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Application of the Policy Choice Framework to Lake Taupo Catchment

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Executive summary

Lake Taupo is a large deep lake in the central North Island of New Zealand. The Waikato Regional Council (the council) has statutory responsibility to protect water quality of the lake[1]. Maintenance of the lake's very high water quality has been the aim of the council's policy intervention over the past nine years.

In response to threats to the clarity of lake water from increases in diffuse sources of nitrogen from land use, the council initiated a policy process involving owners of pastoral, forestry and undeveloped land, Ngati Tuwharetoa and national and local government agencies. The resulting policy instrument chosen by the council was an economic instrument with supporting regulation, namely a cap and trade of nitrogen, and a publicly funded charitable trust for the Lake Taupo catchment to permanently remove nitrogen from the catchment.

The report retrospectively applies the Policy Choice Framework (PCF) to the biophysical, landowner and organisational context in the Lake Taupo catchment from 1999 to 2008. It is a re-interpretation of what happened. The PCF integrates a number of economic and behavioural frameworks to predict the likely responses of land owners and agencies to the implementation of policy instruments. Knowledge of these responses may be used by natural resource policy makers to assist them in choosing packages of policy instruments that may be more effective in influencing the behaviour of land owners and organisations.

The purpose of the report was two-fold. First, it tested the usefulness of the PCF as a tool to be used in the future by the council. Using a case study approach, the PCF is assessed as to whether, after highlighting the appropriate policy instrument to use, it revealed and accounted for land owner and then council's organisational response to the chosen policy instrument. The second purpose of the report was to identify important aspects for the council's continuing implementation of the variation in the Lake Taupo catchment.

In applying the PCF to the Taupo case study, we posed the question as to whether the PCF was useful in highlighting aspects of the process of policy development. We found the PCF is a tool that is likely to be useful for the council to apply in a forward-looking policy analysis. There were several parts of the policy development of the variation where we consider insights into the consequences that the changes posed for

[1] Section 30(1)(c) Resource Management Act 1991 (RMA).

landowners and the council could have occurred sooner if the PCF had been used. This would assist policy processes to be as cost-effective as possible. While the complex nature of many of the policy issues facing the council mean that the consequences of any action cannot be predicted, applying the PCF would assist project planning and resourcing, as it gives a systematic method for assessing policy instruments. More certainty about methods used in policy development would be useful to a ratepayer-funded organisation subject to legislation that promotes public accountability and transparency.

There are three key aspects of cost-effective and transparent decision making where the PCF could assist. First, applying the PCF requires technical evidence to be assembled, and as a result highlights where information is lacking. The decision trees in the framework force users to systematically assess the information they have and the questions that need to be answered. The first broad component of the PCF could have been used to provide the council with several important pieces of information. Using the theoretical framework on justification for government intervention would have provided a robust starting point for the council in its justification for taking action and potentially identifying cap and trade as an appropriate option earlier.

Second, the PCF forces users to understand the land owner holder context. It also requires uses to explicitly consider whether changes to a policy instrument are needed in order to get the necessary behavioural change and whether change will occur at a rate and scope that will achieve the policy outcome. This has important consequences for reducing political risk and for designing the process and timing of consultation. For instance, the I_3 Response Framework component of the PCF, use land owner interviews as an in-depth source of information with which to understand the likely land owner response to an intervention. We argue that it may be faster and more cost-effective for the council to use components of the PCF to understand land owner context, than the more traditional consultation process with representative land owners, who are only able to convey a relatively narrow span, and interpretation, of possible behavioural responses to an intervention.

Third, acknowledging and then appropriately resourcing the in-house capacity for implementing novel policy situations such as occurred in the variation would assist in the development of cost-effective policy.

In terms of the second purpose of the report, we found that applying the PCF retrospectively was helpful in highlighting ongoing aspects for the council to attend to as it progresses implementation of the variation. Specialist knowledge, new skills and experience required to undertake the new processes and procedures were sourced

from within different parts of the council and from external agencies. Related to this were changes to roles, responsibilities and relationships between functional groups within the council to be compatible with the innovation. Because of the wide ranging changes needed, a radical policy innovation such as the variation was organisationally disruptive, requiring considerable time and resources to successfully implement.

Recommendations:

In future policy development processes, the council should consider whether to:

a) Apply the PCF once the council has confirmed the policy objective. This can be done as an initial run-through to highlight where more information is needed and where to focus effort, and then re-visited throughout the process.
b) Develop key messages for internal and external individuals and groups following an initial run-through of the PCF. The various technical and political decisions can be acknowledged.
c) Ensure changes to underpinning component or architectural principles in the policy instrument are articulated and widely discussed.
d) In project planning, ensure that sufficient resources are allowed for implementation and policy development staff to work together throughout the entire process.
e) Apply the Relationship Choice Framework where the success of the councils policy implementation is likely to depend on another organisation meeting its responsibilities, in order to anticipate and manage tensions between organisations with different governance, strategic and workforce management.

In regard to the implementation of the variation for Taupo:

f) Re-visit the councils' approach to outsource much of the nutrient management expertise to AgResearch. Instead, consider increasing in-house expertise or working with other regional councils and external agencies on a certification process for nutrient planning experts.
g) Continue discussions with agricultural agencies and Taupo farmer groups about what role different agencies should have in the delivery of farmer support, to optimise farm performance and profitability within a nutrient-restricted regime

1 Introduction

Lake Taupo is a large deep lake in the central North Island of New Zealand. The Waikato Regional Council (the council) has statutory responsibility to protect water quality of the lake[2]. Maintenance of the lake's very high water quality has been the aim of the council's policy intervention over the past nine years.

In response to threats to the clarity of lake water from increases in diffuse sources of nitrogen from land use, the council initiated a policy process involving Ngati Tuwharetoa, national and local government agencies and owners of pastoral, forestry and undeveloped land. The resulting policy instrument chosen by the council was an economic instrument with supporting regulation. This took the form of a cap and trade of nitrogen, and a publicly funded charitable trust for the Lake Taupo catchment, the aim of which was to permanently remove nitrogen from the catchment.

The Policy Choice Framework (the PCF) was developed by the Practice Change Research Group of Department of Primary Industries, Victoria. The PCF is a systematic method for selecting policy instruments to achieve natural resource outcomes, by integrating research in the fields of economics, land owner decision making and behaviour, and organisational behaviour (Johnson et al. 2006; Kaine et al. 2008). The PCF has been applied in both forward and retrospective situations. For instance, it has been used to assess an existing suite of policy instruments and recommend changes (Kaine et al. 2008) and also in selecting policy instruments where details of the intervention to achieve the policy objective are still to be worked out (Johnson et al. 2009).

This report retrospectively applies the PCF to the biophysical, institutional and landowner context in the Lake Taupo catchment from 1999 to 2008. It is a re-interpretation of what happened. The Lake Taupo catchment was chosen as a case study because the council wanted to understand the far reaching implications of a novel and unprecedented policy intervention to cap and trade diffuse sources of nitrogen.

The PCF was used for this case study because it is a framework designed for situations where there is a high level of uncertainty about responses of land owners and institutions to intervention to achieve natural resource outcomes, such as occurred in the Lake Taupo catchment.

[2] Section 30(1)(c) Resource Management Act 1991 (RMA).

The purpose of the report was two-fold. First, it tested the usefulness of the PCF as a tool to be used in the future by the council to choose a package of policy instruments. Using a case study approach, the PCF is assessed as to whether, after highlighting the appropriate policy instrument to use, it revealed and accounted for land owner and then council's organisational response to the chosen policy instrument. The second purpose of the report was to identify important aspects for the council's continuing implementation of the variation in the Lake Taupo catchment. In the process of reflecting on past events, there naturally arises implications for future policy issues, and some of these are touched upon in the discussion section of the report.

The PCF has been applied solely to council actions to address non-point source nitrogen discharges from rural land. The focus of our analysis was on pastoral farmers as the council put most consultation effort into this group rather than owners of low nitrogen leaching forested or undeveloped land. The analysis also does not consider the council's actions to address the lake water quality threat from human sewage.

The report begins with background information for the analysis, including the institutional and scientific context and the council's decision making process. For detailed information readers are referred to the council's evidence to the Environment Court in 2008[3]. The next section gives an overview of the PCF theoretical framework used, and the methods followed. Analysis of the background material on the process using PCF is presented, followed by discussion of the wider implications and additional policy issues. The final section of the report contains conclusions and recommendations for future action. Appendices contain detail on the conceptual frameworks that make up the PCF. Appendix 1 gives an overview of the PCF, Appendix 2 summarises the primary instrument selection, followed by land owner and organisational components in Appendix 3 and finally Appendix 4 summarises the theoretical framework concerned with organisational responses.

2 Background

Threat to water quality of Lake Taupo

Lake Taupo is the largest lake in New Zealand at 30 kilometres wide, 40 kilometres long, and is approximately 160 metres at its deepest point. The catchment area is 3487 square kilometres, including the lake. The current water quality of Lake Taupo is excellent. Levels of the plant nutrients nitrogen and phosphorus in the water are low.

[3] For more information on the Council's decision making and consultation see the Council's Environment Court evidence in chief of Robert Brodnax and Justine Young (Brodnax 2008, Young 2008). A

As a result, there are low amounts of microscopic algal plants, whose growth the nutrients support. Because of this, the water is clear and blue. Higher levels of nutrients would support higher levels of algae, and the water would appear murkier and greener. It is the threat to the colour and clarity of the lake water that the council focussed on in its presentation of water quality issues.

The water quality of Lake Taupo and some of its inflows have been studied since the early 1970s. While there have not been major changes in water quality at a monitoring site in the middle of the lake, and the water quality there is still high, "there are clear signs of gradual deterioration over the past 30 years" according to the council's water quality scientist (Vant 2008). Furthermore, marked increases have been observed in the levels of nitrogen in several streams flowing into the lake that drain areas of pasture. Modelling studies have shown how the water quality of the lake could be adversely affected in the absence of controls over non-point source nitrogen leached from land use practices in the catchment.

Land use and land ownership

The major productive rural land uses in the catchment are pastoral farming[4] and planted production forestry, making up approximately 20 percent and 25 percent of the land in the catchment respectively. The remainder of the land in the catchment is undeveloped and a small portion is in urban land uses. Of the pastoral farms, the majority run a mix of sheep and beef. The last decade has seen a trend of subdivision of farms into small rural residential blocks, particularly at the north end of the lake near the major urban centre of Taupo.

Ngati Tuwharetoa is the iwi that exercises mana whenua in the catchment of the lake. Ngati Tuwharetoa owns the bed of the lake and is the major private landowner in the catchment. Roughly 40 per cent of all the land in the catchment is in multiple ownership under a governance structure comprising trusts and incorporations as set out in the Te Ture Whenua Maori Land Act 1993.

Past land development and lake protection actions

Historically, land use controls on landowners in the Waikato region were related to managing erosion and direct discharges of contaminants into water bodies. Since the 1960s extensive fencing and planting of erosion-prone and riparian land in the catchment was funded by landowners and government agencies. The Lake Taupo

summary of the Council's understanding of how nitrogen affects water quality in Lake Taupo is found in Environment Court Expert witness Bill Vant's rebuttal evidence (Vant 2008).

[4] The majority of the farms in the catchment are mixed sheep and beef, with some farms also running deer. There are six dairy farms wholly or partly in the catchment.

Catchment Control Scheme started by its predecessor has been carried on by the council (Waikato Regional Council 1998).

One of the outputs of farms is nitrogen that plants do not take up and which leaches[5] into ground water, for instance from urine patches when high or prolonged rainfall causes water to drain through the soil. Management factors that minimise leaching include reducing stock density and autumn and winter grazing management (Ritchie 2007). Until the variation was notified, any person in the catchment was free to change their land use or activities, with minimal control on increases in nitrogen leaving the property.[6]

In the absence of controls on non-point source nitrogen discharges, landowners standard response in the face of increasing costs and fluctuating commodity process for logs, meat, wool and milk, were to make land management changes to increase production on farms or convert from one land use to another. This often had the consequence of increasing nitrogen leaching (Meister 2008, Finlayson and Thorrold 2001).

Scientific modelling and investigations to establish water quality objectives

In order to achieve the council's aim of protecting the excellent water quality of the lake, consultation with local people about the desired water quality in the lake occurred, with the council concluding it should take action to maintain water quality at 2001 levels. Once the desired water quality level had been decided, the council was able to estimate the aggregate supply of nitrogen[7], over which there would be a publicly unacceptable decline in water quality.

The council estimated the current total load of nitrogen delivered to the lake using a simple lake model corroborated by measured nitrogen inflows to the lake.

There are many different sources of nitrogen to Lake Taupo. Pastoral farming represents more than one-third of the total load of nitrogen to the lake from all sources. Of the sources of nitrogen that enter the lake, only pastoral and human wastewater sources can be managed downwards. Nitrogen from pastoral farming represents about 93 per cent of the manageable load to the lake. The loads from urban runoff and sewage are also manageable, but substantially smaller than those from areas of pasture (Waikato Regional Council 2007).

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5 "Leaching", is the movement of nitrogen in drainage water down through the soil below the root zone and which can eventually enter ground water or surface waters such as streams and lakes.

6 The Councils' Waikato Regional Plan contains rules for a limited range of land use activities that discharge nitrogen. For instance, control over the effects of point source and non-point source nitrogen from dairy shed effluent and farm offal pits in the Waikato Regional Plan, Module 3 Water Quality, Chapter 3.5 Discharges, Animal effluent rules Rule 3.5.5.1 – 3.5.5.4.

Objective 1 of the variation[8] lists the measurable water quality characteristics for the lake that must be maintained in the long term. It also introduces the concept that there is a lag time between nitrogen leached[9] from land use practices in the catchment, and the lake's response. This is because much of the rain falling on the Taupo catchment percolates through the soil and is stored underground as ground water - in some cases for many years - before finally entering streams, and then the lake.

While the water quality objective relates to the effect of nitrogen in the lake, it is the amount of leached nitrogen from land use activities that is controlled by policies and rules in the variation. The load of nitrogen lost below the root zone in the catchment is referred to as 'leached nitrogen.' Leached nitrogen can be modelled using property scale input-output models such as Overseer® nutrient budget model (Overseer). Overseer does not make any prediction of the fate of nitrogen once it has left the root zone, and therefore cannot provide a direct, modelled connection between nitrogen from individual properties, and the amount of nitrogen in the lake. In the absence of any other suitable single model that is able to connect water quality in the lake to property specific nitrogen leaching, the council decided to use Overseer in rules that cap nitrogen from properties, and different processes to measure and model lake water quality.

Factors influencing the amount of nitrogen in the lake

The load of nitrogen delivered to the lake is smaller than the amount of leached nitrogen at a property scale, because of processes collectively termed attenuation that permanently remove some of the nitrogen. The load of nitrogen actually delivered to the lake is regarded as being 'attenuated nitrogen' and are the loads that were directly relevant to any consideration of lake water quality.

Scientific modelling and investigation of ground water ages was used to estimate the nitrogen reduction necessary to achieve the water quality objective. In order to account for nitrogen that is still in-transit and is yet to be delivered to the lake, the council proposed to prevent increases in nitrogen and remove 20 per cent of the manageable nitrogen load from pastoral properties and wastewater systems and set this out as a means to achieve the long term water quality objective.

Spatial variability of nitrogen discharges in the catchment was investigated by the council, in order to understand whether the location of a unit of nitrogen discharged in

7 The load of nitrogen entering the Lake from all sources can be termed the aggregate supply of the resource.

8 See Waikato Regional Plan Variation 5 – Lake Taupo Catchment. "Objective 1: Maintenance of the current water quality of Lake Taupo. The effects of nutrients discharges in the catchment are mitigated such that by 2080 the water quality of Lake Taupo is restored to its 2001 levels, as indicated by:…" [table listing numerical water quality characteristics with mean and standard deviations for total nitrogen, total phosphorus, chlorophyll a and secchi depth].

the catchment affected achievement of the policy objective. The council's science advisors reported that the effect on lake water quality of a unit of nitrogen discharged onto land, would vary according to where the discharge occurred. The main reason cited was differing amounts of time taken for a unit of nitrogen to reach ground water and then be transported to the lake. Because the policy objective was to maintain long term water quality in the lake, the council decided that the variation did not need to account for spatial variability of nitrogen discharges. In addition, there was insufficient technical capability to model and measure attenuation processes at a property-specific level.

Councils justification for intervention

Public benefit of continued excellent water quality in the lake was assessed by the council in terms of the extremely high natural values associated with Lake Taupo and the corresponding value it holds for people who live near it or visit it. In its consultation documents[10] the council stated that Lake Taupo is internationally renowned for its deep clear water; is a valuable trout fishery; is a taonga to Ngati Tuwharetoa, and a major contributor to the local economy, attracting increasing numbers of visitors. Evidence for these statements came from community perceptions surveys, key individuals and groups and commissioned reports (McDermott Fairgray 2001). After the decision to take action was made, the council also relied on its cost benefit analysis (Hickman 2002). This analysis assumed continued tourism growth in the catchment was a measurable benefit of continued excellent water quality in the lake. The council also noted there were other benefits that it was unable to put a dollar value on.

Consultation

At the outset of public consultation in 2000 and at public meetings later the same year,[11] the council concentrated on the message that the lake was under threat from current land use patterns and practices. Science information presented at public meetings and in written material was posted directly to land owners or published in local papers.

Throughout the consultation process, the council facilitated one-off public meetings with open invitation and also regular meetings of self appointed individuals who acted as farmer or forestry representatives. A record was kept of all meetings, with larger group meetings (30 to 100 people) following a question and answer format in response to council information on technical subjects or proposed interventions.

[10] See for instance "Strategy for Protecting Lake Taupo – A Partnership Approach" November 2003. www.ew.govt.nz

Initial consultation with farmers

The council's first widely distributed consultation document contained statements about water quality decline and proposals to regulate land use, including changing fertiliser and effluent management (Waikato Regional Council 2000a). The reaction of the farming community was immediate and negative. Elected representatives faced a considerable unfavourable response to the proposal to regulate land use by many of their constituent land owners. Media stories in local and national papers and farming publications contained headers such as "lake clean-up a 'ban on farming'" and "No sledgehammer needed" (ACT 2000). Commentary in some of the media and press releases from farmer lobby groups criticised the imposition of 'draconian regulation' and "Waikato Regional Council could face multimillion-dollar compensation claims if proposed environmental restrictions on farming around Lake Taupo go ahead" (Aronson 2000).

Owners and managers from the 100 large farm blocks in the catchment attended public meetings. A group representing land owners in the catchment called Taupo Lake Care (TLC) formed in 2000, with an estimated membership of 90 per cent of farmers in the catchment. Their purpose statement was to keep the lake clean and also continue to have viable farms and flexibility to run their business (Waikato Regional Council 2001b). In early 2001, the council set up a process of specific and detailed small group meetings with TLC farmer representatives that continued until the variation was notified in 2005.

Rights to nitrogen emissions

Land owners of all land types (forestry, lifestyle blocks, pastoral farming) told the council in many forums that there were high individual costs to them of any restriction on their ability to change land use or management practices.

Throughout the variation process the council maintained that any intervention to restrict nitrogen emissions would use historical emissions as a basis for individual property nitrogen limits. This was termed a 'grand parented nitrogen allocation.'

Owners and managers of forested and undeveloped land opposed the nitrogen allocation limits proposed by the council. Under the council's proposed regime restricting nitrogen emissions to historical levels, forest owners faced additional costs for land use change. They would have to purchase nitrogen units if they wanted to change land use from the very low nitrogen leaching trees, to higher nitrogen leaching land uses such as pastoral farming or tourist and residential development. Forestry owners preferred a nitrogen allocation where every hectare of land received the same

[11] See notes of public meetings June 2000 and November 2000.

initial allocation of nitrogen regardless of actual nitrogen leached. This concept was termed “averaging”.

In terms of economic implications for land owners, the council sought assessment of costs to pastoral landowners (Finlayson and Thorrold 2001). A subsequent report (Thorrold et al 2001) showed that that while the cost of reducing a unit of nitrogen will vary widely across different farms, in general, sheep and beef farms would have negative cash flow if they had to reduce nitrogen to 80 per cent of current emissions. Farmers commissioned their own assessment of the cost of a nitrogen cap and then nitrogen reductions (Thomas et al 2002). Forestry land owners were critical of the council’s lack of assessment of forgone opportunities under a grand parented nitrogen allocation, and gave expert evidence at the public hearing of the variation in 2006. The council’s expert agreed that there were real costs for forestry landowners (Meister 2006).

Research was done to assess the potential economic viability of a range of the management practices to reduce nitrogen leaching on a typical sheep and beef farm system. Management practices and land uses were modelled and in some cases trialled on farms in the catchment (Puketapu Group 2006). Reduced nitrogen fertiliser use, nitrification inhibitors and winter feed pads were all estimated to give a small reduction in nitrogen leaching but they also reduced profitability.[12] These management practices and others were re-visited by nutrient and farm systems experts in 2008 and it was concluded that reductions in nitrogen leaching could be obtained from some practices but the cost of implementing them on sheep and beef farms in the catchment was high (Ledgard 2008).

New policy to manage water quality in Lake Taupo

The council publicly notified the variation in mid-2005, comprising a long term water quality objective, achieved through rules to cap non-point sources of nitrogen at a property level, and a public fund to permanently remove nitrogen from pastoral properties. Allowance was made in the rules for landowners to trade nitrogen with each other.

The public fund had been established after extensive negotiation with Taupo District Council and central government. Through a separate consultation process, local and regional communities agreed to pay additional money in their annual rates to achieve the lake protection target. Central government were also significant contributors to the 81.5 million dollar fund, with the delivery agent a charitable trust called Lake Taupo

[12] Profitability was shown by the gross margin (i.e. after accounting for the costs of the practices) relative to a typical (base) sheep and beef farm.

Protection Trust (the trust), charged with permanently removing 20 per cent of the manageable nitrogen from pastoral land within its fifteen year lifetime.

All land owners in the catchment are affected by the variation. Properties with relatively low amounts of leached nitrogen do not require consent, for instance nitrogen from rural residential land, including the on-site sewage treatment and disposal component, and golf courses, forestry and undeveloped land uses. These activities are required to meet conditions to maintain the amount of nitrogen leached when the variation was notified. For all other landowners (primarily pastoral farmers) who were above the low nitrogen leaching threshold when the variation was notified in 2005, a resource consent must be obtained from the council, setting an individual cap on nitrogen leaching for that property.

For farmers, the variation rules could be described as obligatory yet flexible, focusing on the outcome and not prescribing how it is achieved, thereby farmers have the freedom to decide which nitrogen management practices best fit their farm context.

Formal process to decide the variation

The council held public hearings in mid-2006. Much of the evidence presented by submitters focused on implications to land owners of a regulated nitrogen limit. Sheep and beef farmers sought to demonstrate the lack of options for their continuation as farmers in the catchment. Maori economic authority submissions emphasised that Ngati Tuwharetoa were uniquely disadvantaged by the variation for several reasons. First much of the land owned is forested or undeveloped land with very low nitrogen leaching limits under the historical nitrogen allocation. Second, almost all Ngati Tuwharetoa land is in ownership structures which create significant additional barriers to selling and moving businesses to a catchment with no nitrogen controls.

The hearing was atypical in that many individuals who had never been involved in an RMA process before had made submissions and chose to present them in person. The complexity of matters raised by submitters led the council to request commentary from a variety of experts, including evidence on economics, farm management, lake science and nitrogen trading matters.

The council released its decision on submissions and evidence to the variation in 2007. Representatives of local and national farmer groups, foresters, Ngati Tuwharetoa and environmental groups appealed a wide range of matters to the Environment Court. The council negotiated with appellants, reaching agreement and making changes on some aspects of the variation. As there were substantial unresolved aspects, a lengthy hearing in the Environment Court was needed. An interim decision was released in

November 2008 (Waikato Regional Council v CHH et al 2008). The final Environment Court decision was subject to minor wording changes to be agreed between planning experts for each party. Within months this step was completed, after which several of the national lobby group appellants raised further minor wording changes over more than a year of negotiation with the council. This delay to the Environment Court releasing its final decision meant the variation could not be made operative by the council, reducing certainty for farmers and the council in the implementation process.

Council implementation of the variation

During development of the variation, resource consent and enforcement staff in the council were asked for advice about implementation practicalities. Staff were employed to implement the variation in 2007. The trust was given the ability to make decisions about nitrogen purchases during 2007.

At the outset, little was known by the council about what was involved in the adoption of nitrogen management practices by farmers. AgResearch is a Crown Research Institute and one of the owners of the model referred to in the rules. AgResearch was contracted by the council to provide the necessary expertise in farm systems and nutrient modelling.

Overseer is a computer model into which a user enters farm-specific input information. Results are presented on an annual basis in kilograms of nitrogen per hectare per year. The model identifies and quantifies nutrient inputs and outputs to and from the farm based on farm management practices and determines the resulting nitrogen leaching. Input to the model includes farmers' records of stock numbers, stock ratios by class and sex, fertiliser used, brought in feed, and winter management practices such as numbers of animals wintered on the property.

For farmers, the first step in the consent process, termed benchmarking, estimates the historical amount of nitrogen leached from the property (using farm data from one of the years 2001 to 2006). The council's initial focus for implementing the variation was farms greater than 100 hectares in size, as these comprise nearly 90 per cent of the pastoral land in the catchment and therefore the majority of the manageable nitrogen. Benchmarking is done by farmers with assistance from implementation staff and AgResearch Overseer experts. Although the council has a user-pays policy for resource consents, the governance body of the trust agreed to fund the cost of the first step of the consent process. Accurately knowing the total of all leached nitrogen on farms is important to the trust in determining the nitrogen tonnage that equates to their goal of removing 20 per cent of manageable nitrogen load from pasture.

The nitrogen cap for the property is termed the nitrogen discharge allowance. Each farm has a resource consent that lists the nitrogen discharge allowance for that property. For ongoing compliance checking, the farmer must maintain a nitrogen management plan that lists the 'nitrogen critical' elements of their current farm system, such as winter stock numbers for the different stock classes and sexes. If the farmer changes their farm system they need to show that the new scenario complies with their nitrogen cap. This also occurs if the farmer decides to buy or sell some of their units of nitrogen. The altered nitrogen plan must comply with the farmers new nitrogen discharge allowance once the trade has been completed.

A guideline document titled 'Guide to Farming in the Lake Taupo catchment' was developed by the council to assist farmers understand the steps involved. Farmers within the Taupo catchment are required to apply for a resource consent under Rule 3.10.5.3 of the variation within six months of the rule being operative. As of early 2010 the rules were not operative.

3 Method

3.1 Approach

The Policy Choice Framework (the PCF) integrates a number of economic and behavioural conceptual frameworks to provide a method policy makers may use to assist them in systematically choosing packages of policy instruments to achieve a policy objective. In this report it was used to re-interpret and reveal land owner and institutional issues that emerged during the variation process. In doing so, the PCF is used to systematically document the reasoning underpinning the choice of a cap and trade policy instrument and to identify recommendations to support the implementation of the package of policy interventions aimed at supporting protection of water quality in Lake Taupo. The policy intervention included a cap and trade instrument and the use of a public fund to permanently remove nitrogen from the catchment. This section describes the PCF and the methods employed to collect the data and apply the PCF.

3.2 The Policy Choice Framework

The PCF contains seven separate conceptual frameworks that are grouped in three broad stages; justification for government intervention and selection of primary policy instrument, land owner responses and organisational responses. The feedback loops between the components support an iterative process to evaluate instruments that identifies issues that require revision of the instruments under consideration. An overview of the PCF is given in Appendix 1.

The first component contains frameworks that address the justification for public intervention. The second and third component considers technical feasibility issues that influence the initial selection of policy instruments on the grounds of economic efficiency. A summary of these component is given in Appendix 2.

The frameworks in the second stages of the PCF focus on land owners, taking as their starting point the primary instrument initially selected by applying the first component. The purpose of the second stages is to reveal and incorporate the behavioural responses of landholders to this policy instrument, and these frameworks are summarised in Appendix 3. These responses are then accounted for in the selection of complementary instruments to support the implementation of the primary instrument. One of the components of the behavioural response of landholders in the PCF is the Involvement with Issue and Intervention (I_3) Response Framework. The I_3 Response Framework, along with insights from the literature on marketing and psychology theory are used to assist in understanding how interventions can be designed to reduce the factors that lead to non-compliance. This has benefits for the efficiency and achievement of the desired outcome, which in this case is to maintain the lake's high water quality.

The frameworks in the third stage of the PCF focus on the agencies responsible for implementing policy. They reveal the behavioural responses of the agency to the policy instrument that was initially selected and incorporate them into further instrument selection and design process (Appendix 4). The structure of the PCF is summarised in Figure 1 below and is followed by a summary of the purpose of each of the conceptual frameworks.

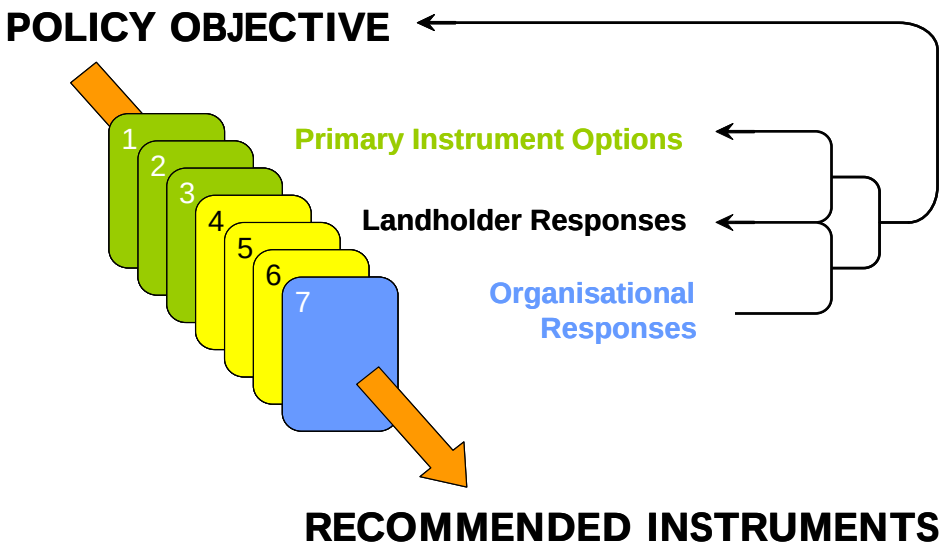

Figure 1. Policy Choice Framework (Sandal, Kaine and Johnston 2009)

Summary of the purpose of each of the conceptual frameworks

1. Identify the justification for government intervention to achieve a policy objective using the policy justification tree.
2. Identify the broad policy tool that is most appropriate using the public: private benefits framework.
3. Identify the specific policy instrument that could be employed, based on the technical feasibility.
4. Identify likely reactions/attitudes of landholders to the policy instrument using the I_3 response framework.
5. Determine if landholders can appear to comply, but act in ways that are not consistent with the policy objective using the use variety framework.
6. Determine whether the scope and rate of change in landholder behaviour is sufficient to achieve the policy objective.
7. Identify the nature of change the chosen instrument poses for implementing organisations using the policy innovation framework.

In this report these seven components have been applied to the policy objective of protecting water quality in Lake Taupo.

3.3 Data collection and analysis

To analyse the first broad component of economic justification for government intervention and technical feasibility of the primary policy instrument to protect water quality of Lake Taupo, we analysed documents produced or commissioned by the council.

For the landholder response component of the framework we were able to refer to detailed programmes and instruments that resulted from the consultation and formal RMA process.

In making judgements about landholder response we used consultation records kept by the council, including verbatim quotes and notes taken at public and small group meetings by staff, many of which were checked by participants either at meetings or sent out as records. The material was collected by the council for the purpose of maintaining a consultation record and for policy analysis. In addition, reviews of this report by key informants provided a check and balance on our interpretation of material collected.

For the organisational response component, the council has been taking steps to implement the new regulation for several years. We drew on an existing Policy Innovations Framework case study analysis of the variation (Kaine et al 2006). Although some policy details have changed, the impact of the variation on the organisation is largely unchanged since that analysis was done. Council documents, staff working file notes and interviews with implementation staff were added to the existing analysis.

In the next section the analysis using the PCF is summarised.

4 Application of Policy Choice Framework

4.1 Economic justification for government intervention

The council's objective was to protect water quality in Lake Taupo. The initial selection of a policy instrument to achieve the policy was guided by economic efficiency considerations based on the distribution of public and private net benefit arising from the objective. The distribution of private and public new benefit depends on whether, to begin with, government intervention is justified on the grounds of income redistribution, missing or incomplete markets, or imperfect competition (Sandall et al 2008).

The analysis must determine whether, in this instance, the policy objective is concerned with a specific product of service. The good is the amount of nitrogen discharged from land uses in the catchment of Lake Taupo, so that in the long term the

lake has the water quality characteristics listed in Objective 1 of the variation.[13] In this case, the objective is not primarily concerned with the redistribution of income.

The first form of market failure that may justify intervention is whether the situation is one of a missing market. This occurs when the products or services concerned are non-exclusive in production and non-rival in consumption. In this situation there is not a missing market because groundwater and surface water travelling to and mixing in the lake has a limited capacity to assimilate nitrogen without publicly unacceptable water quality decline. In economic terms, the nitrogen load to the lake is congestible and therefore has the property of being rival in use (Sandall et al 2008). Given that the policy objective is to maintain a particular level of water quality (resulting from nitrogen being delivered to the lake amongst other things), there is a point at which further increases in nitrogen will cause water quality to degrade past the desired level. In this case, the production of one more unit of nitrogen by a person may affect the consumption of assimilative capacity of nitrogen by another person. This is the point of congestion.

The next question to ask is whether there are non-exclusive costs or benefits created. Farming in Lake Taupo catchment creates costs for third parties that are not fully reflected in the costs of the farming business. These are termed non-exclusive costs or negative externalities. Nitrogen entering surface and ground water and eventually the lake causes water quality degradation and loss of profitability of tourism enterprises important to the local economy. Farmers do not have to pay the full cost of the outputs of nitrogen from their farming operations, and as a consequence, more nitrogen is produced than is socially desirable. The existence of this non-exclusive cost, or negative externality, indicates the market for nitrogen is incomplete and this is the economic justification for public intervention.

Public benefits: Private benefits framework

The key issue here is to identify what type of policy instrument should be employed given the relative distribution of private and public net benefits of land management. When markets are incomplete because non-exclusive costs are present then actors in the market (farmers) obtain a private net benefit and at the same time create a public net cost. By reversing these non-exclusive costs, the council's action to protect lake water quality aimed to create net public benefits for local and national communities,

13 See Waikato Regional Plan Variation 5 – Lake Taupo Catchment.
"Objective 1: Maintenance of the current water quality of Lake Taupo.
The effects of nutrients discharges in the catchment are mitigated such that by 2080 the water quality of Lake Taupo is restored to its 2001 levels, as indicated by:…" [table listing numerical water quality characteristics with mean and standard deviations for total nitrogen, total phosphorus, chlorophyll a and secchi depth].

and these can be defined as the “benefits minus the costs accruing to everyone other than the private land manager” (Pannell 2006b p1).

Public benefit of the lake at 2001 water quality levels was described by the council as being extremely high. It included beneficiaries of a clean lake as people who live in the catchment and Waikato region, as well as national and international visitors.

Although it did not explicitly state that there was a net public cost from increasing nitrogen leaching from properties in the catchment, the council’s communications material emphasised the potential loss of aesthetic and recreational values of clear, blue water and profitability of tourism enterprises important to the local economy. The lake was also described as iconic, implying values above and beyond functional use. Hence the policy objective concerns the reduction of public cost of nitrogen entering Lake Taupo that could adversely affect the highly valued water quality. The community viewed this public cost as unacceptable.

Capping nitrogen discharges from a property, restricted options for changes to land use or management practices. Thus the policy intervention to achieve the water quality objective placed a significant immediate or future private cost on owners of land in the catchment. At the same time, landowners also benefited from lake protection, in the same way as others in the local and national community not directly affected by nitrogen restrictions on their land.

Analysis of the combination of private and public net benefits associated with the policy objective for Lake Taupo resulted in the most efficient policy instrument being a negative incentive to change undesirable behaviour around diffuse nitrogen discharges from land use. Negative incentives can include regulation, taxes and cap and trade markets (Pannell, 2006b).

4.2 Technical feasibility – negative incentives

The third conceptual framework of the PCF is used to identify the appropriate type of negative incentive that should be employed as the primary policy instrument.

The first question is whether the aggregate supply of the resource can be defined. In this case, the resource is the assimilative capacity of the lake for a particular amount of nitrogen. A simple lake model corroborated by measured nitrogen inflows to the lake was used to estimate the total units of nitrogen in the lake from all sources that would maintain water quality at the desired level. Thus the council was able to estimate the aggregate supply of the resource and undertook this exercise early in the process.

The next question is whether individual use of the resource needs to be controlled to avoid spatial externalities. In this case, the council decided the location of a unit of nitrogen discharged in the catchment did not affect achievement of the policy objective. The reason given by the council's science advisors was all nitrogen discharged to land and water in the catchment not taken up by plants or lost though attenuation processes, will eventually reach the lake, regardless of where or when it was discharged. This indicated that individual use of the resource, in this case the discharge of nitrogen from properties at different distances from the lake, does not need to be controlled to avoid spatial externalities.

The next question to ask is whether individual use of the resource can be modelled. In this case, nitrogen leached from below the root zone of plants can both be measured and modelled. Direct measures of nitrogen carrying drainage water below the root zone of plants can also be made, but the method is impracticable for assessing the amount of nitrogen leached over a whole property. Nitrogen leaching from individual properties can be modelled through an input-output model; Overseer was the model preferred by the council. The model can be used to estimate the amount of nitrogen leached from below the root zone of plants within a property, reported in units of kilograms of nitrogen per hectare per year.

The next question concerns whether the benefits from using the resource vary across individuals. Therefore the question is whether resource use moves between individuals as changes occur in the benefits of discharging a unit of nitrogen. Properties in the catchment have biophysical variability, with a range of property sizes, topography, soils, elevation and rainfall. Existing land uses range from undeveloped indigenous shrub land, planted production forestry of predominantly *pinus radiata,* to pastoral farming. Within pastoral farming land use (sheep and beef and six dairy farms), there are a wide range of stocking rates and farm management practices because of the different biophysical and development history of farms. Agricultural innovations such as changing stock type ratio, winter grazing practices or the use of denitrification fertiliser, were reported to have different capital and ongoing costs to different farm properties. Consequently the use of a unit of nitrogen differs from property to property.

The final question is whether the net marginal benefits from the resource are likely to be highly sensitive to the price of the resource. If the net marginal benefit is sensitive to the price of a unit of nitrogen then market mechanisms can facilitate resource transfers. Some evidence that the benefits from the resource use are sensitive to the price of a unit of nitrogen was produced by farmers as part of submissions and evidence in the council hearing of the variation. The evidence methodology and assumptions were reviewed for the council hearings committee (Meister 2007).

Using the technical feasibility tree for negative incentives resulted in the primary policy instrument being a market instrument, namely a cap and trade system.

Capping nitrogen emissions in the catchment requires that nitrogen sources that can be controlled, are included in the cap. In other words, the population of adopters of nitrogen management innovations under a cap and trade policy instrument, includes all nitrogen discharging land uses. This is assessed and reported on below, under the landholder response section of the PCF in section 4.5 entitled 'rate and scope'.

For a cap and trade instrument to function, a supporting regulatory component to establish tradeable rights to discharge nitrogen for the market is required.

4.3 I_3 Response Framework

Having identified 'cap and trade' as the appropriate primary policy instrument, the next step is to consider likely landholder responses to the introduction of such an instrument.

The application of the Involvement with Issue and Intervention (I_3) Response Framework, requires the policy issue to be distinguished from the policy intervention (which is the mechanism for addressing the issue). The issue in this case was defined as the increase in non-point sources of nitrogen discharged from land uses adversely affecting water quality in Lake Taupo. The intervention was defined as limits on nitrogen for all land uses and trading allowed. Nitrogen discharges from pastoral farms had to be at 80 per cent of existing levels in order to maintain 2001 water quality in the long term.[14]

The analysis depended on an assessment of land owner involvement with the issue and the intervention. It also considered whether the council should modify the intervention as a result of landholder response. Components of the intervention were considered separately where there was a strong likelihood that different land owners responded differently.

The Issue and Intervention Framework (I_3) is summarised in Appendix 3. The analysis looked at the level of involvement, representing a continuum from low to high, and also at the type of involvement, that is whether favourable or unfavourable attitudes towards the issue or intervention were held by landholders.

There had been a number of consultation stages between 2000 and 2008. The key period in relation to changes in landowner involvement and attitude is the early public

[14] Refer to the Variation, particularly Objective 1 (long term water quality) and Policies 3 and 4 (nitrogen capping and nitrogen reduction respectively).

consultation from mid-2000 to mid-2002 where the council consulted the local community on the desired water quality objective, while specifying a range of intervention actions. It was also during this time that council and farmer representatives began detailed discussions. We focused on this early period as we found no evidence that involvement in the issue or intervention changed substantially from 2003 to the end of the policy development phase when implementation was underway.

From early stages of the process in 2000, the council listed possible intervention options. It presented information to land owners about the issue of nutrient increases and possible intervention options at the same time, and they became inextricably linked. Because of this, it is difficult to retrospectively separate landowner response to either the issue or the intervention.

Issue involvement during early stages of consultation

At the outset of public consultation in 2000, landowners stated they valued the lake, and talked about how the lake and surrounds was important to them. This indicated their involvement was related to the lake, but not necessarily with the issue of water quality in the lake or the effect of nitrogen on water quality.

A short term monitoring record of the lake's deep water site was presented by council staff at meetings, including a graph showing an average decrease in mid-lake water clarity from approximately 15 metres horizontal visibility to 14 metres in the period 1994 to 2000 (Waikato Regional Council 2001c). However, changes to clarity and other water quality parameters recorded by the mid-lake monitoring programme could not be seen by lake users (Vant personal communication 2008). This suggests for some, there was no motivation to make a link between diffuse sources of nitrogen from land use and increasing microscopic algae in the lake. For these reasons we assessed landholders' involvement with the issue at this time as low.

The council made considerable effort to draw community attention to the issue of nitrogen discharges affecting water quality in the lake. We believe this provoked involvement with the issue.

Highlighting the general importance of the lake and surrounds, appeared to successfully trigger involvement with the general issue around 'lake health' across a range of people. Within months, there was an increase in the level of involvement. At meetings in November 2000 with public and landowners, there was intense questioning and statements about sources of nutrient and effect on the lake. There were requests

for special meetings to discuss the issue (Waikato Regional Council 2000c).[15] Council records show that both urban and rural dwellers attended. At meetings, questions and suggestions about causes of water quality decline, demonstrated some people were involved with the issue.

Although mid-lake water quality was the council's concern, people's involvement was with a range of lake edge issues. For instance, comments made by meeting participants were about noticeable increases in the swan population and weeds around inflows of water diverted from other catchments into the lake for electricity generation. Many people commented on localised weeds and slimes around municipal sewage outfalls, and in shallow water and washed up on the lake shore. The response by the council was to investigate and explain causes for nuisance plants and to make statements about what intervention was possible. For instance, proliferation of some species of nuisance weeds was independent of increased nutrient levels, whereas the growth of other near shore nuisance weeds and slimes was promoted by nutrients contained in urban discharges. We concluded that involvement remained centred on the broad issue of protecting lake health, although the council made attempts to focus attention on particular threats to lake health by emphasising that more than 90 per cent of the manageable nitrogen entering the lake came from pastoral farming.

We were not able to distinguish from the records available between involvement in either the issue or the intervention. We were also not able to identify the source of people's involvement. For instance, in their questions some people linked nutrients affecting lake health to the practices they currently undertook and thus to business risk. This implied their involvement was with intervention, which would limit their nitrogen use, rather than the issue. No specific inquiry was made by the council. A report of the consultation process in the catchment was done by one of the farmers (Yerex 2009). The report used interviews of key informants recording their recollection of the council's consultation process. The farmers chosen for interviews were individuals who had regularly engaged in detailed consultation discussions with council staff. Chairman of TLC Bob Cottrell stated "Apart from the initial emotion and people saying no we're not affecting the lake, we quickly moved to how can we protect the lake without that affecting long term viability and having flexibility of land use"(Yerex 2009 p 16). It appears from this study that some of the individuals interviewed had high involvement in the issue.

[15] Lakes and Waterways Action Group organised a public meeting that was in addition to their monthly meeting and invited WRC staff and other speakers to present information about water quality in the Lake and possible intervention.

Intervention involvement during early stages of consultation

Policy intervention options listed by the council in the information pamphlet distributed in 2000, had implications for every aspect of farm operation. Options included land activities already regulated, such as avoiding direct discharge of fertiliser and animal effluent to waterways. For farmers however, a more far reaching implication was the inclusion of options to control stocking rates and controls on land conversion to other uses. The council also stated that "restrictions on land use could lead to higher costs to meet environmental protection standards", but did not specify who would bear the cost of the intervention (Waikato Regional Council 2000a p3). In the written material mailed to farmers, the primary policy instrument was new regulation that would apply to all land owners in the Lake Taupo catchment. In describing the process, only several months were allowed for consultation, after which the Variation would be released and start to come into force.

Land owners level of involvement in the various intervention options set out by the council was high, with the attitude toward the intervention being strongly negative. This assessment was supported by letters to the editor and articles in national and local newspapers and farmer journals. Taupo catchment farmers were quoted as 'not volunteering to go broke' and compensation was demanded. At meetings with staff, farmers said they were 'being seen as the problem' and believed the intervention would threaten their farm viability and flexibility in the day to day running of their business. Land owners had unfavourable attitudes toward the council reducing leached nitrogen to 80 per cent of current levels by regulation. Farmers expressed their outrage[16] at the intervention and the process undertaken by the council up to that point in the media, at public meetings and directly to politicians and the chief executive. Murdoch *et al* (2006) suggest that if outrage occurs, individuals publicly voice their objection to the intervention and devalue its role in managing the issue. In addition, they may attract the support for their objection from the wider community.

The strongly unfavourable attitudes were considered to endanger the policy outcome. At this point the council was forced to consider complementary policy instruments to assist in changing these negative attitudes to lessen, neutralise or change the negative attitude formation towards the intervention. Councillors made two key decisions at this point.[17] First, in response to a proposal by the newly formed Taupo catchment farmer representative group (Taupo Lake Care) they agreed to put resources and time into consultation with affected landowners. Second, they agreed to pursue cost sharing discussions with central and local government. At about this time, councillors discussed modelling work showing, amongst other things, that sheep and beef farms in the

[16] Outrage is defined as the public's response to a risk or the behaviour of risk managers (Sandman, *et al* 1993).
[17] These decisions followed a council workshop in late 2000, and were set out in a Council resolution April 2001.

catchment would not be viable if they bore the full cost of reducing nitrogen leaching to meet the nitrogen target for the lake (Finlayson and Thorrold 2001).

Whilst the water quality objective was retained, a new component was added to the intervention. The change was from one of solely regulation to achieve the lake target of 80 per cent of manageable load, to a combination of regulation and public buy-back of nitrogen. The council resolution described this as needing to 'share the cost' of meeting the target (Waikato Regional Council 2000b).

Changes to the consultation process led to an extensive and detailed series of consultation meetings between a representative group of farmers, staff and third party farm systems experts. Government funded research on nitrogen management innovations on Maori economic authority farms was undertaken and reported to farmers (Puketapu Group 2006). The project manager recalled "people focussed on farm management solutions early on – interest from Maori economic authority trustees, owners and managers and the rest of the farming community, meant they came to field days to find out what they could do on their property" (Thorrold personal communication 2008).

In 2002 the council also changed how it expected farmers to operate under a nitrogen cap. This part of the intervention had been a rigid requirement for all farmers to undertake specific activities. The change was to clarify the council's focus was a nitrogen cap, with farmers defining the 'nitrogen critical' activities that could be undertaken within their farm nitrogen cap. It was recognised that farmers had different costs in reducing nitrogen and that it was critical for farmer to have the flexibility to be able to make day to day farm management decisions in their farming business. The change made by the council at this point would have provided the necessary framework for a cap and trade system as identified by the Technical Feasibility component of the PCF in section 4.2 above. However council staff did not actively assess nitrogen trading for some time (Young 2003).

It is proposed the intensity of farmers' involvement in the intervention did not change as a result of the council changing and extending the consultation process and making alterations to the policy instrument. However, there is evidence that as consultation about the detail of the policy instrument progressed, and the nature of the regulation was changed to allow flexibility and nitrogen trading, the attitude toward intervention became less negative. Instead of all farmers having highly unfavourable attitudes to the intervention, we believe some farmer's attitudes became more favourable. Evidence for this is the record of the consultation meetings and statements made at the council hearing several years later, displaying weakening negative attitudes to the

intervention.[18] While positive statements were made by a number of individual farmers, these focussed on the consultation process, rather than the intervention.

The I_3 Response Framework analysis identified landowner involvement with the issue of water quality in Lake Taupo was low at the beginning of the variation process in 2000, and that while there was some evidence council successfully triggered an increase in involvement, for the majority of farmers in the catchment involvement with the issue remained low. Farmer involvement with the intervention was high and attitudes were extremely unfavourable at the beginning of the process. The I_3 Response Framework describes this as being in quadrant 3 where the behavioural response is predicted to be compliance with conflict, endangering achievement of the policy objective. The council modified the intervention by adding the new components of an extended consultation process and investigation of a public fund. There is evidence this resulted in farmer attitudes shifting away from extremely unfavourable.

A caveat to the analysis is our reliance on information collected for a different purpose. The council did not undertake individual farmer interviews using the interview process and theoretical underpinning of the I_3 Response Framework. In addition, we assumed people with low involvement in the issue and low involvement in the intervention are underrepresented in council records as they were unlikely to attend meetings or respond to surveys. And although implementation staff interact with individual farmers, they are not collecting specific information about farmer involvement with the issue and intervention. Therefore, this does not allow for more than a general assessment of involvement.

4.4 Use variety

The key point here is to assess whether landowners are likely to respond to the intervention in ways where they appear to comply, but in fact their actions are counter productive to the achievement of the policy objective.

The potential for use variety in the catchment was considered in terms of the resource consent process to achieve the policy objective. The process for farmers is first to obtain a property nitrogen discharge allowance and second, to develop an up-to-date nitrogen management plan that specifies their particular nitrogen-critical farm activities (for instance winter stocking rate), as mandatory conditions of the resource consent. Farm management practices may be changed as farmers consider how to maximise profitability within their capped nitrogen discharge allowance. The landowner may buy

[18] See for example meeting notes between TLC, WRC and AgResearch from (date ref) and Graham Law's evidence at the Variation Council hearing. See also Yerex 2009.

or sell nitrogen from any other person and their nitrogen discharge allowance is adjusted through a separate resource consent process.

It seems the potential for use variety is low because landowners who comply with the variation rules are not likely to behave in ways that are counter-productive to achieving the policy goal. Primarily, because farmers have to maintain an up to date nitrogen management plan which sets out the particular farm activities they are undertaking, after modelling the nitrogen leached from those activities does not exceed their nitrogen limit. This means that while farmers can freely change farming practices, they have no discretion to make changes that would increase nitrogen leaching without contravening their resource consent and becoming non-compliant.

A variety of nitrogen management practices are expected because of the differences in farm context (topography, existing infrastructure, stock type, labour resources). It is also anticipated that over time farmers will change their nitrogen management practices to get the maximum benefit from each unit of nitrogen. Nitrogen units will change hands, but the catchment wide nitrogen cap controlled by the cap and trade component of the intervention will not change. Therefore, the potential for use variety is low because landowner responses outlined above are not likely to be counter productive to achieving the policy goal. This suggests that use variety is not a problem in achieving the water quality policy objective within the intervention chosen by the council. Therefore it is not necessary to take additional measures beyond those needed to monitor compliance, to address counter-productive landowner responses.

4.5 Rate and scope

This part of the land owner response component of the PCF is concerned with whether the intervention creates behavioural change at a scale to achieve lake water quality protection, and whether it will occur at an appropriate rate.

Scope of behavioural change

The scope of change needed was defined as land owners in the Lake Taupo catchment complying with restrictions on nitrogen discharges from land use to meet the nitrogen cap. The catchment wide scope was justified by scientific information that the receiving water body for a unit of nitrogen discharged in the catchment is the lake, with nitrogen being delivered either directly or via ground and surface water. Knowing that varying amounts of nitrogen is leached below all vegetated land, the council justified controls on the use of land and nitrogen discharges as being within its functions under the Resource Management Act 1991. The scope did not alter through the nine years of the variation process. We concluded that while the intervention was at a scale that

made it possible to achieve the water quality objective, some modifications to implementation processes would accelerate the rate of change.

Rate of behavioural change

The rate of change is set out in the variation. The catchment-wide nitrogen cap as it applies to farmers is achieved by farmers being required to have applied for a resource consent by 1 July 2009 or six months after the rule is made operative, whichever is the sooner.[19] The 20 percent nitrogen reduction target on pastoral land applies to the trust, which has until 2020 to purchase nitrogen, either by buying whole properties or entering the nitrogen trading market.

There are two areas where the rate of change is affected by farmer response. First, a farmer can withhold information and delay the time at which the council benchmarks then grants resource consent to confirm the individual farm's nitrogen cap. Second, delays may occur in the time taken by a farmer to consider and make decisions about nitrogen management practices on their farm.

Delays in establishing nitrogen limits for each farm

Farmers are not obliged to change what they do on their farm as a result of the variation. However, changing prices and feed supply mean that from year to year, farmers make different decisions on aspects that influence nitrogen leaching such as fertiliser application. This seasonal variability is in addition to larger decisions on whether to take up an agricultural innovation. As the agency charged with buying nitrogen from farmers, the Lake Taupo Protection Trust relies on some farmers changing nitrogen management practices and selling nitrogen, or it is at risk of not achieving its purpose.

We used the results of the I_3 Response Framework, namely that farmers tended to have an unfavourable attitude to the intervention, to make inferences about whether there were likely to be delays in farmers engaging in the resource consent and nitrogen trading process. In doing so, we considered whether the council modified the intervention as a result of landholder response. Where relevant, the trust's actions are also considered.

[19] When the Council drafted the controlled activity Rule 3.10.5.3 that applies to farmers, it was expected the Variation would be made operative before the date where consents were required on 1 July 2009.

Owners of large farms were contacted by staff to implement the intervention to cap nitrogen from early 2007. Farmer attitude was highly negative, with initial community tension directed through implementation staff. Some farmers indicated they were unwilling to allow benchmarking of historic nitrogen leaching. Farmers made comments such as “farming is too important to the country, they will never let [the nitrogen cap] happen.” (Waikato Regional Council 2009). This implied that many farmers had decided to wait and see whether the council’s intervention would change through the Environment Court appeals process.

Because of the compulsory nature of the resource consent and associated timeframes to formalise each farm’s nitrogen cap, there is certainty of achieving the policy objective. However, the council was aware that enforcement is a costly and time consuming process given there were over 100 farms requiring resource consent.

The council responded to the delay in farmers completing their initial resource consent in several different ways. These took the form of assistance on one hand and threat of enforcement on the other.

Changes made by the council to the intervention were to assist farmers by providing information and negotiating timeframes. Implementation staff reported “We recognised very early on that the integrity of relationship with individual farmers was the make or break of the project. And this took time and effort” (Waikato Regional Council 2009). Whilst the council sent letters to farmers setting out its enforcement powers, it also incorporated flexibility in the enforcement style by extending timeframes for requiring resource consents to be lodged.

Financial assistance to support decision making was a significant addition to the regulatory policy instrument by both the council and the trust to increase the rate of change. The council altered its cost recovery policy and the trust agreed to fund staff time to benchmark nitrogen so farmers were no longer required to pay the whole cost of the resource consent process.

Delays in making decisions about changes that affect a farms nitrogen limit

The second area where the rate of change is affected by farmer response is where farmers make decisions about ongoing nitrogen management practices, and thus whether they will buy or sell nitrogen to stay within their preferred management practices while not exceeding their individual nitrogen cap. We found that farmers were highly involved in this component of the intervention and the attitude was unfavourable. The council had stopped regular consultation meetings between staff, third party farm

systems experts and farmers when the variation was notified in 2005. Farmer representative group Taupo Lake Care (TLC) continued to make contact with implementation staff, voicing concerns the council would impose an onerous burden of proof that a farm's nitrogen cap was not being exceeded. The chairman of TLC emphasised that the novel and untested regulation of diffuse nitrogen discharges made it even more important for open and constructive dialogue to continue throughout the formal RMA process, including fine-tuning compliance and trading aspects set out in the variation rules (Mike Barton personal communication January 2008).

Farmer attitude toward nitrogen purchase by the trust (the intervention) began as highly unfavourable. The evidence for this was a critical 'open letter' to the trust from TLC, published in local media in early 2008. Media stories with farmers quoted as saying "Protection trust is not on the side of farmers" and "The trust has been slow to buy nitrogen" reflected farmer distrust and unfavourable attitudes. Farmers seeking to sell and exit the catchment felt the trust was their only potential buyer and would actively seek to drive the price of nitrogen down, contrary to assurances given by council staff during consultation. Implementation staff reported "farmers told us they thought if you were struggling you would be first in line for [the trust] to buy your farm at market value." (Waikato Regional Council 2009).

The council and the trust made several modifications to aspects of the intervention related to aspects where farmers had the ability to delay making decisions on nitrogen management practices.

After taking advice from third party farm systems experts, the council simplified its requirement for each farm to demonstrate ongoing compliance with their nitrogen cap. In 2008 the trust added to the financial assistance it was providing for benchmarking by funding staff time to assist farmers develop the farm nitrogen management plan needed to complete the resource consent process. About this time, the trust employed a chief executive, with one of his roles being to pro-actively investigate and negotiate nitrogen purchases with farmers.

Evidence for the rate of change increasing as a result of changes to implementation is the increase in interest by farmers to start benchmarking, coinciding with the trust finalising its first nitrogen purchases[20].

20 From the time the council announced its intention to intervene to protect the lake, few farms in the catchment changed hands. At about the same time Taupo District Council announced a moratorium on processing subdivision applications while it considered the infrastructure and future housing needs of the District, in response to a flood of applications for large scale rural residential around the shores of the lake. Then in late 2008, five farms were purchased by the trust and earlier that year other buyers entered the market with several large government owned farms in the catchment sold to private individuals.

The uptake of benchmarking was not across the board however, with a proportion of farmers deciding not to engage with the process. The rapid increase in numbers of farmers making contact with the council to initiate the first step of the resource consent process, was accompanied by a less unfavourable attitude for some farmers.

TLC had appealed to the Environment Court on a number of matters, one of which was seeking assurance that nitrogen trading would work. The council made several changes in response. It undertook to commission future research and in the interim, worked with farmer representatives and economists to produce a draft guideline on nitrogen trading. Some 18 months later, while publication of the document awaited the result of the court decision, staff reported “at the moment there is a lot of negotiation to trade nitrogen [between themselves]…they have things all sorted like gentlemen’s agreements, then are just coming to us to do the final steps.” and “Not having [the nitrogen trading guideline] available is not putting people off thinking about buying or selling nitrogen” (Waikato Regional Council 2009).

Unfavourable farmer attitudes to the intervention were a key factor in slowing achievement of the policy objective. The council already had challenges in implementing novel and unfamiliar regulation of non-point source nitrogen discharges and nitrogen trading. Added to this was uncertainty about the outcome of appeals to the Environment Court on all aspects of the variation by farmers and other parties. When unfavourable farmer attitudes were factored in, council staff realised deadlines for completion of resource consent processes could not be met.

We found that both the trust and the council modified components of the intervention with the aim of increasing the rate of change, with the council also reducing its expectation about the rate of change. We found some evidence farmer attitude became more favourable to the actions of the trust and the council and thus removed or had the potential to remove some of the delays in farmers making decisions about ongoing nitrogen management on their farm.

In our assessment the sum of these actions by the council and the trust, did not change the level of involvement with the intervention. Instead, these actions have shifted attitudes from highly negative to a spectrum that spans negative through to neutral. Providing information, the one:one process between farmers and the two agencies, and financial assistance appears to have increased the rate of change for the two areas considered. There is some evidence that by late 2008 there were less farmers delaying completing the resource consent and then also considering ongoing nitrogen management including buying and selling nitrogen. However, not all farmers have

completed the first stage of the resource consent process, therefore uncertainty remains as to whether these actions have encouraged an appropriate rate of change.

4.6 Policy as an innovation

The last component of the PCF is to identify the extent of organisational change required to achieve the policy objective of maintaining the high water quality of Lake Taupo and whether this would affect the success of policy intervention. We used the Policy Innovation Framework to classify the change in policy instrument and provide a systematic way to anticipate and manage the likely consequences that the cap and trade instrument poses for the council.

The Policy Innovation Framework has previously been applied to the variation as a case study by Kaine et al (2006). The following analysis draws on that earlier work, assessing implementation actions since that time. The overall findings did not change.

Table 1 compares the fundamental elements of the existing and new policy instruments. It lists the key new components and their associated principles.

The variation introduced a new policy instrument. Capping and trading nitrogen required new components to be devised – the rules, processes and procedures, each with their own function. Property rights to nitrogen were established through policies and rules requiring individual property level nitrogen limits and procedures for allowing trading between landowners. This is in contrast to the previous policy instrument, still applying outside the Taupo catchment, where it is the farm practices that are prescribed, not the amount of nitrogen discharged.

The design and functioning of each component is underpinned by principles that represent a departure from those previously in use in the catchment (Kaine et al 2006). In designing the rules and processes to achieve the nitrogen cap component, the council was clear that its role was to provide clarity about the desired outcome – that is, the total nitrogen load in the lake that would ensure its continued excellent water quality. The underpinning principle was that the nitrogen cap is directly linked to environmental benefit (Kaine et al 2006). An associated principle was that the policy instrument should allow each farmer to choose practices that suit their farm context because they are the experts on how to best manage within their nitrogen limit. In contrast, the principle underpinning the existing Regional Plan policy instrument, was that environmental benefit could be linked with regulating farm activities (Kaine et al 2006). In practice, it is only a sub-set of farm activities that is regulated in the Regional Plan (for instance rule conditions relate to effluent from the milking shed rather than

dairy cow effluent over a whole farm). The design and functioning of a nitrogen trading component had an associated principle of efficient achievement of environmental benefit (Kaine et al 2006).

The way the different components are arranged or integrated to form the policy instrument is the architecture of the policy instrument. A cap and trade instrument concept requires a particular architecture, and this can be described in a general sense as market management (Kaine and Higson 2006).

Kaine et al (2006) identified several new architectural principles associated with market management. The first new principle for the council is shared financial responsibility for achieving the environmental target, linking nitrogen reduction components that require public contributions through rates and taxes, with nitrogen capping policies and methods that impose costs on land owners (Kaine et al 2006).. The second new principle is based on economic theory predicting that trading of emission permits will encourage the most efficient use of emissions and the lowest cost mix of abatement measures will be implemented (Kaine et al 2006). The principle is one of maximising wealth generated for the community within the nitrogen cap, and links components that allocate and maintain rights to nitrogen for each property, with procedures for transferring nitrogen between parties.

There is another architectural principal associated with the way the variation is structured and the procedures for ongoing monitoring and reporting. The principle is that specific environmental benefits are known at the outset, through the way the rules, processes and procedures fit together to achieve the nitrogen target for the lake. This is in marked contrast with the Regional Plan where regulating activities in the absence of an overall environmental limit, means that even when designing components such as conditions of permitted activity rules, the region-wide environmental benefits were unknown.

Table 1: Comparison of previous and new policy instruments

Instrument concept as it relates to nitrogen management	**Regional Plan** Regulated practices.	**Lake Taupo catchment** Cap nitrogen from whole property and trade nitrogen.
Components *rules, processes, procedures*	• Rules and procedures prescribe allowed practices (e.g. fertiliser application, dairy shed effluent). • Within each practice, minimum standards apply (written as conditions on permitted activity rules).	• Rules set property right to nitrogen discharges. • Each farm gets a specific nitrogen cap - allocation based on the farm's historical nitrogen leaching (modelled by AgResearch experts).

	• Council relies on education to inform farmers of rule requirements. • General conditions on rules require 'information' to be supplied upon request by council.	• To demonstrate compliance, farmers maintain a plan and supporting data, that shows 'nitrogen critical' farm activities. • After landowners have traded, council approves the changed nitrogen cap for each property. • Lake Taupo Protection Trust buys nitrogen which is retired from the available pool.
Component principles *design and functioning of the component*	• There is a link between activities and environmental benefit. • Environmental benefit of activities will vary from farm to farm. • Each activity has no more than minor adverse effect if minimum standards are complied with. • 'Reward' for farmer in staying within minimum standards is no need for resource consent.	• There is a link between capping nitrogen and environmental benefit. • Over time, trading will be the most efficient way of achieving environmental benefit. • Farmers choose the practices that suit their farm context. • Expertise in modelling nitrogen or farm business changes should come from outside council. • Flexibility for landowner to achieve nitrogen cap on their property.
Architecture	Regulating specific activities on a case by case basis.	Market management.
Architectural principles *How the components fit together*	• Control over the way certain practices are undertaken will achieve general but unknown environmental benefits. • Region wide monitoring of the state of the environment will provide information to trigger any need for further. intervention.	• Control over the nitrogen cap will achieve specific and known environmental benefits in Lake Taupo. • Within the limited pool of nitrogen in the catchment, societal wealth is maximised through trading. Nitrogen purchases are made by those who most highly value a unit of nitrogen.

In the variation, the council has changed both component principles and architectural principles. The Policy Innovation Framework classifies this change as a radical policy innovation. Because the components and the way they fit together, and their underlying principles are different from existing policy, they are likely to create significant challenges for the council (Kaine and Higson 2006).

An examination of the components of the cap and trade policy instrument highlighted the policy innovation was not compatible with the council's organisational

competencies. There are several areas where new competencies were needed. First, in developing new components with external parties and second, in agreeing new roles and responsibilities.

The variation required the design and functioning of completely new components. New processes and procedures were needed, and these ranged from relatively straight forward re-assessment and alteration of existing databases which record resource consent information, to developing more complex components such as benchmarking historical nitrogen emissions and creating nitrogen management plans to demonstrate achievement of property nitrogen limits. Whilst the organisation had some experience regulating farm activities, there was no precedent within the council or any other organisation in New Zealand for this latter task.

Development of the new cap and trade components of the policy instrument started in 2003. The project team included staff with consenting and compliance experience and relied heavily on input from farmers and third party farm systems experts. Implementation staff were employed well before the variation was likely to become operative, and were instrumental in influencing the final wording of rules through the Environment Court process. The wording of the components and the way they fitted together in the variation changed considerably throughout the policy drafting process. For instance, the first set of rules developed for the Taupo catchment were similar in component principles to existing rules, in that the effect on the lake was linked to a regulated set of activities.

Including detailed farmer input in developing components of regulation was unprecedented in the council's experience. Elected representatives made the decision to resource the consultation with farmers and a small group of farmer representatives and staff made considerable effort at the outset of the meeting process to agree on how they would work together, including criteria for what constituted fair and equitable policy and protocol for media contact. At meetings, working drafts of rules were discussed.

Modelling nitrogen leached at a property level and relating it to farmer activities was a critical new component of the variation. The council sought external expert advice. The agency contracted was AgResearch, a publicly owned Crown Research Organisation and one of the owners of the Overseer nutrient model, employing model developers and farm systems experts. As the council did not have the skills and knowledge to implement the new component, staff debated whether detailed understanding of nitrogen modelling and implications for farm activities was an organisational competency the council wished to develop. Initially the council took the view that its

role was simply a processing one, where it received the completed benchmarked nitrogen information and granted a resource consent stating the nitrogen limit for the farm and that an up to date nitrogen management plan must be maintained. The farmer's role was to farm within the consented nitrogen limit, which was likely to require assistance from appropriately qualified third parties to model profitability and nitrogen leaching of different farm practices.

The council had to revise its initial view of its role and invest effort into new competencies for its staff. Nitrogen is modelled rather than measured at a paddock scale, therefore it is the farm practices, or the inputs to the model, that are used to monitor compliance with nitrogen limits. In assessing whether nitrogen management plans showed that stock numbers and other farm practices were not exceeding the nitrogen limit, council staff had to become competent users of Overseer. Staff were required to undertake external training to gain nitrogen modelling skills. In addition, it was apparent some farm knowledge and familiarity with the variety of farm systems in the catchment was essential, both in the desktop review of nitrogen management plans and to enable the detailed discussion necessary with farmers. For instance staff report they must be able to interpret farm terminology and relate it to Overseer parameters. Recruitment of implementation team included staff chosen for their specific areas of knowledge and experience. The complexity of the rules and the iterative changes made to them through the council and Environment Court processes meant implementation staff with planning expertise were essential. This was particularly important as the changes to rules not only had to reflect the underlying principles of the components and the way they fitted together, but also be able to be practical and legally defensible for all scenarios encountered in the catchment, many of which were unforeseen at the time rules were first drafted.

A radical policy innovation is also likely to require changes to roles and relationships between functional groups (Kaine et al 2006). One such change was where the council had to rely on a third party (AgResearch). Another change was between the policy development and implementation functional groups at the council. The novelty and complexity of regulating and trading diffuse discharges of nitrogen, meant institutional knowledge was critical in assisting implementation staff interpret the rules. Similarly, working through the different scenarios as implementation progressed was critical in refining individual components and how they worked.

AgResearch experts advised the council that Overseer was initially developed to support farmer decisions for production efficiency and as such was not specifically designed for a regulatory setting, although it believed it was feasible to use given consistency in how data was entered (Ledgard 2008). AgResearch updates Overseer

periodically according to a programme agreed by the owners of the model. Because the model did not contain all innovations potentially available to farmers (such as nitrification inhibitors) and the variation specifies the particular version of Overseer that must be used, the council lobbied the owners to speed up the updating programme. Since the variation was notified there have been a number of different publicly available versions of Overseer and in 2008 a four month 'gap' between versions occurred, with Overseer not available for benchmarking. Staff reported "farmers want certainty and we haven't been able to give them this because of delays."(Waikato Regional Council 2009 p 3).

In summary, specialist knowledge, new skills and experience was required to undertake the new processes and procedures, and these were sourced from within different parts of the council and from external agencies. Related to this are changes to the roles, responsibilities and relationships between functional groups within the council to be compatible with the innovation. Because of the wide ranging changes needed, a radical policy innovation such as the variation was extremely organisationally disruptive requiring considerable time and resources to successfully implement.

5 Discussion

The discussion is divided into two parts. The first is whether the PCF was useful and practical to apply in retrospectively assessing the variation process. In assessing this, we focused on the PCF components related to justification for government intervention and landholder responses. The second part of the discussion takes the results of applying the organisational responses component of the PCF, and assesses whether the council has made changes to date to successfully implement what has been a radical policy innovation. Where implications for other resource management situations have arisen; this is touched on in terms of future research.

5.1 Usefulness of Policy Choice Framework

We posed the question as to whether the PCF was useful in highlighting aspects of the process of policy development. For instance, as a ratepayer-funded organisation subject to legislation that promotes public accountability and transparency it is important to the council that its policy processes are as cost-effective as possible. There are several parts of the policy development of the variation where we argue insights into the consequences that the changes posed for landowners and the council could have occurred sooner if the PCF had been used. These are discussed below with reference to the relevant components of the PCF.

Economic justification for council intervention

Economic theory underpins the first broad component of the PCF concerned with justification for government intervention and the choice of the primary policy instrument. This component of the PCF could have been used to provide the council with several important pieces of information. First, use of the theoretical framework on justification for government intervention could have helped the council respond to critics of the variation by putting more structure around its rationale for taking action. Second, application of the PCF may have helped the council to identify cap and trade as an appropriate option earlier.

During the informal consultation stages of the variation process, the council released communications material prepared for a general audience. These documents summarised actions, rather than giving reasons for decisions (Waikato Regional Council 2000, Waikato Regional Council 2003). The most detailed analysis of the chosen policy instrument in the variation and alternatives considered, was released when the variation was notified (as required by the RMA in section 32).[21] The documentation produced by the council mentioned work it had commissioned on the distribution of public and private net benefits arising from the objective of maintaining lake water quality (Waikato Regional Council 2005 pp 5-6). However, it did not systematically assess what the policy instrument should be from an economic perspective. For instance it did not explicitly make the point that farming creates costs for third parties that are not fully reflected in the farming business. Instead, in describing its decision to take action, the council made general statements about community expectation of a clean lake and the council's legislative responsibility to protect water quality.

According to Pannell (2006b; 2008) a critical distinction to be made in the public benefits: private benefits framework is that negative incentives discourage an undesirable change in land management, whilst positive incentives encourage a desirable change in land management. This distinction was not made at the early stages of the variation process but if it had, may have given councillor workshops a useful starting point for discussion.

Both positive and negative incentives can include instruments broadly categorised as financial or regulatory. Financial or regulatory instruments can be split into either polluter-pays or beneficiary-pays, and Pannell (2004) notes this choice depends on decisions about how property rights are assigned, which tend to be political decisions. In this case there were a range of political views about how the variation should assign

property rights to nitrogen. At council workshops over several years, elected representatives debated amongst themselves whether farmers should pay all, some or none of the costs of the past and current nitrogen emissions that resulted in the threat to water quality. A forum[22], set up for political representatives from councils, Ngati Tuwharetoa and government to discuss funding options, took as their starting point that rights to nitrogen would be grand parented and a buy-back fund was necessary. These meetings and workshops were held in a political climate of strong lobbying from farmers who believed nitrogen reductions mandated by rules would cost hundreds of millions of dollars (Thomas et al 2002) and farmers should receive financial compensation. In contrast, forestry and environmental groups maintained the variation should use a polluter-pays instrument and that the proposal for a public fund to buy-back nitrogen was beneficiary-pays. Forestry owners stated "The apparent unwillingness to impose applicable environmental costs onto those responsible for nitrate emitting land uses (pastoral agriculture and urban development including tourism) prevents the development of sustainable solutions."(New Zealand Forest Owners Association 2003 p 1)[23]

A report to the council setting out a calculation of relative contribution of public (ratepayers and taxpayers) and private landowners for the buy-back of nitrogen, argued that both landowners and the public benefited from a clean lake, so should contribute to its long term protection. From this it appeared the council accepted the nitrogen reduction component of the policy instrument was beneficiary-pays, where farmers and the wider public all paid increased rates to ensure the lake was protected, albeit the largest increases in rates were to be paid by farmers[24].

Before the council released its decision on the variation, communications material contained general statements that did not respond to the particular points that different parties were making. It is interesting to speculate whether acknowledging where it was making political decisions, would have assisted the council as it sought to reduce political risk and potential policy failure. We argue that delineating where it relied on economic perspectives and crisply setting out its rationale could have made the variation process more streamlined and cost-effective. Some evidence for both of these points is that six years after the start of the process, the Council Hearings Committee chair, former Environment Court Judge Skelton commissioned economic evidence to

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[21] See in particular RMA s32(3)a) and b) relating to the extent to which each objective is appropriate in achieving the purpose of the Act, and whether, having regard to their efficiency and effectiveness, the policies, rules and other methods are the most appropriate for achieving the objectives.

[22] Partners and stakeholders meetings ran from 2002 – 2005 and involved politicians and senior staff from Councils, Central Government and Ngati Tuwharetoa, with foresters and farming representatives occasionally invited to contribute.

[23] Forest owners position statement dated 22 September 2003. Handed out at a 'Taupo Partnership' meeting attended by political representatives of Ngati Tuwharetoa Mari Trust Board, WRC, Taupo District Council, and Central Government Ministries for Environment and Agriculture and Forestry.

assist the committee with commentary on the extensive expert evidence presented by submitters. The resulting council decision was the first time it had explicitly stated that "by restricting emissions the cap prevents landholders from generating emissions that will impose unacceptable costs on the rest of the community. The act of capping of emissions is an application of the polluter pays principle. The capping of emissions restricts the scope for all landholders to engage in emission creating activities in the future" (Kaine 2006, referred to in Waikato Regional Council 2007 Volume 1 pp 42-43). It was also the first time the council made a distinction between overall judgements about fairness (in choosing the 'grand parenting' method of allocating entitlements to nitrogen) and economic considerations of efficiency (in allowing nitrogen allocations to be traded).

Arguably the biggest advantage in delineating economic rationale from political judgements would have been to make the council's experience with the variation more easily transferable to future policy interventions in the Waikato region.

Identifying the primary policy instrument

Using the PCF technical feasibility component, our analysis highlighted the appropriate primary policy instrument was a cap and trade. As early as 2001, the council had sufficient information to choose a cap and trade instrument as technically feasible. However nitrogen trading was not considered by the council for several years (Young 2004). We concluded application of the PCF may have helped the council to identify cap and trade as the primary policy instrument three years earlier than it did.

Once the primary policy instrument has been identified, detailed design of the instrument can occur, such as supporting regulation and processes for it to work in a particular situation. In this case, the primary policy instrument was initially identified as a nitrogen cap. When a cap and trade instrument was chosen, considerable re-working of the supporting regulation and processes by council staff was needed, because new components and their attendant principles were added. At some cost and time pressure, council staff and commissioned experts responded to Environment Court appellants who sought further detail about, and trialling of the non-point source trading component. We argue the council may have avoided this additional cost if nitrogen trading had been chosen earlier.

Trading non-point source to non-point source nitrogen was unprecedented, not only in New Zealand, but internationally. Despite receiving technical and legal advice that it

[24] Farmers pay Taupo District Council rates based on property value, compared to forestry landowners who pay a small flat charge. All Waikato Regional Council ratepayers pay a small flat charge in their annual rates.

was possible, a reason for the delay in settling on a cap and trade instrument may have been simply due to a lack of confidence.

Modification of policy instrument after considering land owner responses – the role of public and farmer consultation

In the PCF components concerned with land owner responses (including the I_3 Response Framework and Rate and Scope), changes to the policy instrument are made as a result of the regulators awareness of, and action taken to address the highly unfavourable involvement in the intervention. In this case, we have argued unfavourable response by land owners to the original intervention proposed by the council caused it to make significant changes to the policy instrument. The changes made by the council in the early stages of policy development were to allow more time and resource for detailed landowner consultation and develop regulation, and more significantly, to request regional ratepayers contribute one third of the cost of an $81 million dollar public fund to buy-back nitrogen. However, we found no evidence the council explicitly acknowledged that potential behavioural responses from land owners risked policy failure. Communications messages from the council emphasised the need to avoid major social disruption and cost such as “It is critical that actions taken to reduce nitrogen entering the lake do not displace or permanently disadvantage local people” (Waikato Regional Council 2003 pp 5).

We speculate that similar outcomes would have been reached earlier or with less effort on the part of council staff and landowners, if the council had known about and used I_3 Response Framework before a list of farm-specific interventions was announced. The council has not reviewed the total cost of the variation process, but the intensive five year consultation process alone, prior to notifying the variation, was unprecedented. Use of I_3 Framework to systematically interpret land owner response to the intervention may have assisted in the design of a more cost-effective process, thereby avoiding some of the unproductive early meetings.

While the council’s initial public campaign created outrage in the farming community and delayed constructive discussion of what successful policy implementation would take, it had some positive spin-offs for the council. Highlighting the general importance of the lake and surrounds appeared to successfully trigger involvement with a general issue around ‘lake health’ across a range of people. This was useful for the council when it sought to engender support from ratepayers for a public fund. In public statements, the council used public concern about protecting Lake Taupo as an important justification for rate increases to achieve the water quality target.

Modification of policy instruments – Rate and Scope component of PCF

Later in the process, once changes to the policy instrument had been made and the formal RMA process and implementation began, farmers who had remained highly involved in the intervention, reacted unfavourably to the process and costs of resource consents and nitrogen trading, including selling nitrogen to the trust.

In the analysis we argued the council's awareness that farmer response affected the rate at which the policy objective could be achieved, led to modification of the policy instrument in the hope that this would lead to an increase in the rate of uptake of the policy. The offer of financial assistance and one to one extension services to complete resource consent processes were both initiatives unprecedented in the council's experience of implementing policy and at the time the necessity of these actions was not universally agreed by council staff. For instance, some staff did not agree there are risks of policy failure once RMA regulation is in place. Reasons given included a belief in the compulsory nature of regulation and their experience that holders of resource consents for point source discharges tend to comply with conditions. This is in contrast to implementation staff awareness that land owner attitude is extremely relevant to getting sufficient rate of uptake of benchmarking and consent application to meet deadlines in the variation.

The council will need to continue to consider whether the rate at which change occurs will achieve the policy objective, given the areas in which farmers can delay the process. As implementation progresses, there is a risk that the council is not sufficiently responsive to, or aware of, the danger posed to achieving the policy objective by land owner response.

We believe that a key incentive for farmers to increase the rate at which they move through the resource consent process is seeing that nitrogen has a value in the catchment. One of the ways this is demonstrated is nitrogen purchase by the trust. Our analysis suggested the delay in the trust's action to purchase farms triggered an increase in farmer involvement with that part of the intervention, and that involvement was highly unfavourable. The trust's actions are closely linked to the council's ability to gain the necessary rate of change. This was demonstrated in our analysis when a combination of land sales to private buyers and actions by the trust to purchase farms appeared to significantly increase the rate at which farmers initiated contact to begin the resource consent process.

A concerted effort by both the trust and the council is needed to ensure their action or inaction does not trigger unfavourable farmer responses again, as this will affect the rate at which the policy objective is achieved.

5.2 Organisational changes to implement policy in Lake Taupo catchment

The variation was a radical policy innovation for the council. To successfully implement the variation, wide-ranging changes were needed. Our analysis concluded organisational disruption occurred, both in the time and effort needed to develop new components, and in adapting to new relationships between functional groups within the council and between the council, AgResearch and the Lake Taupo Protection Trust. Existing roles and relationships had to be re-negotiated. This occurred where there was a change of principle that underlies a change of component, and where there was a change in the way components are arranged. In some cases the change in principle was not immediately understood or accepted by individuals and functional groups within the council and the Lake Taupo Protection Trust. In the following section, we highlight some of the implications of these changes and comment on whether different actions could have reduced organisational disruption.

The analysis raises questions about whether more critical insights into the different consequences that the changes posed for the council would have assisted streamlined implementation of the variation. While many of the challenges identified in the analysis were not anticipated by the council and have been unsettling and disruptive to staff productivity, they do not appear to have posed a serious risk of policy failure. It appears they have been largely overcome, due to concerted but ad-hoc efforts between individuals in the different functional groups to spend time solving issues together, rather than any proactive realignment of resources or procedures.

Changes to components and principles of the policy instrument

Different forms of regulation were discussed at length at the 35 half day meetings involving staff, AgResearch advisors and six farmer representatives. The council did not use the I_3 Response Framework. Instead, farmers' views were sought through consultation with farmer representatives. In assessing the notes of these meetings, it is apparent council staff made various attempts to draft regulation that was workable and practical from the farmer's point of view, in addition to being certain of achieving the policy objective and be legally enforceable. We argue that use of frameworks specifically designed to identify the factors that influence farmers' decision-making such as the I_3 Response Framework (Kaine 2004) could have short-circuited some of the trial and error associated with drafting what was, to the council, an entirely new way of regulating discharges. The use of such frameworks could have given the council a detailed understanding of the variety of factors that influence the different grazing

management practices used in the Taupo catchment. This in turn would have assisted fine-tuning of the policy instrument.

Neither council staff nor the small group of farmers representing the 100 or so farmers in the catchment had a detailed understanding of the variability of farm contexts and thus the likely population of adopters (the market) for an innovation or the different segments within that market on the basis of benefits sought by the farmer. In the absence of this understanding, assumptions were made by council and external agencies that particular innovations were equally applicable to all farmers. Initial regulatory options were dismissed as unworkable by both the farm systems experts and farmer representatives. However, a 'recipe approach' to regulating farm practices with all farmers required to adopt the same agricultural innovation at little or no cost, persistently appeared in some council and external parties documents. Environment Court expert witness established, in an agreed statement, that requiring all farmers to adopt the same practices was not a cost-effective or efficient approach (Waikato Regional Council 2008).

Organisational Relationships

The Organisational Relationships Framework (Kaine and Keeble 2007) is not part of the PCF, but may assist in understanding difficulties encountered by the council in outsourcing expertise, whether internally in its own organisation or externally to AgResearch. It was developed as a "systematic method for identifying the kinds of tensions that can arise in relationships between organisations that are implementing policy, the conditions under which they are likely to arise and how they may be managed" (Keeble et al 2008 pg 2).

The novel regulatory situation posed challenges to the existing operation of resource consents at the council. This has challenged the existing work culture and processes. The council is a large organisation with multiple functions set out in legislation (Resource Management Act 1991 and Local Government Act 2002), and is accountable to rate payers for efficient use of public money. Historically policy intervention to achieve outcomes has operated as a series of functional specialities where policy is drafted and taken through a formal RMA process by one group and then handed over to implementers who are further divided into speciality areas depending on whether the policy instrument is one of raising awareness, extension, or regulation. Because of the specialised knowledge needed for each of these areas, the arrangement has developed to achieve efficiency. However, the nature of speciality areas can result in less overall adaptability in the organisation, particularly when resource constraints are present.

The implementation manager needed information and assistance from policy, farmer education and compliance monitoring groups within the council. However, varying degrees of difficulty in outsourcing expertise from each of these groups occurred. There were no existing formal agreements in place between the groups to assist them to manage competing priorities. As a result roles and responsibilities for implementing the variation were unclear and tensions about resourcing priorities emerged.

Outsourcing to other agencies

AgResearch is a research agency that specialises in agricultural science and farmer education and extension, and employs experts in the ongoing development and use of Overseer. In contrast, the council has a regulatory auditing and enforcement function. Communication difficulties due to differences in organisational culture were under-estimated. While good relationships between staff at the two organisations are reported by council staff, assumptions made early on in the contracting agreement led to delays and misunderstanding. The initial standard contracting arrangement for this core activity (Kaine and Keeble 2007) was not satisfactory, and changes to respective client and policy decision roles were negotiated. As a result, AgResearch staff undertake nitrogen benchmarking in a way that is more consistent with the council's regulatory and compliance roles. For this example, it appears the council identified where to exert greater control in the outsourcing relationship, concentrating on aspects that may threaten achievement of the policy objective.

An emerging issue the council will need to address is ongoing timely access to the small number of nutrient experts in the country, most of which are employed by AgResearch. There may be competing priorities for AgResearch as there are several other regional councils in the central North Island who are taking a nutrient budgeting regulatory approach. This raises the question of whether the council should re-visit its decision to outsource Overseer and farm systems expertise to AgResearch. Alternative approaches available to the council are to further develop its own in-house expertise, or re-look at its initial idea of developing a process for certifying independent advisors. While there is an advanced nutrient management course available in New Zealand, attendees do not undertake any farm systems or RMA component. These may be important aspects from both a farmer and council point of view when contracting advice for implementing the variation rules.

Changes to architectural principles

Managing the new architectural principles was perhaps the most challenging aspect for the council in implementing a radical policy instrument. In this case, principles underpinning new components were very different from existing ones. Principles were developed by staff in one part of the organisation and not clearly articulated or

disseminated as implementation began. We argue it was necessary for the newly involved council staff, their managers, legal advisors and elected representatives to first question and understand why components in the variation had been developed and second, embrace the principles behind the components. A key benefit of this greater understanding is to reduce the risk of small adaptive changes in implementation having large unforeseen consequences. For instance, as implementation progressed, numerous small changes made to the variation rules had far reaching legal and practical implications. In this case the staff and legal advisors involved in the Environment Court case had to develop an understanding of the principles behind the design and functioning of the variation components. This was particularly important as the variation is a legal document and the RMA process makes it time consuming and costly to make any change once the rule is operative.

Unforeseen challenges for implementation staff due to new architectural principles not being explicitly acknowledged include the situation where principles underpinning the variation required a fundamental shift by council staff to accommodate new philosophy. This can create tensions as staff charged with implementing cap and trade attempted to interact with other parts of the organisation that operate on different principles. For instance, the market management principle of maximising societal wealth is very different from previous principles used to guide rule drafting.

When principles are not explicitly acknowledged or agreed, it affects whether staff see the variation as fair. We argue this is especially challenging for implementation staff in their interactions with other staff in the organisation who are not aware of the different components or underlying architectural principles.

The analysis found farmer involvement in the intervention to be generally high and remaining unfavourable, albeit with a softening in attitudes away from the highly unfavourable end of the spectrum. The impact for implementation staff in their day to day interaction with farmers, at times affected their wellbeing and job satisfaction. This was especially the case if they had previously had roles that farmers saw as being helpful or at least neutral to their business. Staff reported *“people who are most affected on the lowest stocking rates are pretty grim and that affects us.”*

In summary we found that when both component and architectural principles are changed it is critical to clearly and consistently state what the new principles are in order to achieve successful implementation.

6 Summary and recommendations

The report tested the usefulness of the PCF, and found it was able to highlight the appropriate policy instrument to use, and reveal and account for land owner responses and council's organisational responses to the chosen policy instrument.

The analysis of the economic justification for government intervention, revealed; (1) non-exclusive costs and incomplete markets; and (2) application of the technical feasibility decision tree identified a cap and trade policy instrument, where non-exclusivity could be reversed by legislation applying to individual farm properties to establish rights to nitrogen discharges. Both were consistent with the council's intervention.

We found that use of the economic justification part of the PCF could have helped the council respond to critics of the variation by putting more structure and transparency around its rationale for taking action. Arguably the biggest advantage in delineating economic rationale from political judgements would be to make the council's experience with the variation more easily transferable to future policy interventions in the Waikato region.

Capping nitrogen emissions at a socially desirable nitrogen limit was made possible by the council's ability to model the aggregate total of nitrogen delivered to the lake. The council was also able to model diffuse nitrogen emissions at a property scale. If the council had used the first component of the PCF concerned with justification for government intervention and technical feasibility, it would have:

- provided a means of clearly articulating the fundamental reasoning as to why cap and trade was the preferred instrument for limiting nitrogen emissions
- given the council confidence to include nitrogen trading in the regulated nitrogen cap at the outset of drafting the variation document.

Regulatory options were presented at the same time the council described a water quality issue people were not previously aware of, and were not able to see in the lake. The farmer response to the intervention was immediate and negative. Our analysis showed the council was responsive to farmers' highly unfavourable attitude to the intervention. Changes were made to the policy instrument early in the process. However, the reasons for the changes was not explicitly stated and communicated to the community. Whilst it is likely that farmer response to any intervention that restricts

their management choices would be unfavourable, use of the I_3 Response Framework to systematically interpret land owner response to the intervention would have helped the council and the Lake Taupo Protection Trust anticipate and develop strategies and responses. Use of the I_3 Response Framework, including the assessment of whether enough farmers would change at a rate fast enough to meet the policy objective, may have:

- assisted the design of a more cost-effective consultation process, thereby avoiding some of the unproductive early meetings
- reduced the amount of re-drafting of variation rules, by giving an early understanding of the variability of farm contexts in the catchment
- informed the wider debate on options available to farmers for reducing nitrogen leaching, by removing the assumption that agricultural innovations were equally applicable to all farmers
- highlighted the need for the council and the Lake Taupo Protection Trust to be aware of, and responsive to, the risk posed to achieving the policy objective, given that farmers can delay completing the initial consenting process or delay making nitrogen management decisions in preparation for selling nitrogen to the trust.

The second purpose of the report was to identify aspects for the councils continuing implementation of the variation.

The council developed new processes and procedures to implement the individual components of the cap and trade instrument. Whilst some processes and procedures were relatively straightforward, others took considerable time and discussion. The analysis raised questions about whether more critical insights into the different consequences that the changes posed for the council would have assisted streamlined implementation of the variation. Many the challenges identified in the analysis were not anticipated by the council, although appear to have been largely overcome by concerted but ad-hoc efforts between individuals in the different functional groups in the council and external agencies.

Recommendations:

In future policy development processes, the council should consider whether to:

a) Apply the PCF once the council has confirmed the policy objective. This can be done as an initial run-through to highlight where more information is needed and where to focus effort, and then re-visited throughout the process.

b) Develop key messages for internal and external individuals and groups following an initial run-through of the PCF. The various technical and political decisions can be acknowledged.

c) Ensure changes to underpinning component or architectural principles in the policy instrument are articulated and widely discussed.

d) In project planning, ensure that sufficient resources are allowed for implementation and policy development staff to work together throughout the entire process.

e) Apply the Relationship Choice Framework where the success of the councils policy implementation is likely to depend on another organisation meeting its responsibilities, in order to anticipate and manage tensions between organisations with different governance, strategic and workforce management.

In regard to the implementation of the variation for Taupo:

f) Re-visit the councils' approach to outsource much of the nutrient management expertise to AgResearch. Instead, consider increasing in-house expertise or working with other regional councils and external agencies on a certification process for nutrient planning experts.

g) Continue discussions with agricultural agencies and Taupo farmer groups about what role different agencies should have in the delivery of farmer support, to optimise farm performance and profitability within a nutrient-restricted regime.

References

ACT NZ Limited 2000. No sledgehammer needed. Press release 25 May 2000

Aronson C 2000. 25 May 2000. Lake Taupo clean-up ‘a ban on farming’. Waikato Times; 3

Brodnax R 2008. Evidence in chief to Environment Court. Lake Taupo Regional Plan Variation 5 Appeals Env 2007 Akl 00336, 337, 342, 345, 350 to 352. Environment Waikato Document No 1284298

Finlayson J, Thorrold B 2001. Estimating the costs of restrictions on nitrate emissions in the Taupo Catchment. Client Report to Environment Waikato (Waikato Regional Council). Hamilton, AgResearch.

Gravitas Research and Strategy Limited 2004. Environmental attitudes, awareness and actions, 2003 : a survey of residents of the Waikato Region. Environment Waikato technical report 2004/01. Hamilton, Waikato Regional Council (Environment Waikato)

Hickman M 2002. Cost benefit analysis for Lake Taupo catchment. September 2002. Environment Waikato Document No 775258

Johnson F, Kaine G, Ford J, Leth M 2006. A framework for selecting policy instruments in natural resource management. Practice Change Research Working Paper 07/06. Tatura, Victoria, Department of Primary Industries.

Johnson F, Kaine G, Sandall J, Murdoch, H 2009. Policy responses to ensure the delivery of public benefits from the modernisation of irrigation infrastructure. Practice Change Research. Tatura, Victoria, Department of Primary Industries.

Kaine G, Johnson F 2004. Applying marketing principles to policy design and implementation. Social Research Working Paper 02/04. Hamilton, AgResearch.

Kaine G 2006. Evidence to Waikato Regional Council Hearings Committee June 2006. Environment Waikato Document No 1091465

Kaine G, Higson M 2006. Policy as an innovation. Practice Change Research Working Paper 02/06. Tatura, Department of Primary Industries.

Kaine G, Higson M, Sandall J, Lourey R 2006. Policy as an innovation : case studies in Australia and New Zealand. Practice Change Research Working Paper 07/06. Victoria, Department of Primary Industries.

Kaine G, Keeble B 2007. Organisational relationships and the implementation of natural resource policy. Our Rural Landscape Project Report. Victoria, Department of Primary Industries.

Kaine G, Johnson F, Lourey R, Ford J, Keeble B, Higson M 2008. Approaches to managing nutrient emissions in the Macalister Irrigation District : final report prepared for the Gippsland Lakes Taskforce Sub-Committee, Practice Change Research. Victoria, Department of Primary Industries.

Keeble B, Kaine G, Hunter J 2008. A new approach to investigating how organisations work collectively to implement natural resource policy : a case study in the implementation or irrigation policy. Report for the Goulburn-Broken Catchment Management Authority October 2008. Tatura, Victoria, Department of Primary Industries.

Ledgard S 2008. Evidence in chief to Environment Court. Lake Taupo Regional Plan Variation 5 Appeals Env 2007 Akl 00336, 337, 342, 345, 350 to 352. Environment Waikato Document No 1284277 and No. 1284278.

McDermott A, Fairgray F 2001. The impact of alternative land uses in Taupo Catchment : report prepared for Environment Waikato and the Sustainable Management Fund of the Ministry for the Environment. Auckland, McDermott Fairgray.

Meister A 2006. Evidence to Lake Taupo Regional Plan Variation 5 WRC Hearings Committee. Environment Waikato Document No. 1091234.

Meister A 2008. Evidence in chief to Environment Court. Lake Taupo Regional Plan Variation 5 Appeals Env 2007 Akl 00336, 337, 342, 345, 350 to 352. Environment Waikato Document No. 1284283 and No. 1282482.

Murdoch H, Bewsell D, Lourey R, Kaine G. 2006. Understanding people's response to biosecurity regulation. Decision Making in Uncertain Times : 3rd National Conference on Risk Management. New Zealand Society for Risk Management Inc., Auckland, NZ.

New Zealand Forest Owners 2003. Position statement on Lake Taupo sent to Waikato Regional Council. Environment Waikato Document No. 875041.

Pannell DJ 2004. Heathens in the chapel? : application of economics to biodiversity. Pacific Conservation Biology 10 (2-3): 88-105.

Pannell DJ 2006b. Public benefits, private benefits, and the choice of policy tool for land-use change. Retrieved from htpp;//cyllene.uwa.edu.au/~dpannell/pd/pd0079.htm. [accessed October 1 2008]

Pannell DJ 2008. 'Public benefits, private benefits and policy mechanism choice for land-use change: technology change'. Paper presented to 52nd Annual Conference of the Australian Agricultural and Resource Economics Society, Canberra, 5-8 February.

Ritchie H 2007. On farm nutrient practice : research and applicability to Upper Waikato. Environment Waikato Technical Report 2007/42. Hamilton, Waikato Regional Council (Environment Waikato)

Sandall J. Personal communication, 20 September 2008. Department of Primary Industries, Victoria.

Sandman PM, Miller PM, Johnson BB, Weinstein ND 1993. Agency communication, community outrage, and perception of risk: three simulation experiments. Risk Analysis 13 (6), 585-598.

Thomas A, Bell B, McRae, A 2002. Assessing the loss to farmers associated with nitrogen restriction outputs in the Lake Taupo catchment. Report prepared for Taupo Lake Care Incorporated. Wellington, Nimmo-Bell & Company Limited.

Thorrold B, Finlayson J, Lambert G, Ledgard S, Smyth D, Tarbotton I, Smeaton D, and Webby R. 2001. Land use, farm businesses and environmental policy in the Lake Taupo catchment. Proceedings of the New Zealand Grassland Association 2001. 63:Pp 69-72.

Thorrold B, Betteridge K 2006. New profitable farming systems for the Lake Taupo catchment : final report. Wellington, Sustainable Farming Fund, Ministry of Agriculture and Forestry.

Thorrold B 2008. Email 3 November 2008 b.thorrold@dairynz.co.nz

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. Environment Waikato Document No. 699155.

Vant B 2008. Email 8 October 2008 bill.vant@ew.govt.nz.

Vant B 2008. Rebuttal evidence to Environment Court. Lake Taupo Regional Plan Variation 5 Appeals Env 2007 Akl 00336, 337, 342, 345, 350 to 352. Environment Waikato Document No. 1284298.

Vant B, Hadfield J, Rutherford K, Baisden T, Dyck W, Lavery J, White P, Silvester W 2008. Statement of members of the scientists group called by the Environment Court to caucus on the unresolved issues of nitrogen load to the Lake. Table AS1 p 8. Environment Waikato Document No. 1318027.

Waikato Regional Council (Environment Waikato) 1998. Asset management plan: Lake Taupo catchment control scheme. Waikato Regional Council Policy Series 97/09. Hamilton, Waikato Regional Council (Environment Waikato)

Waikato Regional Council (Environment Waikato) 2000a. Protecting Lake Taupo : a plan by Environment Waikato. Environment Waikato Document No. 1284290.

Waikato Regional Council (Environment Waikato) 2000b. Issues and options for managing water quality in Lake Taupo : discussion paper. Hamilton, Waikato Regional Council (Environment Waikato)

Waikato Regional Council (Environment Waikato) 2000c. Taupo variation : Lakes and Waterways Action Group meeting. Questions and answers from special meeting held 24/5/00. Environment Waikato Document No. 615475.

Waikato Regional Council (Environment Waikato) 2001a. Minutes of an ordinary council meeting. April 26, 2001. Environment Waikato Document No. 672632.

Waikato Regional Council (Environment Waikato) 2001b. Notes of a meeting to discuss consultative relationship during pre notification phase of Taupo Variation. Environment Waikato Document No. 675086.

Waikato Regional Council (Environment Waikato) 2001c. Managing water quality in Lake Taupo. Powerpoint presentation water quality data slide 24. Environment Waikato Document No. 666525.

Waikato Regional Council (Environment Waikato) 2007. 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. Waikato Regional Council Policy Series 2007/09. Hamilton, Waikato Regional Council (Environment Waikato)

Waikato Regional Council (Environment Waikato) 2009. Taupo Implementation Team Meeting – Issues with Implementation13 January 2009. Environment Waikato Document No. 1427549.

Waikato Regional Council v Carter Holt Harvey, Environmental Defense Society, Federated Farmers of NZ, Taupo Lake Care Incorporated, Lake Taupo Forest Trust, Lake Rotoaira Forest Trust, Lake Taupo Forest Managers, Tuwharetoa Maori Trust Board, Fonterra Co-operative group Limited, Ngati Tuwhareota Agricultural Group. Environment Court Interim Decision No. A123/2008.

Waikato Valley Authority 1973. Lake Taupo Catchment Control Scheme. Hamilton, Waikato Valley Authority.

Yerex S 2009. Protecting Lake Taupo : the strategy and the lessons. S Yerex, Turangi, NZ.

Young J 2003. Protecting Lake Taupo : Taupo Catchment rules for farming : June 2004. Internal memorandum 12 September 2003. Environment Waikato Document No. 852951.

Young J 2004. Protecting Lake Taupo partnership : principles and roles. Internal memorandum January 2004. Environment Waikato Document No. 881641.

Young J 2008. Evidence in chief to Environment Court. Lake Taupo Regional Plan Variation 5 Appeals Env 2007 Akl 00336, 337, 342, 345, 350 to 352. Environment Waikato Document No. 1284293.

Appendix 1: The Policy Choice Framework

Adapted from: Kaine G, Ford J, Leth Johnson F, 2007. Policy Choice Framework. Practice Change Research Working Paper 02/07, Department of Primary Industries, Tatura, Victoria.

Traditionally, natural resource policy has relied on regulatory, statutory and legal instruments to influence the behaviour of individuals and agencies in ways that protect the natural environment (Ward *et al* 2005). Over the past decade or so there has been a growing interest among policy makers in considering a wider range of instruments to influence behaviour and contribute to natural resource policy (Hatton MacDonald *et al* 2004). This has resulted in an increasing need for frameworks that assist policy makers to choose between different types of policy instruments (Hatton MacDonald *et al* 2004; National Action Plan for Salinity 2005; Ward *et al* 2005).

A variety of frameworks have been proposed by economists and policy experts to assist policy makers in choosing between the different types of policy instruments (Connor and Bright 2003; Hatton MacDonald *et al* 2004; Martin and Verbeek 2006; Ridley and Pannell 2005; Tietenburg and Johnstone 2004; Whitten *et al* 2006; Ward *et al* 2005; Young *et al* 1996; Young and Hatton MacDonald 2003). While these frameworks differ in their scope and detail, there is broad agreement that the following criteria should be used when choosing between policy instruments (Hatton MacDonald *et al* 2004):

1. The potential of different instruments to ensure environmental policy objectives are met.

2. The potential of different instruments to reduce the cost of meeting environmental policy objectives.

3. The responses of the individuals or groups that are the target of the policies and instruments.

4. The feasibility of instruments in the current institutional settings.

Kaine *et al* 2007 view is that the various frameworks that have been recommended to date for choosing between policy instruments do not contain a systematic and practical process for anticipating the variety of responses of different groups to proposed policy instruments. Furthermore, they do not contain systematic and practical methods to predict the responses of public, private and community agencies to proposed policy

instruments. Hence, the various frameworks that have been recommended to date lack rigorous and practical processes for evaluating policy instruments in relation to the third and fourth criteria above.

The absence of methods for assessing the magnitude of variety in individual and institutional responses to policy instruments increases the risk of policy failure (Hatton MacDonald *et al* 2004; Kaine et al 2006; Martin and Verbeek 2006). Hence, frameworks for choosing policy instruments could be improved by including processes that both reveal whether a policy instrument will provoke an undesirable response from a community or organisation and suggest how the policy instrument could be altered to avoid this type of response.

The intention of the Policy Instrument Choice Framework (PCF) is to assist natural resource policy makers to choose between policy instruments when the focus of policy is on changing the behaviour of land owners. The PCF contains seven conceptual frameworks that link systematically through a series of decision trees. Although the decision trees are sequential steps, they contain feedback loops that support an iterative approach to policy instrument selection.

The seven conceptual frameworks of the PCF can be grouped together in three broad components. In the first component the case for the policy intervention is made explicit and a category of policy instruments appropriate to the issue at hand are identified. In the second component the responses of land owners to the policy instrument and subsequent modifications to the instrument are considered. In the third component, the responses of agencies and subsequent modifications to the instrument are considered.

References

Connor J, Bright M (2003). Which Market-based instrument for natural resource management? Paper prepared for presentation at the 47th Annual Conference of the Australian Agricultural and Resource Economics Society. CSIRO Land and Water.

Hatton MacDonald D, Connor J and Morrison M (2004). Market-based instruments for managing water quality in New Zealand. Final report prepared by CSIRO Land and Water for New Zealand Ministry for the Environment.

Kaine G, Johnson F, Ford J and Leth M (2006). A review of approaches for selecting policy instruments. Practice Change Research Working Paper 06/06, Department of Primary Industries of Victoria, Tatura.

Martin P, Verbeek M (2006). Sustainability Strategy. Federation Press, Australia.

National Action Plan for Salinity (2005). National Market-based Instruments Pilot Program: Round One. An Interim Report, by the National Market Based Instrument Working Group, Canberra, Australia.

Ridley A, Pannell D (2005). SIF3: An investment framework for managing dryland salinity in Australia. SEA working paper 1901. CRC for Plant-based Management of Dryland Salinity, University of Western Australia, Perth.

Tietenberg T, Johnstone N (2004). The Management of Ex Post Public Policy Evaluations: Tradable Permits. Policy Evaluation, Design and Reform. Organization for Economic Co-operation and Development, Paris, pp.173-189.

Verbeke W, Vackier I (2004) Profile and effects of consumer involvement in fresh meat. Meat Science 67, 159-168.

Ward J, Bryan B, Gale G, Hobbs T (2005). Market-Based Instrument approaches to implementing priority revegetation in the South Australian Murray-Darling Basin. CSIRO Land and Water Client Report.

Whitten SM, Coggan A, Reeson A, Shelton D (2006) 'Market based instruments: Applying MBIs in a regional context', Report to the Joint Venture Agroforestry Program and Rural Industries Research and Development Corporation, CSIRO Sustainable Ecosystems, Canberra.

Young M, Gunningham N, Elix J, Lambert J, Howard B, Grabosky P, McCrone E (1996). Reimbursing the future: An evaluation of motivational, voluntary, price-based, property-right, and regulatory incentives for the conservation of biodiversity – Part 1. Prepared by CSIRO Division of Wildlife and Ecology, the Australian Centre for Environmental Law, and Community Solutions January 1996. Biodiversity Series, Paper No. 9. Biodiversity Unit. Available [Online]: http://ea.gov.au/biodiversity/publications/series/paper9/index.html. [June 2nd 2003].

Young M, Hatton MacDonald D (2003). An Opportunity to Improve Water Trading in the South East Catchment of South Australia. Water Policy Volume 5, Issue 2, 127-146.

Appendix 2: Primary instrument selection

Extract from: Sandal J, Kaine G, Johnson F 2008. Agricultural Adaptation to Climate Change - The Case for Government Intervention. Practice Change Research Group, Department of Primary Industries, Tatura, Victoria.

See also: Sandal J, Kaine G, Johnson F 2009. Clarifying Economic Justifications for Government Intervention to Assist Agricultural Adaptation to Climate Change. Practice Change Working Paper 02/09, Department of Primary Industries, Tatura, Victoria.

The economic justification for government intervention

The purpose of the first component framework of the PCF is to clarify the economic justification for government intervention that underpins a given policy objective, such as increasing water use efficiency in agricultural production or assisting agricultural industries to adapt to climate change. In neoclassical economics it is recognised that, while the free operation of competitive markets is ideal, in practice, the presence of some conditions may justify government intervention to enhance social welfare. A combination of these conditions may be present in any given situation.

The form of government intervention and, therefore, the appropriate policy instruments, will depend on which combination of conditions a given policy objective addresses. By clarifying the conditions that may justify government intervention, this framework provides a foundation for choosing policy instruments that are justified on economic grounds.

Four fundamental conditions exist that, according to neoclassical economics, may justify government intervention. These conditions are described as inequalities in income distribution, missing markets, incomplete markets and imperfect markets. The logic that is used to identify which combination of conditions is present in a given situation is summarised in Figure A.1. From an economic perspective, each condition provides a necessary, though insufficient, justification for government intervention. For government intervention to be economically justified it is also necessary to establish that the social benefits of the chosen intervention outweighs its costs (Jones 1994; Belli 1997).

The first condition that may justify government intervention is when *inequalities in income distribution* are present that a society considers to be unacceptable (Jones 1994). As indicated in Figure A.1, this condition is qualitatively different to the other three conditions because it concerns access to products and services broadly, rather

than the production or consumption of specific products or services at levels that are not socially acceptable.

The second condition that may justify government intervention is when specific properties of the products or services involved exist that prevents a market from being established (Young 1982; Godden 2006). Randall (1983) argues that the critical properties to understand in this regard are exclusivity and rivalry. The economic problem underpinning this justification could be described as *missing markets* (Beare and Newby 2005).

The third condition that may justify government intervention is when a market exists in a product or service, however, the production or consumption of the product or service creates benefits or costs that are not fully reflected in its price (Pigou 1920; Coase 1960; Randall 1972; Jones 1994; Vatn and Bromley 1997). In other words, there is a degree of non-exclusivity associated with the production or consumption of such products or services, as indicated in Figure A.1. The non-exclusive benefits created by the production or consumption of such products or services are commonly called positive externalities, while the non-exclusive costs created by the production or consumption of such products or services are commonly called negative externalities. The economic problem underpinning this justification could be described as *incomplete markets* (Greenwald and Stiglitz 1986; Heaney et al. 2005). The fourth condition that may justify government intervention is when a market exists in a product or service, however, competition in the market operates imperfectly due to one or more participants in the market being able to influence the price they receive or pay for products and services. This influence might arise from the cost structure of an industry (Henderson and Quant 1980) or information asymmetries (Stigler 1961; Arrow 1963b; Akerlof 1970). The economic problem underpinning this justification could be described as *imperfect markets* (Beare and Newby 2005).

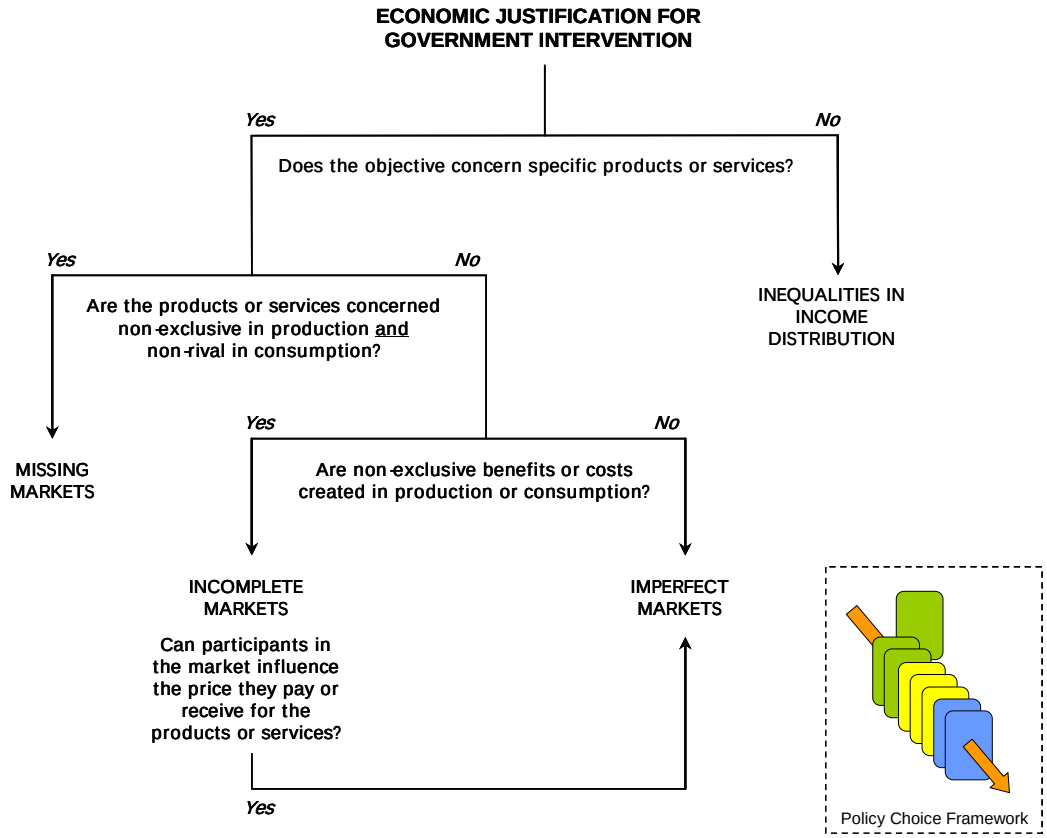

Figure A.1. Economic justification for government intervention tree (Sandal J, Kaine G, Johnson F, 2008.)

The public benefits: private benefits framework

The public benefits: private benefits framework was developed by Pannell (2006; 2008). Pannell developed the framework to inform the choice of policy instruments when a natural resource problem requires changes in land use on privately owned land (Pannell 2006a). The framework is grounded in economic theory and involves considering the relative private and public net benefits of a proposed change in land management. Pannell (2006b:p.1) defines private net benefits as the 'benefits minus the costs accruing to the private land manager as a result of a proposed change in land management' and public net benefits as the 'benefits minus the costs accruing to everyone other than the private land manager.'[25] According to Pannell (2006b), private net benefits provide insights into the behaviour of land owners while public net benefits provide insights into the effects on everyone else (or externalities) that flow on from the behaviour of land owners.

A fundamental proposition underpinning the public benefits: private benefits framework is that some categories of policy instruments will be more efficient[26] than others in promoting a proposed change in land management, depending on the combinations of private and public net benefit associated with that change. Pannell (2006b) distinguishes five categories of policy instruments for promoting changes in land management on land that is privately owned. These five categories are positive incentives, negative incentives, extension, technology development and no action. The characteristics of these categories, as described by Pannell, are summarised in Table A.1.

[25] Pannell (2006c) notes that these definitions of net benefits exclude the costs of a policy intervention that will accrue to a public land manager charged with implementing the intervention. An advantage of this is that it enables the benefits and costs of a policy intervention to be compared separately.

[26] Pannell (2006a:p.8) defines efficiency as the 'biggest environmental benefit per dollar spent.'

Table A.1 Categories of policy instruments for promoting change in land management on land that is privately owned (Pannell 2008:p.3).

Category	Specific policy mechanisms included
Positive incentives	Financial or regulatory[A] instruments to encourage change
Negative incentives	Financial or regulatory[A] instruments to inhibit change
Extension	Technology transfer, education, communication, demonstrations, support for community network
Technology change	Mechanisms that alter the benefits of land management options, such as strategic R&D, participatory R&D with landholders, provision of infrastructure to support a new management option, and training to enhance the performance of existing technologies
No action	Informed inaction

[A] Financial or regulatory instruments include polluter-pays mechanisms (command and control, pollution tax, offsets), beneficiary-pays mechanisms (subsidies, conservation auctions and tenders), and mechanisms that can work in either way depending on how they are implemented (define and enforce property rights, such as tradable permits).

From Table A.1 it can be seen that the categories 'positive incentives' and 'negative incentives' both comprise financial and regulatory instruments. In the context of the public benefits: private benefits framework, Pannell (2006b; 2008) explains that the critical distinction between these categories is that positive incentives encourage a desirable change in land management while negative incentives discourage an undesirable change in land management. It follows that the public benefits: private benefits framework does not directly address the choice between polluter-pays and beneficiary-pays instruments for promoting a change in land management (Pannell 2004; Pannell 2006c).[27]

In figure 4, recommended categories of policy instruments for six combinations of public and private net benefits are graphed. The units of the horizontal and vertical axes are dollars. According to Pannell (2006b), the horizontal axis represents the private net benefit of a potential project involving specific changes in land management in specific locations (private net benefits less than zero are described as private net costs). Similarly, the vertical axis represents the public net benefit of a potential project involving specific changes in land management in specific locations (public net benefits less than zero are described as public net costs). In the interests of clarity, in applying the public benefits: private benefits framework we will interpret the axes in terms of potential changes in land management rather than potential projects involving specific changes in land management. [28]

[27] Pannell (2004; 2006c) makes the point that this choice depends on decisions about how property rights are assigned, which tend to political rather than economic. In practice, Pannell (2006c) observes that polluter-pays instruments tend to be used to discourage an undesirable change in land management while beneficiary-pays instruments tend to be used to encourage a desirable change in land management. A discussion of the contribution that economics can play in informing the choice between beneficiary-pays and polluter-pays instruments is presented in Pannell (2004).

[28] Pannell has made various refinements to the public benefits: private benefits framework (see for example Pannell 2008), however, the description reported here captures its fundamental logic.

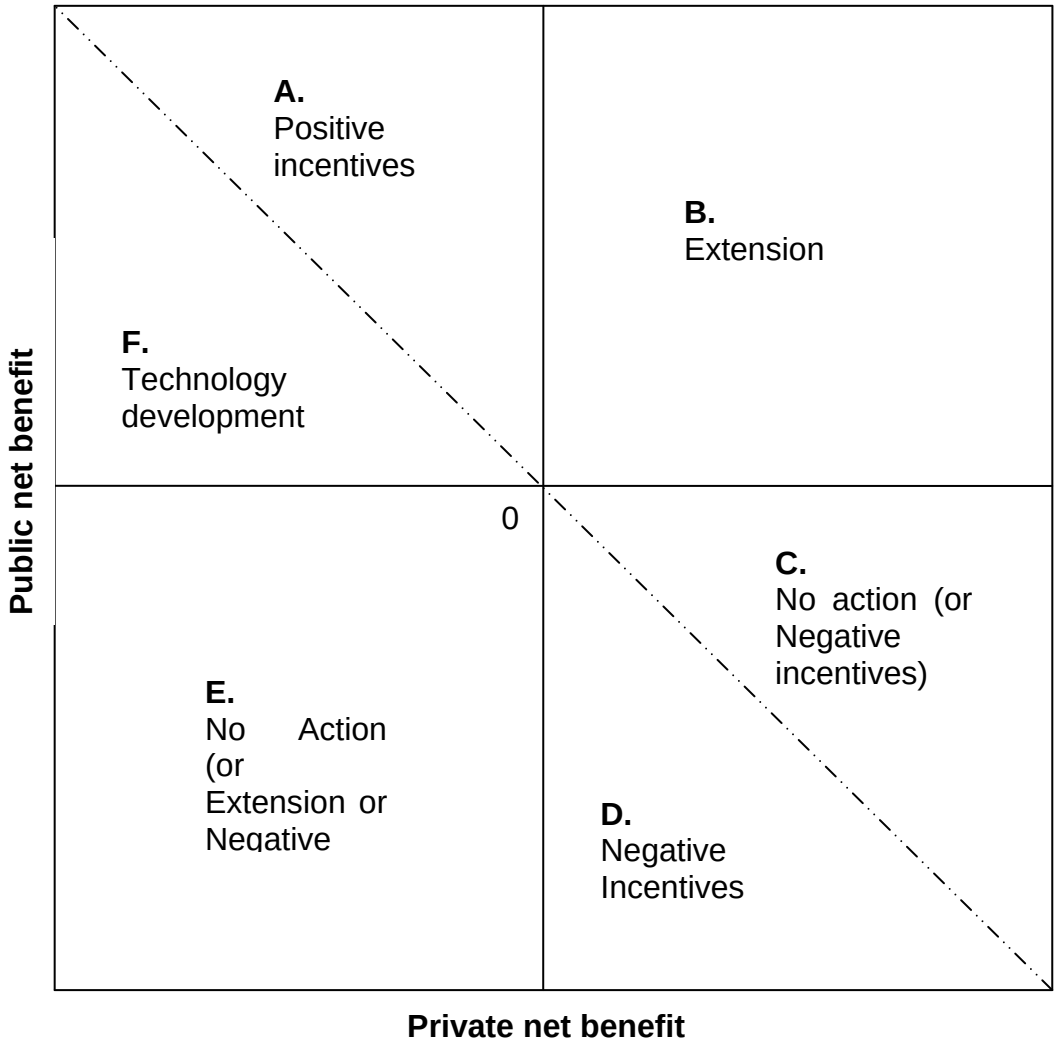

Figure A.2 **Recommended categories of policy instruments for different combinations of public and private net benefits. The units on the horizontal and vertical axes are dollars and the diagonal line passing through the origin is at a 450 angle to the axes (Source: adapted from Pannell 2008:p.3)**.

On the basis of this interpretation, the area labelled A. in Figure A.2 represents potential changes in land management that would create public net benefits and private net costs. Further, the public net benefits created by these changes would outweigh their private net costs. Pannell (2006b; 2008) recommends the use of positive incentives to encourage such changes in land management because:

- They would create public net benefits.
- Such changes would create net benefits overall.
- Land owners are unlikely to voluntarily adopt such changes without positive incentives; as they would create private net costs.

The area labelled B. in Figure A.2 represents potential changes in land management that would create public net benefits and private net benefits. Pannell (2006b; 2008) recommends the use of extension[29] to encourage such changes in land management because:

- They would create public net benefits.
- They would create net benefits overall.
- Such changes would create private net benefits, so that land owners are likely to voluntarily adopt them without positive incentives.
- As such changes would create private net benefits, access to information is likely to be the major limitation on the rate at which landholders adopt them; extension can address this limitation.

The area labelled C. in Figure A.2 represents potential changes in land management that would create public net costs and private net benefits. Further, the private net benefits created by these changes would outweigh their public net costs. For potential changes in land management with these characteristics, Pannell (2006b; 2008) recommends no action, or, in some circumstances flexible negative incentives because:

- Such changes would create net benefits overall.
- Such changes would create private net benefits, so that landholders are likely to voluntarily adopt them.

[29] Pannell (2006a;2008) emphasises that while extension could also be used to support other categories of policy instruments this recommendation relates to the use of extension as the main policy instrument.

- Such changes would not create public net benefits; therefore public investment in incentives or extension would not be justified on efficiency grounds.

- In circumstances where information is not available on whether such changes would create sufficient private net benefits to outweigh their public net costs, Pannell (2008) advises that relatively flexible negative incentives (for instance, a pollution tax) may be used to communicate their public costs to landholders. Pannell adds that this leaves the ultimate decision about whether or not to adopt the change to landholders. Further, Pannell advises against inflexible negative incentives such as command and control in these circumstances.

The area labelled D. in Figure A.2 represents potential changes in land management that would create public net costs and private net benefits. However, the public net costs created by these changes would outweigh their private net benefits. For potential changes in land management with these characteristics Pannell (2006b; 2008) recommends negative incentives because:

- Such changes would create private net benefits, so that landholders are likely to adopt such changes unless negative incentives are used to discourage adoption (presumably extension aimed at discouraging adoption would be insufficient, alone, to offset the private net benefits these changes would create).

- Such changes would create net costs overall, and would therefore be economically undesirable; this means that public investment in negative incentives would be justified on efficiency grounds.

The area labelled E. in Figure A.2 represents potential changes in land management that would create both public and private net costs. For potential changes in land management with these characteristics Pannell (2006b; 2008) recommends no action or, in some circumstances, extension or negative incentives because:

- If landholders are aware that a potential change in land management would create private net costs then they are unlikely to adopt it.

- In circumstances where landholders are unaware that a change in land management would create public and private net costs, Pannell (2008) advises that the adoption of such a change could be discouraged by using extension, or, if stronger discouragement is required, by using negative incentives.

The area labelled F. in Figure A.2 represents potential changes in land management that would create public net benefits and private net costs. Further, the private net costs created by these changes would outweigh their public net benefits. For potential

changes in land management with these characteristics, Pannell (2006b; 2006d; 2008) recommends technology development because:

- These changes would create private net costs, so that landholders are unlikely to voluntarily adopt them without public investment in positive incentives or technology development to offset the private net costs that such changes would create.[30]

- These changes would not create net benefits overall; therefore, technology development may be used to generate options that would increase public or private net benefits to the point where net benefits overall are created.

References

Beare, S and Newby, J 2005, 'Incomplete markets, excluded goods and natural resource management' paper presented at: *Australian Agricultural and Resource Economics Society*, Coffs Harbour, 9-11 February, Australian Bureau of Agricultural and Resource Economics.

Coase, RH 1960, 'The problem of social cost', *Journal of Law and Economics*, vol. 3, pp. 1-44.

Godden, D 2006, *Agricultural and Resource Policy: Principles and Practice*, 2nd edition edn, Sydney University Press, Sydney.

Greenwald, B and Stiglitz, AA 1986, 'Externalities in economics with imperfect information and incomplete markets', *Quarterly Journal of Economics*, vol. 101, pp. 229-264.

Heaney, A, Dwyer, G, Beare, S, Peterson, D and Pechey, L 2005, 'Third-party effects of water trading and potential policy responses' paper presented, Providence, Rhode Island, 25-27 July, American Agricultural Economics Association.

Jones, R (ed.) 1994, *Australian Microeconomic Policies*, 4th edn, Prentice Hall, New York.

Pannell, DJ 2004, 'Heathens in the chapel? Application of economics to biodiversity', *Pacific Conservation Biology*, vol. 10, no. 2/3, pp. 88-105.

Pannell, DJ 2006, 'Public benefits, private benefits: the final framework'. Pannell Discussions no. 80, 19 June 2006.

Pannell, DJ 2006a, 'Public benefits, private benefits, and the choice of policy tool'.

Pannell, DJ 2006b, 'Public benefits, private benefits, and the choice of policy tool for land-use change'.

Pannell, DJ 2006c, 'Public benefits, private benefits, and incentives for changing land management'. Pannell Discussions no. 74, 8 May 2006.

[30] Pannell (2006d) observes that technology development could potentially be used to alter public and private net benefits for any area in figure 2, depending on the opportunities and costs involved.

Pannell, DJ 2006d, 'Public benefits, private benefits, and technology development'. Pannell Discussions no. 79, 12 June 2006.

Pannell, DJ 2008, 'Public benefits, private benefits and policy mechanism choice for land-use change: technology change' paper presented at: *52nd Annual Conference of the Australian Agricultural and Resource Economics Society*, Canberra, 5-8 Feb 2008.

Pigou, AC 1920, *The Economics of Welfare*, McMillan, London.

Randall, A 1972, 'Market solutions to externality problems: theory and practice', *American Journal of Agricultural Economics*, vol. 54, no. 2 pp. 175-183.

Vatn, A and Bromley, DW 1997, 'Externalities - a market model failure', *Environmental and Resource Economics*, vol. 9, no. 2, pp. 135-151.

Young, OR 1982, *Resource Regimes: Natural Resources and Social Institutions*, University of California Press, Berkeley.

Appendix 3: Land holder components

Adapted from: Kaine G, Johnson F, Lourey R, Ford J, Keeble B, Higson M, 2008. Approaches to Managing Nutrient Emissions in the Macalister District. Final Report prepared for the Gippsland Lakes Taskforce Sub-Committee, Practice Change Research, Department of Primary Industries, Victoria, Australia.

Landholder responses

In the second stage of the PCF the likely responses of landholders to the policy instrument selected in the first stage are identified and the implications for the feasibility and design of the instrument are considered. There are three components in this stage - I_3 Response Framework, use variety framework and the scoping framework (Kaine and Higson 2006a; Kaine and Johnson 2004a; Murdoch et al 2006).

The I_3 Response Framework predicts the responses of landholders to proposed changes in land management and the policy instruments supporting those changes. The responses of landholders are assumed to depend on their involvement and attitudes towards the policy issue at hand, and their involvement and attitudes towards the policy instrument itself. Involvement is a social psychology construct and describes the motivational state of an individual with regard to some issue or activity. The strength of involvement depends on the relevance of the issue or activity to the achievement of the individual's utilitarian, social or hedonic goals (Mittal and Lee 1989).

Involvement predicts the level of effort an individual will invest in decision-making about the issue or activity. Effort includes dimensions such as the extensiveness of decision-making, the number of factors evaluated in a decision, the number of alternative actions considered and the time spent to reach a decision (Dholakia 2001; Kapferer and Laurent 1986; Mittal and Lee 1989; Poisesz and de Bont 1995; Verbeke and Vackier 2004; Zaichkowsky 1986).

The concept of involvement is used in the I_3 Response Framework to predict the likely behavioural responses of landholders to a policy instrument depending on:

- Their degree of involvement in the policy issue
- Their attitudes towards the policy issue if involvement in the issue is high
- Their degree of involvement in the policy instrument

- Their attitudes towards the policy instrument if involvement in the instrument is high

In broad terms, landholders' involvement in the instrument will be high and their attitude will be positive (negative) if the land management change creates large private net benefits (costs).

The two dimensions of involvement, involvement with the issue and involvement with the intervention, are combined to predict different categories of behavioural response among landholders to a policy instrument (see Figure A.3). Importantly, the framework may assist in identifying behavioural responses that will lead to policy failure, such as non-compliance and outrage. Once the responses of landholders have been identified, alterations to the policy instrument, or new policy instruments that reduce the risk of eliciting these types of response from landholders can be considered.

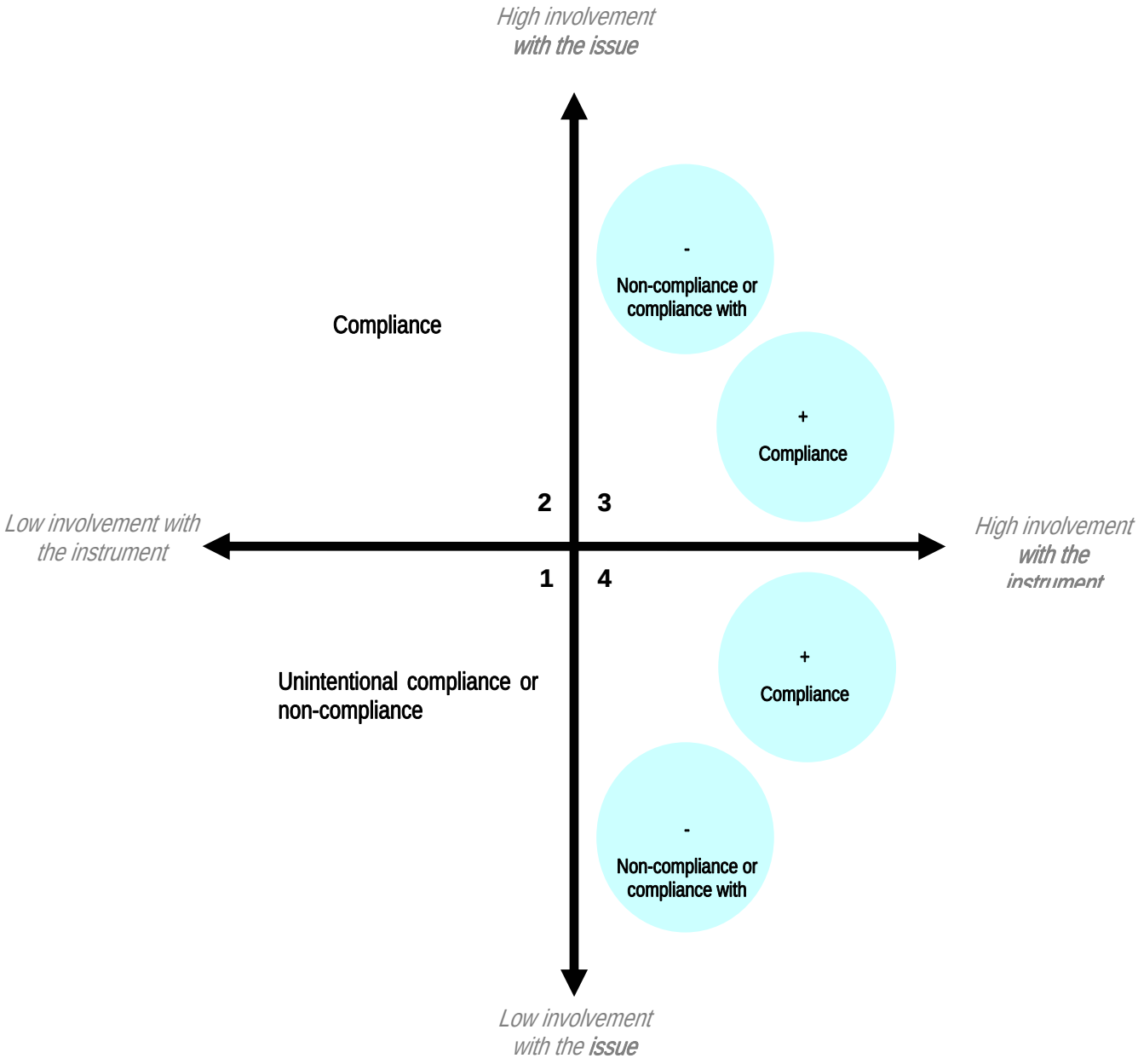

Figure A.3 I_3 Response Framework

Source: Adapted from Murdoch, Bewsell, Lourey and Kaine (2006)

The I_3 response framework is followed by the use variety framework (Kaine and Higson 2006a). In this framework the potential for landholders to comply with the policy instrument in ways that are counter-productive to the achievement of the policy objective is considered (Kaine and Higson 2006a). Where the potential for use variety is unacceptably high this potential may be reduced by introducing modifications to the instrument or employing supplementary instruments. Policy instruments are eliminated from consideration where landholders are most likely to use them in counter-productive ways and this cannot be managed.

So far, we have evaluated the response of landholders to proposed policy instruments and modified or eliminated those instruments that could fail as a result of landholder responses. We have also eliminated those instruments that could be implemented but are counter-productive to the policy objective. We have yet to evaluate the remaining options in terms of whether or not they elicit a behavioural response that will result in the achievement of the policy objective. There are two aspects to this – whether the responses of landholders would be of a scale sufficient to achieve the policy objective and whether the landholders will respond at a sufficient rate to achieve the policy objective (Kaine and Johnson 2004a). Again we use the concept of involvement to assess landholders' responses in regard to these criteria.

In this framing, policy instruments that affect the scale of the responses of landholders are those that change the decision making criteria used by landholders to evaluate the benefits of changes to agricultural enterprises, practices and technologies. Policy instruments that affect the rate of the responses of landholders do not change the decision making criteria used by landholders to evaluate the benefits of changes to agricultural enterprises, practices and technologies but reduce the costs of introducing those changes (Kaine and Johnson 2004a).

For example, extension reduces the effort the landholder must invest in obtaining the information needed to evaluate a land management change or the effort the landholder must invest in acquiring the skills needed to implement a change to agricultural enterprises, practices or technologies. Evaluating policy instruments on this basis leads to selecting the policy instrument that is most likely to have the affect on both the scope and rate of landholder responses that is needed to achieve the policy objective.

References

Dholakia U (2001). A motivational process model of product involvement and consumer risk perception. European Journal of Marketing, Vol. 35 No.11/12, pp.1340-62.

Johnson F, Kaine G, Ford J and Leth M (2006). A framework for selecting policy instruments in natural resource management. Practice Change Research Working Paper 07/06, Department of Primary Industries, Tatura.

Kaine G and Higson M (2006a). Understanding variety in landholders' responses to resource policy. Australian Agribusiness Review, 14, Paper 6.

Kaine G and Higson M (2006b). Policy as an Innovation. Practice Change Research Working Paper 02/06, Department of Primary Industries, Tatura.

Kaine G and Johnson F (2004a). Applying Marketing Principles to Policy Design and Implementation. Social Research Working Paper 02/04, AgResearch, Hamilton, New Zealand.

Kaine G and Johnson F (2004b). Water Policy in New Zealand and Australia: We're not playing for tiddlywinks. Proceedings of the New Zealand Grasslands Association (66), Ashburton, October.

Kapferer J and Laurent G (1986). Consumer involvement profiles: a new practical approach to consumer involvement. Journal of Advertising Research, Volume 25, Number 6, pp.48-56

Mittel B, Lee MA (1987) A causal model of consumer involvement. Journal of Economic Psychology 10, 363-389

Murdoch H, Bewsell D, Lourey R and Kaine G (2006). Understanding people's response to biosecurity regulation. Paper presented to 3rd National Conference of the New Zealand Society for Risk Management Inc, Decision making in uncertain times, Auckland New Zealand, October 17.

Poisesz T and deBont C (1995). Do we need involvement to understand consumer behaviour? Advances in consumer research, Volume 22, pp.448-452.

Verbeke W, Vackier I (2004) Profile and effects of consumer involvement in fresh meat. Meat Science 67, 159-168.

Zaichkowsky J (1986). Conceptualizing involvement. Journal of Advertising 15, 4-14

Appendix 4: Organisational responses

Adapted from: Kaine, G, Higson M, 2006. Policy Change as Innovation. Practice Change Research Working Paper 02/06, Department of Primary Industries, Tatura, Victoria.

and

Kaine G, Higson M, Sandall J, Lourey M, 2006. Policy as an Innovation – Case Studies in Australia and New Zealand. Practice Change Research Working Paper 07/06, Department of Primary Industries, Tatura, Victoria.

Organisational Responses

The third stage of the PCF uses the Policy Innovations Framework (Kaine and Higson 2006a; Kaine et al 2006) to reveal the impacts of the proposed package of policy instruments for the organisations implementing them and what this means for achieving the policy objective.

Policy innovation

The Policy Innovations Framework (Kaine and Higson 2006a; Kaine et al 2006) is used to reveal the potential scale of changes in organisational skills, competencies, procedures, policies, structure and culture that the implementation of policy instruments may require (Abernathy and Clark 1985). The proposed policy instruments are initially characterised according to their fundamental elements. This includes their components and fundamental principles. Any policy instruments that the organisations are currently implementing are also characterised according to these fundamental elements. The existing policy instruments and proposed policy instruments are then compared and any changes in the fundamental elements are identified. The nature and degree of these changes are used to determine the type of innovation that the proposed package of instruments will represent for the implementing organisations.

The different types of innovations signal different implications for the organisations in terms of changes in capabilities, processes, structure and culture that may be required to successfully implement the proposed policy instruments. This in turn provides insights into the potential impacts such instruments may have on the successful achievement of the policy objectives.

The following section describes the fundamental elements underpinning the classification of the policy instruments, the four types of innovation that changes in the instruments represents and finally the implications for the organisations implementing the proposed package of instruments.

The fundamental elements of the Policy Innovation Framework that are used to classify a policy instrument are the instrument concept, components, component principles, architecture and architectural principles (see Table A.2). The instrument concept is a generic description of the way that the policy instrument achieves the policy objective. Different policy instruments achieve policy objectives in fundamentally different ways. For example, an incentive program is a generic description of a policy instrument that achieves the policy objective through providing financial assistance for the adoption of prescribed activities.

The individual rules, processes and procedures that form the policy instrument are its components. Each component performs a particular function. For example, the list of prescribed activities is a key component of an incentive program. This list provides a link between prescribed landholder behaviours and an environmental outcome. Other components of an incentive program might include funds to allocate to landholders and eligibility rules.

Component principles are the fundamental principles that guide the design and functioning of a component. For example, the principle that prescribed landholder behaviours will contribute to an environmental outcome guides the design and functioning of the list of prescribed activities component of an incentive program. Another component principle of an incentive program might include that a financial reward will promote behaviour that contributes to an environmental outcome. This component principle relates to the funds to allocate component of the incentive program.

The way that the components are arranged or integrated to form the policy instrument is the architecture. As outlined above, the list of prescribed activities, funds to allocate and eligibility rules are components of an incentive program. They are arranged such that funds are awarded based on eligibility rules that are tied to the list of prescribed activities. This arrangement forms the basis of an incentive program and we have termed this architecture reward management.

The architecture is founded on a set of architectural principles. Architectural principles are the fundamental principles that underpin the arrangement and combined functioning of the components that form the policy instrument, i.e. the architecture. Different instrument concepts have different architectures and so are underpinned by different architectural principles.

For example, rewarding landholder contribution to an environmental outcome is a principle that underpins the arrangement and combined functioning of the components (list of prescribed activities, funds to allocate and eligibility rules) that form an incentive program.

Types of policy innovation

The fundamental elements described above provide a basis for classifying changes in policy instruments into four types of policy innovation: incremental, modular, architectural and radical. These four types of policy innovation are distinguished by the dimensions of change the policy innovation introduces to the component principles and architectural principles of the original policy instrument. The dimensions of change represent a continuum with no change at the minimum and major change at the maximum (see Figure A.4).

An incremental policy innovation is a change to a policy instrument that involves only minor change to the component principles and little, if any, change in architectural principles compared to existing instruments. A modular policy innovation is a change to a policy instrument that involves a major change to its component principles with little, if any, change to its architectural principles. This type of policy innovation essentially involves major changes to the components of an existing policy instrument. The implementation of this type of innovation often requires the acquisition of new organisational skills and competencies and the changing of some organisational procedures and processes (Abernathy and Clark 1985).

An architectural policy innovation is a change to a policy instrument that involves major change to its architectural principles but little, if any, change to its component principles. This type of policy innovation essentially involves rearranging the components of an existing instrument. The implementation of this type of innovation often requires changing key organisational procedures and processes and even altering organisational structures (Abernathy and Clark 1985).

A radical policy innovation is a change to a policy instrument that involves major changes to both component principles and architectural principles. As such, it also involves changes to the components and architecture of the existing policy instrument. The implementation of this type of innovation often requires the acquisition of a range of new organisational skills and competencies, major changes to organisational procedures and processes, organisational restructuring and even the modification of organisational cultures (Abernathy and Clark 1985).

In this section we have outlined the Policy Innovation Framework which is used to classify changes in policy instruments into four types of policy innovations: incremental, modular, architectural and radical. These types of policy innovation provide a basis for predicting the intra-organisational implications associated with implementing new policy instruments.

Table A.2: Fundamental elements of the policy innovation framework

Instrument Concept	A generic description of the way that the policy instrument achieves the policy objective.
Components	The individual rules, processes and procedures that form the policy instrument.
Component Principles	The fundamental principles that guide the design and functioning of a component.
Architecture	The way that the components are arranged or integrated to form the policy instrument.
Architectural Principles	The fundamental principles that underpin the arrangement and combined functioning of the components that form the policy instrument.

Source: Kaine Higson, Sandall and Lourey (2006)

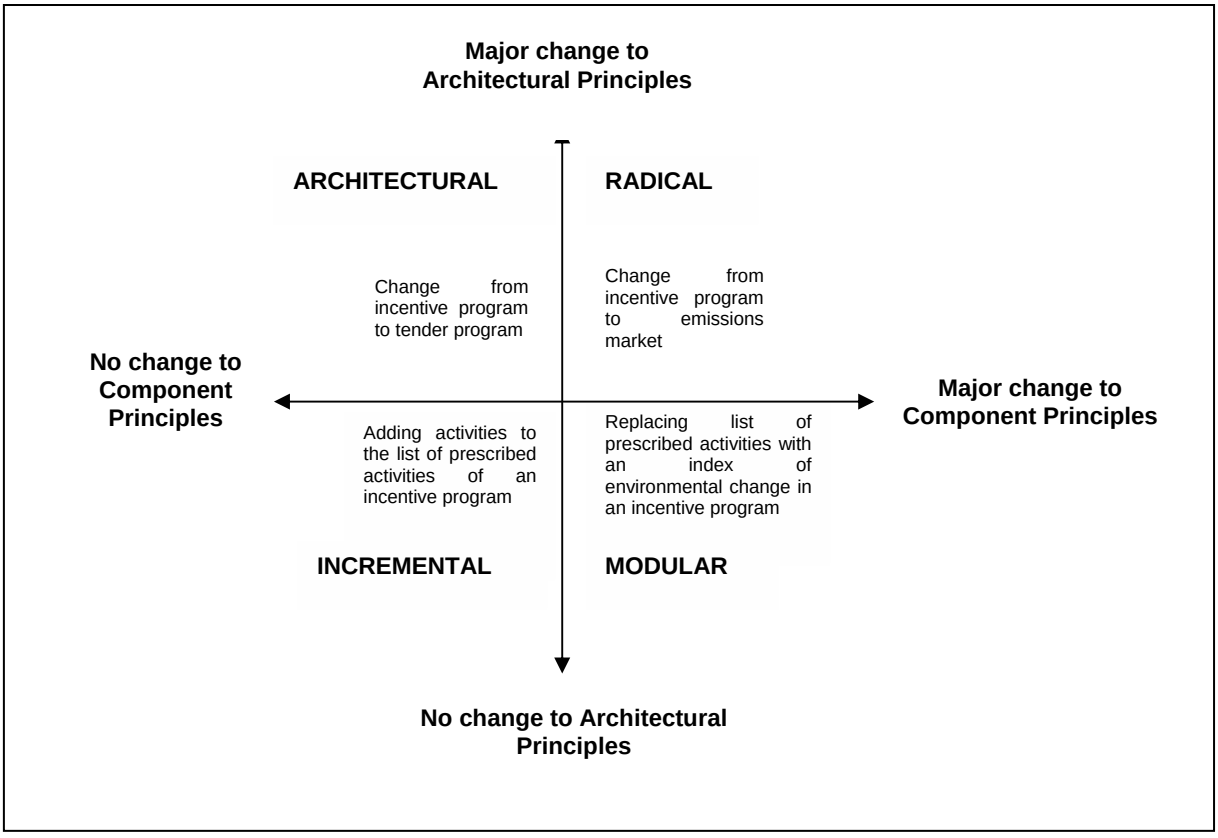

Figure A.4: Examples **of policy instruments as types of innovations**

Source: Adapted from Kaine and Higson (2006) and Kaine et al (2006)

References

Dholakia U (2001). A motivational process model of product involvement and consumer risk perception. European Journal of Marketing, Vol. 35 No.11/12, pp.1340-62.

Johnson F, Kaine G, Ford J and Leth M (2006). A framework for selecting policy instruments in natural resource management. Practice Change Research Working Paper 07/06, Department of Primary Industries, Tatura.

Kaine G and Higson M (2006a). Understanding variety in landholders' responses to resource policy. Australian Agribusiness Review, 14, Paper 6.

Kaine G and Higson M (2006b). Policy as an Innovation. Practice Change Research Working Paper 02/06, Department of Primary Industries, Tatura.

Kaine G and Johnson F (2004a). Applying Marketing Principles to Policy Design and Implementation. Social Research Working Paper 02/04, AgResearch, Hamilton, New Zealand.

Kaine G and Johnson F (2004b). Water Policy in New Zealand and Australia: We're not playing for tiddlywinks. Proceedings of the New Zealand Grasslands Association (66), Ashburton, October.

Kapferer J and Laurent G (1986). Consumer involvement profiles: a new practical approach to consumer involvement. Journal of Advertising Research, Volume 25, Number 6, pp.48-56

Mittel B, Lee MA (1987) A causal model of consumer involvement. Journal of Economic Psychology 10, 363-389

Murdoch H, Bewsell D, Lourey R and Kaine G (2006). Understanding people's response to biosecurity regulation. Paper presented to 3rd National Conference of the New Zealand Society for Risk Management Inc, Decision making in uncertain times, Auckland New Zealand, October 17.

Poisesz T and deBont C (1995). Do we need involvement to understand consumer behaviour? Advances in consumer research, Volume 22, pp.448-452.

Verbeke W, Vackier I (2004) Profile and effects of consumer involvement in fresh meat. Meat Science 67, 159-168.

Zaichkowsky J (1986). Conceptualizing involvement. Journal of Advertising 15, 4-14