agriculture.
NEUTRAL (#2)
(44) Creating protected areas on private property is an invasion of private property rights.
(17) The dairy industry is committed to addressing sustainability concerns.
(19) A farm plan approach with input from specialists is needed to solve problems of soil nutrient overload.
(23) We have to accept environmental degradation as a trade-off for a strong economy.
(29) Maori have much to offer with regard the holistic management of environmental resources.
(1) Environmental sustainability is fundamental to our existence.
(9) Water should never be privatised, it belongs to
AGREE (#3)
(4) New Zealand farm production needs to continue to grow in order to feed the world.
(27) As there are so few wetlands left, they should be protected, not drained.
(14) The wider public's views must be given priority when assessing any environmental risk.
(7) Sacrificing water quality to increase farm production is unacceptable.
(45) Farmers need to be given fully-funded incentives to restore and maintain ecosystems.
(35) The primary sector is the backbone of the NZ economy, and regional councils should not interfere with this.
16%
Help
start
6 Microsoft Word
EndNote X4 - [wright ...
FlashQ - Mozilla Firefox
Skype™ - jeanette.w...
12:03 a.m.


FlashQ - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Have your say: Dairy Industry and Susta...
FlashQ
qsortonline.com/qsort/EPSDI/
DISAGREE
AGREE
-4 -3 -2 -1 0 +1 +2 +3 +4
Ranking the statements.
Take the statements from the "AGREE" pile and read them again. You can scroll through the statements by using the scroll bar. Next, select three statements you MOST AGREE with and place them on the RIGHT side of the score sheet below the "+4".
Now read the cards in the "DISAGREE" pile again. Just like before, select the three statements you MOST DISAGREE with and place them on the LEFT side of the score sheet below the "-4".
Next, select the statements you second most agree/disagree with and place them in columns, under "+3"/"-3". Follow this procedure for all cards in the "AGREE" and "DISAGREE" piles.
Finally, read the "NEUTRAL" cards again and arrange them in the remaining open boxes of the score sheet. You will be able to change the position of any cards later, if you wish.
If you want to read this instruction a second time, press the help-button at the bottom right corner.
Continue
DISAGREE
(3) Our right to swim and fish in waterways is at risk
(22) Farmers need consistent rules if they are to invest in expensive sustainable farming systems.
(8) NZ needs consistent national environmental standards
NEUTRAL
(17) The dairy industry is committed to addressing sustainability concerns.
(13) Climate change is not some distant threat, it is happening now.
AGREE
(4) New Zealand farm production needs to continue to grow in order to feed the world.
(27) As there are so few wetlands left, they should be protected, not drained.
start
6 Microsoft Word
EndNote X4 - [wright ...
FlashQ - Mozilla Firefox
Skype™ - jeanette.w...
12:04 a.m.


FlashQ - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Have your say: Dairy Industry and Susta...
FlashQ
qsortonline.com/qsort/EPSDI/
Google
DISAGREE
AGREE
Checking the ranking.
Now that you have placed all statements on the score sheet, please go over your distribution once more and shift the statements around if you wish to.
Continue
79%
Help
start
6 Microsoft Word
EndNote X4 - [wright ...
FlashQ - Mozilla Firefox
Skype™ - jeanette.w...
12:06 a.m.

Appendix IV

Treaty of Waitangi Principles

The Principles of the Treaty originate in contemporary politics from a case brought in 1987 to the High Court by the New Zealand Māori Council (NZ Māori Council v. Attorney-General). In 1989 in response to this, the Fourth Labour Government adopted the following Principles (Hayward, n.d.)

Principles for Crown Action on the Treaty of Waitangi (1989)

Principle of government or the kawanatanga principle

Article 1 gives expression to the right of the Crown to make laws and its obligation to govern in accordance with constitutional process. This sovereignty is qualified by the promise to accord the Māori interests specified in article 2 an appropriate priority. This principle describes the balance between articles 1 and 2: the exchange of sovereignty by the Māori people for the protection of the Crown. It was emphasised in the context of this principle that 'the Government has the right to govern and make laws'.

Principle of self-management (the rangatiratanga principle)

Article 2 guarantees to Māori hapu (tribes) the control and enjoyment of those resources and taonga that it is their wish to retain. The preservation of a resource base, restoration of tribal self-management, and the active protection of taonga, both material and cultural, are necessary elements of the Crown's policy of recognising rangatiratanga.

The Government also recognised the Court of Appeal's description of active protection, but identified the key concept of this principle as a right for iwi to organise as iwi and, under the law, to control the resources they own.

Principle of equality

Article 3 constitutes a guarantee of legal equality between Māori and other citizens of New Zealand. This means that all New Zealand citizens are equal before the law. Furthermore, the common law system is selected by the Treaty as the basis for that equality, although human rights accepted under international law are also incorporated. Article 3 has an important social significance in the implicit assurance that social rights would be enjoyed equally by Māori with all New Zealand citizens of whatever origin. Special measures to attain that equal enjoyment of social benefits are allowed by international law.

Principle of reasonable cooperation

The Treaty is regarded by the Crown as establishing a fair basis for two peoples in one country. Duality and unity are both significant. Duality implies distinctive cultural development while unity implies common purpose and community. The relationship between community and distinctive development is governed by the requirement of cooperation, which is an obligation placed on both parties by the Treaty. Reasonable cooperation can only take place if there is consultation on major issues of common concern and if good faith, balance, and common sense are shown on all sides. The outcome of reasonable cooperation will be partnership.

Principle of redress

The Crown accepts a responsibility to provide a process for the resolution of grievances arising from the Treaty. This process may involve courts,

the Waitangi Tribunal, or direct negotiation. The provision of redress, where entitlement is established, must take account of its practical impact and of the need to avoid the creation of fresh injustice. If the Crown demonstrates commitment to this process of redress, it will expect reconciliation to result (Hayward, n.d., pp. 493-494).

Appendix V

A Sample of Legislation & Policy Exercised to Disenfranchise Māori

Legislation/policy	Goal and outcome
1840 Treaty of Waitangi	In the Māori view the Treaty of Waitangi guaranteed Māori sovereignty and safeguarded Māori land for as long as they wished to retain it.
1840 Royal Charter	Provided a provision for the government to make grants of wasteland to private persons. However the category 'wasteland' only applied to Māori land.
1841 Land Claims Ordinance	Stated that lands not actually occupied or used by Māori belonged to the Crown. This contradicted Article 2 of the Treaty. Section 2 of the later 1841 Act also assumed that all unappropriated lands subject to the 'rightful and necessary occupation and use thereof by the aboriginal inhabitants' was Crown lands, and Section (n 7) exempted from claims land that was likely to be required for public purposes.
1844 British Select Committee	The British Select Committee findings supported the theory of wasteland. From this view Māori only had rights to land in their actual use and possession **if** it was under permanent cultivation.
1846 Royal Instruction 1846 NZ Government Act	The 1846 Royal Instructions and the New Zealand Government Act 1846 all assumed the existence of 'waste' lands available for settlement. This meant that Māori land claims could be limited to areas in actual use and occupation (Marr, 1997, p. 32).
1846 New Zealand Constitutional Act	Established a vote for all those who held lands according to individual tenure, and who were able to read and write English. This ensured that any Parliament established would be representative solely of propertied Pākehā. This disenfranchised just about all Māori (O'Malley, et al., 2010, p. 4).
Native Land Purchase Ordinance Act1846	The Land Purchase Ordinance 1846 stopped Māori owners renting their land and forced them to sell it to the government. The Government promised that five per cent of the profit from the sale of this land would go to public provision for Māori, including building schools, hospitals, and flour mills. However, after the sale these promises went largely unfulfilled (Marr, 1997, p. 47).
Kingitanga Movement	The King movement was designed to help achieve the Treaty goal of equal partnership between the Crown and Māori (Marr, 1997, p. 47)
1852 Constitution Act	The Constitution Act 1852 provided for the establishment in New Zealand of elected municipal corporations (provincial government), and a General Assembly. The qualifications for voters to the General Assembly and Provincial Councils included a freehold

	property interest. There was provision made under section 71 for the maintenance of Māori laws, customs, and usages, as long as they were not repugnant to 'the general principles of humanity' and for separate districts for Māori where such traditional customs, laws, and usages could be observed. These were never established. (Marr, 1997, p40.
1853 -55 per cent of Land in Government hands.	By 1853, the Government had purchased some 32 million acres of land. This was almost half the land area of New Zealand, and at this time it enabled the Government to provide sufficient land to meet the public works needs of settlers without the need for compulsory land- taking legislation. Public works were constructed on land set aside from purchases and from Crown land even though the purchases and the definition of Crown land were already the subject of dispute with Māori (Marr, 1997, p. 35).
1862 Native Lands Act	Under this Act the pre-emption clause in the Treaty that stated that only the Crown could purchase Māori land was changed. It allowed settlers to buy Māori land directly. This saw Land Courts established to individualise land title.
Native Land Act 1873	Under this Act, title could no longer be held by iwi or hapū. All individuals with an ownership interest had to be named in the title. Individual Māori received blocks of land that were partitioned and repartitioned into uneconomic parcels of land. Fragmentation and loss of land continued (Auditor General, 2011).
Māori Affairs Act 1953	Anyone who could show the Māori Land Court that a good piece of Māori land was not being used could apply to have it vested in trustees. Māori whose shares in land were of low value were forced to sell them to the Māori Trustee. This Act remained the governing legislation for Māori land for 40 years (Auditor General, 2011)

(Source: Auditor General, 2011; Marr, 1997; O'Malley, et al., 2010)

Appendix VI

Major Documents Analysed for Research

Document Analysis	Documents
Legislation	• 1975: Treaty of Waitangi Act (1975) • 1986: Environment Act (1986) • 1991: RMA (1991)and Amendments • 2002: Local Government Act (2002) • 2002: Climate Change Response Act (2002) • 2006 Te Arawa Lakes Settlement Act (2006)
Central government Ministries , policy, reports and strategies	**<u>Ministry For the Environment</u>** • 1997: Towards Sustainability: Environment 2010 and the Green Package • 1999: Resource Management Act; Practice and performance are desired environmental outcomes being achieve at least cost? A case study of farm dairy effluent management • 2001: Valuing New Zealand's Clean Green Image. • 2003: Cabinet Paper: Sustainable Water Programme of Action –Implementation Package • 2003: Report to Minister for the Environment on Lake Rotoiti and other Rotorua Lakes • 2003:Dairy and Clean Streams Accord between Fonterra, Regional Councils and MfE and MAF • 2003: Sustainable Water Programme of Action • 2004: Water Programme of Action: The effects of rural land use on water quality • 2006: Freshwater for the future : A supporting document • 2007: Environment New Zealand Report 2007. • 2009: Backgrounder on New Start for Fresh Water • 2009: New Start for Fresh Water (Cabinet Paper) • 2009: Reversing the Decline in our Fresh Water • 2009: Reporting on New Zealand's Environment: How the National Environmental Reporting programme works • 2011: Fresh Start for Fresh Water Reforms • 2011: National Policy Statement for Fresh Water Management 2011 • 2012:National Policy Statement for Fresh Water Management (2012) • 2013: Freshwater Reform 2013 and Beyond: Regulated National Objectives Framework • 2013:Improving our Resource Management systems: A Discussion Document • 2013: MfE Environmental Indicators **RMA Technical guides:**

	• Website; Planning Guide: An Everyday Guide to the RMA **Ministry Agricultural and Forestry** • 1997:Impacts of dairy Conversions in the Taupō District **Ministry for Primary Industries** • 2012: Evaluation of Impact of different policy options for managing water quality limit • 2013:Sustainable Farming Fund **National Institute of Water and Atmosphere** • 2010: How clean are our Rivers? • 2010: Freshwater Quality monitoring by Environment Southland, Taranaki Regional Council, Horizons Regional Council and Environment Waikato **Parliamentary Commissioner for the Environment** • 2002: Creating Our Future Sustainable Development for New Zealand • 2004: Growing for Good: intensive Farming, Sustainability and the New Zealand Environment • 2006: Restoring the Rotorua Lakes: The Ultimate Endurance Challenge • 2010: How clean is New Zealand? Measuring and Reporting on the Health of our Environment • 2011Waikato Regional Council. (2011). *Waikato Regional Plan (online version).* • 2012: Water Quality in New Zealand: Understanding the Science • 2013: Improving our Resource Management System: A Discussion Document: Submission to the Minister for the Environment • 2013: Water Quality in New Zealand: Land Use and Nutrient Pollution
Regional councils strategies and community and government documents	**Bay of Plenty Regional Council / Environment Bay of Plenty** • 2002: Strategy for the Lakes of the Rotorua District-Te Kaupapa mo Nga Taonga o Rotorua: Te Arawa Māori Trust Board, 2000 #969} • 2004:TheRotura Lakes Protection and Restoration Programme Outline of Project Structure and Timeline • 2004: Government Funding of Rotorua Lakes Restoration (McKinley Douglas Limited) • 2005: Lakes Quality Assessment and Action Plan prioritisation • 2006: Lake Okaro Action Plan • 2008: Operative Bay of Plenty Regional Water and Land Plan • 2009 the Rotorua Lakes protection and restoration action programme • 2010: Review of the Rotorua Lakes strategy • 2010: 2009/2010 Rotorua Lakes TLI update

	• 2011: State of the Rotorua/Te Arawa Lakes 2009-2010 • 2011: Rotorua Benchmarking, challenges and Progress (Park & McCormick) • 2012:Rotorua Lakes Action Plans: What is an Action Plan
	<u>Waikato Regional Council / Environment Waikato</u> • 1999: Sources of nitrogen and phosphorus in several major rivers in the Waikato region (Vant, 1999) • 2001: A method for estimating the load of Nitrogen still to come from the current extent and intensity of pastoral land use in the catchment of lake Taupō (Vant, 2001); • 2003: Protecting lake Taupō: A long term strategic partnership • 2007: Environment Waikato Clean Streams project survey of farmers • 2007:Proposed Waikato regional plan variation –Lake Taupō • 2007:Proposed Waikato Regional Plan variation 5 Lake Taupō catchment (Hearings committee recommendations version) • 2008: The Conditions of Rural Water and Soil in the Waikato • 2008: Implications of Agricultural Change in the Waikato Region: Current Trends and Future Scenarios (Cameron et al.) • 2010: Environmental Monitoring 2009 • 2010 Nitrogen Sourcing and Trading in the Lake Taupō Catchment (WRC, 2010)
Dairy industry strategies and government and industry agreements	• 2003: Fonterra Dairy and Clean Streams Accord (Fonterra, 2009) • 2006: Fonterra Annual Report (2006) • 2006 Dairy Industry Strategy for Sustainable Environmental Management 2006 • 2008: Dairy Industry Guidelines for Developing RMA Policy • 2008 Primary Sector Partnership • 2009: Fonterra and the Environment • 2009: Fonterra Sustainability Indicators • 2009 Dairy New Zealand Strategy for NZ Dairy farming 2009-2020 • 2012 New Zealand Dairy Statistics • 2012: Fonterra Annual Report 2012 • 2012: Fonterra Group Environmental Policy • 2013: Fonterra: Supply Fonterra: Our path to a sustainable future • 2013: Draft Sustainable Dairy Water Accord: A commitment to NZ by the dairy sector • 2013 Strategy for Sustainable Dairy Farming 2013-2020

	• 2013 Sustainable Dairy Water Accord 2013: Questions and Answers 2013: Water Accord 2013 making Dairy Farming work for everyone – Strategy for sustainable dairy farming 2013-2020 – Background Supplement
Stakeholder Interviews & Q-sort survey	The transcribed stakeholder interviews were used in the development of the concourse for the Q-sort survey, and for analysis in the broader thesis
Media texts	• Media texts; including rural newspapers such as *Straight Furrow*; *Waikato Farming Lifestyles, The New Zealand Farmers Weekly*, and *Rural News*. • Websites of institutional, dairy industry networks and community actors were drawn on as were press releases.
Historical agricultural texts	• 1932: *A Conspectus of Recent Agricultural Research with some Reflections* (Lord Bledisloe, Cawthron Lecture Nelson NZ) • 1933: *The New Zealand Dairy Industry: The Formation, Administration, Accounts, Finance, Costing and Statistics of Dairy Factory Companies*. (Duncan, G, 1933) • 1937: *A History of the New Zealand Dairy Industry 1840-1935* (Philpot, H, 1937) • 1939: *The Rape of the Earth* (Jacks, G., & Whyte, R. 1939). • 1944: *Soil Erosion in New Zealand: A Geographic Reconnaissance* (Cumberland, K, 1944). • 1948: *Science of Dairying: A Text-book for the use of Secondary and Technical Schools* (Pennlington, W 1948). • 1964: *Grass To Milk: A New Zealand Philosophy* (McMeekan, G, 1964). • 1969: *Heritage Destroyed: The Crisis in Scenery Preservation in New Zealand* (Salmon, J. T. 1960). • 1970: *The Grasslands of New Zealand* (Levy, B. 1970). • 1970*: Land Development by Government 1945-69* (H Plunket 1970). • *1970: The Grasslands Revolution*. Small field, P. 1970). • .1973: *Hold this Land: A History of Soil Conservation in New Zealand* (McCaskill, L, 1973). • *1975: A Command of Cooperatives: The Development of Leadership, Marketing and Price Control in the Cooperative Dairy Industry of New Zealand* (Ward, A. 1975).

Appendix VII

Sample of Planning Claims

Claim	The Planning Claims 1977 – 1988
Manukau Claim	This claim was brought on environmental grounds. The tribes concern was with further damage to the Manukau harbour and marine life if a thermal power station was allowed. The Tribunal found in favour of the claimants and brought customary fishing rights into focus. The report notes the 'impressive ecological insight that past and present Māori had (Oliver, 1991).
Motunui-Waitara Claim	This claim was focused on the destruction of the tribe's traditional shellfish gathering grounds on the offshore reefs by the sewerage outfall at Waitara. The claimants argued that the Crown had permitted the discharge of untreated or lightly treated sewage and other effluents along the north Taranaki coast and destroyed their traditional resources, and this was a breach of the Treaty. They argued they had the right to retain the traditional food resources of the hapu, who each had their own sections of the reefs to harvest. This was seen as essential for their own use, for hospitality and for their Mana. The Tribunal agreed, and stated that in the future there was a need to place a greater emphasis on tribal rights and Māori values in decision-making (Oliver, 1991).
Te Arawa Claim	Te Arawa objected to a proposal to discharge effluent from the Rotorua waste water treatment plant which would see treated sewage going through a pipeline into the Kaituna River, and then flow into the sea in the Bay of Plenty. The claimants objected on medical, social and spiritual grounds. They forcefully asserted that 'to mix waters that have been contaminated with human waste with waters that were used for gathering food was deeply objectionable'. The fishing grounds from Lake Rotoiti to the Bay of Plenty would be lost, as well as all the plant material on its banks, which was used for food, weaving and medicinal purpose'(Oliver, 1991, p. 22). Again the Tribunal found that these were breeches that needed to be considered in Council decision-making.

Source: (Oliver, 1991)

Appendix VIII

Permitted Activity Waikato Regional Council

Conditions of Permitted Activity Rule 3.5.5.1 (Waikato Regional Council, 2013b)

a) No discharge of effluent to water shall occur from any effluent holding facilities.

b) Storage facilities and associated facilities shall be installed to ensure compliance with condition a).

c) All effluent treatment or storage facilities (e.g. sumps or ponds) shall be sealed so as to restrict seepage of effluent. The permeability of the sealing layer shall not exceed 1x10-9 metres per second.

d) The total effluent loading shall not exceed the limit as specified in Table 3-8, including any loading made under Rules 3.5.5.2 and 3.5.5.3, 3.5.6.2, 3.5.6.3 or 3.5.6.4.

e) The maximum loading rate of effluent onto any part of the irrigated land shall not exceed 25 millimetres depth per application.

f) Effluent shall not enter surface water by way of overland flow, or pond on the land surface following the application.

g) Any discharge of contaminants into air arising from this activity shall comply with permitted activity conditions in Section 6.1.8 of this Plan.

h) The discharger shall provide information to show how the requirements of conditions a) to g) are being met, if requested by the Waikato Regional Council.

i) The discharge must not occur within 20 metres of a Significant Geothermal Feature.

j) Where fertiliser is applied onto the same land on which farm animal effluent has been disposed of in the preceding 12 months, the application must be in accordance with Rule 3.9.4.11

Achieving compliance

Avoid overflow

- There must be no capacity for the effluent to discharge to any drain, stream, river or lake on your property, either directly or by soakage.
- You must maintain a minimum freeboard level of at least 400 millimetres.
- You must have sufficient storage room to allow for prolonged periods when you can't irrigate or spread to pasture, such as wet weather or system breakdown.
- Your effluent treatment and storage facilities should be constructed in accordance with the publication 'Dairying and the Environment – Managing Farm Dairy Effluent' (1996) by the Dairying and the Environment Committee. Copies of this guideline are available from the New Zealand Dairy Research Institute, Private Bag 11029 Palmerston North.

Holding facilities

- Your effluent must be contained at all times. It must not be able to drain away, either into the ground or by overflow.
- Your storage facilities must be sealed with clay, concrete or some other recognised sealing compound.
- Your holding ponds should have the base and sides thoroughly compacted with a wheeled machine. If the soil has less than 8 per cent clay additional sealing measures may be required, such as an artificial liner.

Source:Waikato Regional Council, 2013b