Practice Change Research

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Policy as an Innovation:

Case Studies in Australia and New Zealand

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1. Introduction

Natural resource policy is in a process of constant change as policy makers continue to seek ever better ways of achieving environmental objectives in regard to water quality, salinity, nutrient run-off and biodiversity. While some changes in policy involve only incremental refinements to existing policy instruments others involve major investments in the development of radically new policy instruments (such as markets in nutrient emission permits).

Often in natural resource management formulating and implementing changes to policy instruments is especially challenging because responsibility for achieving environmental objectives is shared among a range of government and non-government organisations. Each organisation will have its own unique skills and knowledge which will depend on the organisation's history, culture, resources and responsibilities. This means that changing policy instruments can have completely different consequences for the different organisations involved. These consequences are often difficult to anticipate in advance. Hence, we suggest that the process of formulating and implementing changes to policy instruments would be more effective if the various organisations involved had better insights into the different consequences that such changes might pose for them. Kaine and Higson (2006) have shown that the organisational management literature on product innovation may provide such insights.

Kaine and Higson (2006) drew on the organisational management literature to propose that changes in policy instruments could be viewed as policy innovations.[1] Given this proposition, they developed a policy innovation framework to classify policy innovations into four types, namely incremental, modular, architectural and radical. Each type has different implications for the organisational knowledge and skills required to implement the policy innovation. Thus, this framework provides a systematic way to anticipate and manage the likely consequences of policy changes for organisations charged with formulating and implementing policy innovations. As such, this framework provides new insights into the issues organisations face in implementing changes in policy instruments.

[1] In the context of this work, when we refer to an innovation we are referring to a change that introduces something new or novel to an organisation.

In this paper we apply the policy innovation framework developed in Kaine and Higson (2006) to four case studies of policy change in Australia and New Zealand. The case studies allow us to illustrate the application of the framework and to gain an insight into the different implementation issues surrounding each type of change. Our aim is to provide real world examples of each type of policy innovation and the organisational consequences associated with them.

In the next section we outline the policy innovation framework used to classify changes in policy instruments into different types of policy innovation. We then apply this framework to four case studies in Section 3 and explore the organisational consequences of each type of innovation. We then summarise the findings of this research and present our conclusions in Section 4.

2. Policy Innovation

2.1 Introduction

Kaine and Higson (2006) suggested that policy instruments could be viewed as a kind of 'product' that is adopted by organisations. By adapting Henderson and Clark's (1990) framework for classifying product changes into types of innovation to the natural resource policy context, Kaine and Higson (2006) developed guidelines for classifying changes in policy instruments into types of policy innovation. Kaine and Higson (2006) believed that the classification of policy instruments into types of policy innovation might allow organisations to better anticipate the implications of changes in policy instruments. In this section we define the fundamental elements of the policy innovation framework, the four types of policy innovation and the organisational consequences associated with each type of innovation.

2.2 Fundamental elements

The fundamental elements of the policy innovation framework are the instrument concept, components and component principles, and architecture and architectural principles (see Table 1).

Table 1: 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.

These elements are illustrated below with reference to an incentive program and an emissions market (see Table 2).

The instrument concept is the policy instrument equivalent to the notion of a product concept. The instrument concept is a generic description of the way that the policy instrument achieves a policy objective. Different policy instruments achieve policy objectives in fundamentally different ways. For example, an emissions market is a generic description of a policy instrument that achieves a policy objective through establishing a system of transferable property rights. In contrast, an incentive program is a generic description of a policy instrument that achieves a policy objective through providing financial assistance for the adoption of prescribed activities. Therefore emission markets and incentive programs are examples of two instrument concepts; other instrument concepts include environmental taxes, regulation or education.

The individual rules, processes and procedures that form the policy instrument are its components. Each component performs a particular function. For example, the overall limit on emissions is a key component of an emissions market. This limit sets a ceiling on collective emissions to ensure that an environmental target is achieved. Other components of an emissions market might include emission permits and rules for trading emission permits. Similarly, the list of prescribed activities is a key component of an incentive program. This list provides a link between specific behaviours and an environmental outcome. Other components of an incentive program might include funds to allocate and eligibility rules.

The design of components is influenced by a set of component principles that are equivalent to Henderson and Clark's (1990) core design concepts. Component principles are the fundamental principles that guide the design and functioning of a component. For example, the principle of controlling the quantity of resource use guides the design and functioning of the overall limit on emissions component of an emissions market. Similarly, the principle that specific behaviours will contribute to an environmental outcome guides the design and functioning of the list of prescribed activities component of an incentive program.

Table 2: Comparison of an incentive program with an emissions market

Instrument Concept	**Incentive Program**	**Emissions Market**
Components	- list of prescribed activities - funds to allocate - eligibility rules	- limit on emissions - emission permits - permit trading rules
Component Principles	- specific behaviours will contribute to an environmental outcome - a financial reward will promote behaviour that contributes to an environmental outcome	- controlling the quantity of resource use - trading will promote minimum mix of abatement costs - trading will promote efficient resource use - trading will promote highest economic value use of resources
Architecture	- reward management	- market management
Architectural Principles	- rewarding landholder contribution to an environmental outcome - voluntary participation - cost sharing - similar reward for similar contribution	- minimisation of abatement costs - compulsory participation - efficient resource use - trading will encourage maximum wealth generated for community from limited resource

The way that the components are arranged or integrated to form the policy instrument is the architecture. As outlined above, the overall limit on emissions, emission permits and the rules for trading emission permits are components of an emissions market. They are arranged so that emission permits are allocated based on the overall limit on emissions; these emission permits are then traded subject to rules for trading emission permits. This arrangement forms the basis of an emissions market. Likewise, 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.

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. Different instrument concepts have different architectures and so are underpinned by different architectural principles. For example, the minimisation of abatement costs is a principle that underpins the arrangement and combined functioning of the components (overall limit on emissions, emission permits and rules for the trading of emission permits) that form an emissions market. Other architectural principles of an emissions market might include compulsory participation and efficient resource use. In contrast, 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. Other architectural principles of an incentive program might include voluntary participation and cost sharing (see Table 2).

2.3 Types of policy innovation

The fundamental elements described in the previous section provide a basis for classifying changes in policy instruments into four types of innovation: incremental, modular, architectural and radical. These four types of innovation are distinguished by the dimensions of change the innovation introduces to the component principles and architectural principles of the original policy instrument. Below we define and provide examples of each type of innovation with reference to changes in policy instruments. The relationship among these types of policy innovation is illustrated in Figure 1.

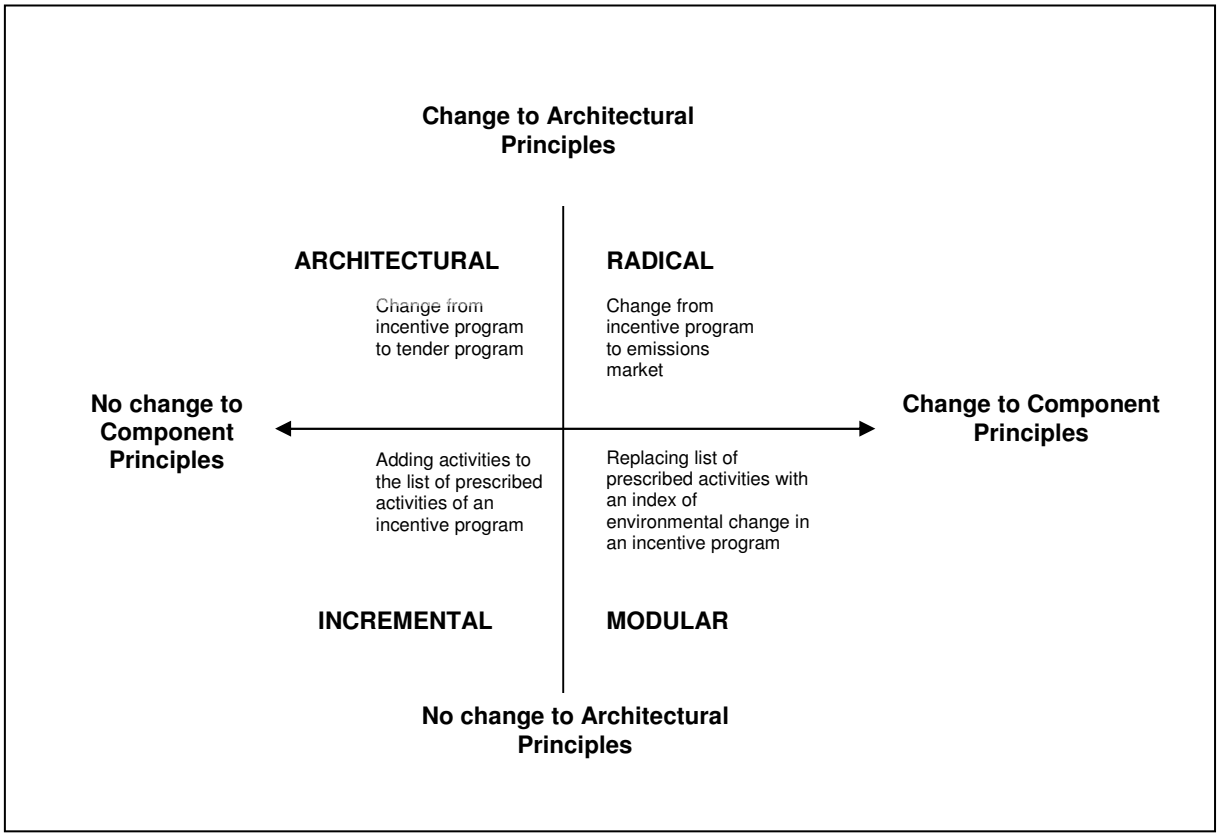

Figure 1: Examples of policy instruments as types of innovations
(Adapted from Kaine & Higson 2006)

An incremental innovation is a change to a policy instrument that does not substantially change its component principles or architectural principles. This can be illustrated with reference to adding a new activity to the list of prescribed activities of an incentive program. This is a change to a component of an incentive program that is unlikely to change either the component principles or architectural principles of the incentive program; therefore it is an incremental innovation.

A modular innovation is a change to a policy instrument that changes its component principles without changing its architectural principles. This can be illustrated with reference to changing the components of an incentive program by replacing the list of prescribed activities with an index of environmental change. As noted earlier, a component principle underlying the list of prescribed activities is that specific behaviours will contribute to an environmental outcome. In contrast, a component principle underlying the index of environmental change is that such indexes directly measure progress towards an environmental outcome. This new component principle does not change the existing architectural principles of the incentive program such as rewarding landholder contribution to an environmental outcome, voluntary participation or cost sharing. Therefore replacing the list of prescribed activities with an index of environmental change represents a change in component principles that does not change architectural principles; therefore it is a modular innovation.

An architectural innovation is a change to a policy instrument that changes its architectural principles without changing its component principles. This type of innovation changes the architecture of the existing policy instrument so that the existing components are arranged in a new way. This can be illustrated with reference to replacing an incentive program with a tender program. As noted earlier, an architectural principle of the incentive program is cost sharing. This recognises the private costs that farmers accrue in contributing to an environmental outcome that creates public benefits. In contrast an architectural principle of a tender program is differential sharing of net benefit. This recognises the differences in the private benefits and costs that landholders accrue in contributing to an environmental outcome. This new architectural principle need not change the existing component principles of an incentive program such as the principle that specific behaviours will contribute to an environmental outcome and the principle that a financial reward will promote behaviour that contributes to an environmental outcome. Under these conditions, replacing an incentive program with a tender program represents a change in

architectural principles that does not change component principles; therefore it is an architectural innovation.

A radical innovation is a change to a policy instrument that changes both its component principles and its architectural principles. This type of innovation creates a completely different instrument concept that fundamentally departs from the design of the existing policy instrument. This can be illustrated with reference to Figure 2 which illustrates replacing an incentive program with an emissions market. As shown in Figure 2, changing from an incentive program to an emissions market changes all of the component principles and architectural principles of the incentive program; therefore it is a radical innovation.

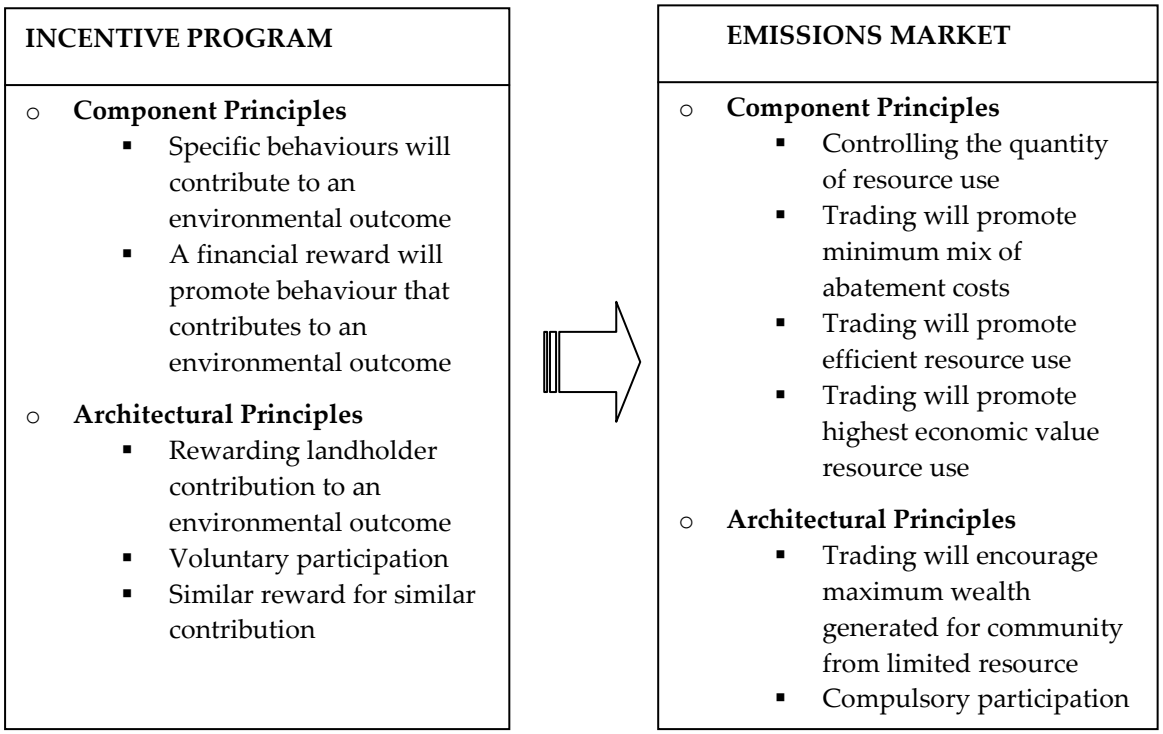

Figure 2: Illustration of a radical innovation

2.4 Organisational implications of innovations

The four types of policy innovation we have described above represent a continuum of change for organisations. Each type of innovation requires different competencies of an organisation; this in turn has consequences for the values, roles, responsibilities and structures of the organisation (Abernathy & Clark 1985). Hence, being able to classify innovations into different types enables an organisation to better anticipate the competencies they are likely to require to successfully implement the innovation.

Competencies are the skills, abilities and knowledge of the organisation (Gatignon et al. 2002; Smith 2000; Tushman & Anderson 1986). These competencies are rooted in an organisation's experiences and are unique to the organisation (Gatignon et al. 2002). The uniqueness of organisational competencies means that a particular innovation may represent different degrees of change for different organisations. This means an innovation that is compatible with the existing competencies of one organisation may be incompatible with the existing competencies of another organisation. Hence, an innovation may be classified as incremental for one organisation but architectural or radical for another (Afuah & Bahram 1995).

To the degree that an innovation is incompatible with the existing competencies of an organisation, new competencies may be acquired through internal or external sources to address the competency gap. Gatignon et al. (2002) argue that, depending on the type of innovation, the acquisition of new competencies from an external source may be less organisationally disruptive or challenging than adapting the existing competencies of the organisation. Below we briefly explore the organisational implications of each type of innovation.

An incremental innovation is a change to a policy instrument that does not substantially change its component principles or architectural principles. As such this type of innovation is likely to be compatible with the existing competencies of the organisation. This suggests that any new organisational competencies required to implement the innovation are likely to be sourced from within the organisation. Consequently, this type of innovation is unlikely to be organisationally disruptive.

A modular innovation is a change to a policy instrument that changes its component principles without changing its architectural principles. As such this type of innovation is likely to be more

compatible with some competencies than others. Thus it may provide an opportunity to build on some areas of knowledge or skills while also requiring the development of new competencies to implement the new components; such new competencies may have to be sourced externally. In addition, this type of innovation may lead to changes in the roles of groups within the organisation that are involved in the implementation of the new components. Consequently, this type of innovation is likely to be organisationally disruptive along component-related lines.

An architectural innovation is a change to a policy instrument that changes its architectural principles without changing its component principles. As such this type of innovation is likely to be compatible with competencies related to individual components of the existing policy instrument yet incompatible with competencies related to the architecture of the existing policy instrument. This incompatibility is likely to be organisationally disruptive as architectural competencies are embedded in the existing processes, procedures and structure of the organisation. This may make it difficult for those within the organisation who are accustomed to the existing processes, procedures and structure to appreciate that change is necessary and should be supported (Henderson & Clark 1990). As such, new architectural competencies may need to be acquired from an external source. Successful implementation may also require establishing new relationships and communication channels between functional groups within the organisation to reflect the new architecture of the policy instrument (Henderson & Clark 1990).

A radical innovation is a change to a policy instrument that changes both its component principles and its architectural principles. As such this type of innovation is likely to be incompatible with competencies related to both the individual components and the architecture of the existing instrument. This suggests that successful implementation of the innovation requires the organisation to develop new competencies that are compatible with the innovation. This is likely to have a range of implications for the organisation. First, the organisation is most likely to use external sources with specialist knowledge, skills or experience (competencies) related to aspects of the innovation to develop the required competencies internally. Second, the organisation may need to develop new processes, procedures and structures to be compatible with the innovation. Third, the organisation may also need to change some of the roles, responsibilities and relationships between functional groups within the organisation to be compatible with the innovation. Consequently, this type of innovation is likely to be extremely organisationally disruptive requiring considerable time and resources to successfully implement.

2.5 Summary

In this section we have outlined the policy innovation framework that Kaine and Higson (2006) have developed from Henderson and Clark's (1990) product innovation framework to classify changes in policy instruments into four types of innovations: incremental, modular, architectural and radical. We have defined and provided examples of the fundamental elements of the framework and the four types of innovation. We have also drawn from the innovation literature to describe the potential consequences that these different types of innovations may have on an organisation. In the next section we apply this framework to four case studies in Australia and New Zealand and consider the systematic differences in the organisational consequences associated with implementing each type of policy innovation.

3. Policy innovation case studies

3.1 Introduction

In this section we apply the policy innovation framework to four case studies in Australia and New Zealand. Our aim is to provide real world examples of each type of policy innovation and to explore the organisational consequences associated with each type. We start by presenting the methods we have used to conduct this research before providing a brief description of the Australian and New Zealand institutional environments. We then present each of the four case studies. For each case study we outline the context of the natural resource management issue before describing the fundamental elements of both the existing and proposed policy instrument. Note that the components, component principles and architectural principles we report are not intended to be comprehensive and are our interpretations of the data. We then present the type of innovation the change represents and explore the organisational implications associated with such an innovation before concluding with a summary of the case study.

3.2 Methods

The purpose of this research was to understand situations of policy change in order to help government and non-government agencies to better manage changes in policy instruments. Further, we wanted to explore whether the policy innovation framework could be a useful tool to

help agencies manage such changes. To do this we needed an in-depth understanding of policy change in practice. A case study approach was selected for this purpose.

Four case studies across Australia and New Zealand were selected to cover the different types of policy change posited in the framework. The first case study examined changes to an incentive program to address salinity in the Goulburn Broken region of Victoria, Australia. The second case study examined changes to a regulation to allocate water in the Waikato region of New Zealand. The third case study examined the trial of a tender mechanism to achieve biodiversity conservation in the Goulburn Broken and North Central regions of Victoria, Australia. Finally, the fourth case study examined the introduction of a cap and trade instrument to achieve water quality improvements in the Waikato region of New Zealand.

Within each case study, two semi-structured interviews were undertaken with policy staff from Environment Waikato in New Zealand or Catchment Management Authorities and the Department of Primary Industries in Victoria. Policy staff were selected based on their experiences in developing or implementing changes in policy instruments. Laddering techniques were used in these interviews to enable interviewees to explore and articulate their experiences in a way that was meaningful to them (Grunert & Grunert 1995). Follow-up interviews were conducted as necessary to clarify the information obtained in the initial interview. Interview responses were recorded through note taking by the two interviewers present at each interview. The resulting notes were later transcribed and analysed using case and cross case analysis (Patton 1990).

The information collected through interviews was supplemented with information collected from relevant policy documents. The information collected represents a perspective on policy change at a particular point in time. In some instances the policy changes that were proposed have evolved further since the time of writing.

3.3 Institutional environments

3.3.1 *Australia*

In Australia there are three tiers of government: national, state and local. The national government has four main functions: legislation, representation, scrutiny and the formation of government. The powers of the national government include defence, foreign affairs, trade and immigration. The

powers of the state government include such things as health, education, transport, agriculture and forestry (Parliamentary Education Office 2006). Local governments' powers are defined by Acts of Parliament in each state, and include building regulations, waste management and recreation spaces (Parliamentary Education Office 2006). Naturally there is a level of overlap in the responsibilities and powers of each tier of government. In practice national, state and local governments work collaboratively on a range of issues. Constitutionally, natural resource management is predominantly a state responsibility; however, the national government can become involved in specific natural resource issues through its external and residual powers.

In Victoria, natural resource management occurs within a complex institutional environment where many organisations, often with overlapping roles and responsibilities, develop and implement a range of policies. Broadly these organisations can be grouped into four categories: government departments, statutory authorities, non-government organisations and stakeholders or interest groups. The Victorian case studies in this paper occur within the second category of organisation, statutory authorities. Statutory authorities are created and defined by Acts of Parliament. In particular, our case studies occur within the jurisdiction of Catchment Management Authorities (CMAs).

CMAs were established in ten separate regions across Victoria in 1997 under the *Catchment and Land Protection Act (1994)* and the *Water Act (1989)*. CMAs provide the strategic direction for managing the natural resources within Victoria's regions based on national and state policy frameworks. As such, CMAs are responsible for the policy oversight and strategic management of the land, water and biodiversity resources of a catchment in coordination with community and local stakeholders (Goulburn Broken Catchment Management Authority 2006).

Each CMA consists of a Board, Implementation Committees and supporting staff. The Board is ministerially appointed and directly responsible for the strategic direction of land and water management in the catchment. Implementation Committees are established geographically or by policy areas to oversee the development of detailed work programs and the implementation of on-ground programs for specific issues or sub-catchments (Ewing 2003).

Under the Catchment and Land Protection Act each CMA must develop and implement five-yearly Regional Catchment Strategies. The Regional Catchment Strategy is a key strategic document that sets the direction "for achieving integration and delivery of all land and water

management programs in the catchment" (Department of Natural Resources and Environment 2003, 5). It identifies the high level natural resource management priorities and outcomes to be achieved in a catchment while applying a number of federal and state strategies at a regional level. Regional Catchment Strategies are developed and implemented in cooperation with a range of local stakeholders including water authorities and community groups as well as federal and state government representatives.

3.3.2 *New Zealand*

In New Zealand there are two tiers of government: national and local. The national government is responsible for setting national policy statements and standards while local government is responsible for managing local issues; this includes the provision of an infrastructural and planning framework (Department of Internal Affairs 2006). Local government is separated into District or City Councils and Regional Councils. The District or City Councils are responsible for the provision of municipal services. They also influence land use through planning consents for subdivision and buildings. Regional councils have responsibility for managing the natural and environmental resources of a region such as water, soil, air quality, flood protection and pest control (Environment Waikato 2006). The regional councils are responsible for developing and implementing natural resource and environmental policy instruments while also carrying out the necessary monitoring and compliance activities. The New Zealand case studies in this paper occur within regional councils.

Regional councils were established in 1989. Each Regional Council makes its own decisions about how it will structure or organise itself to work for and on behalf of its community (Department of Internal Affairs 2006). The two key pieces of legislation that regional councils operate within are the *Resource Management Act (1991)* and the *Local Government Act (2002)*. The Resource Management Act provides a framework to ensure the sustainable management of natural and physical resources. The Local Government Act provides a framework for seeking community guidance, to achieve community well-being and to account for local government expenditure (Environment Waikato 2005a). It is the Resource Management Act that gives regional councils responsibility for the sustainable management of the natural resources within a region and sets out a number of legislative requirements that bound the way in which councils may meet these responsibilities.

Under the Resource Management Act regional councils are responsible for developing a regional policy statement and a regional plan. The regional policy statement provides an overview of resource management policies in a region. The statement describes the policies and methods that the regional council may use to achieve integrated management of natural and physical resources across the region, across jurisdictional boundaries and across agency functions (Environment Waikato 2006). The regional policy statement guides the development of a regional plan. The regional plan is also used as a means to implement the regional policy statement. The policies contained in the statement are translated through the plan into rules governing access to the natural and physical resources of the region. Rules are used to control and monitor activities that use resources. The rules in the regional plan state which activities are or are not allowed and the conditions under which resource consents are required.

Resource consents are permits that allow the use or take of water, land or coastal resources, subject to conditions. They also allow the emission of water or wastes onto land or into the air or water. Once resource consents are issued, the regional council monitors activities to ensure that consent conditions are being complied with (Environment Waikato 2006).

3.3.3 *Summary*

In this section we have provided a brief overview of the institutional arrangements for natural resource management in Australia and New Zealand in order to provide a degree of context for the case studies.

3.4 Salinity policy: a case of incremental innovation

In this case study we use changes to the incentive program used to manage salinity in the Shepparton Irrigation Region, Victoria to illustrate the introduction of an incremental policy innovation and to explore the implications of this type of innovation for the Goulburn Broken Catchment Management Authority which is responsible for the incentive program. Refer to Section 3.3.1 for further information on the Australian institutional environment.

3.4.1 *Context*

The Shepparton Irrigation Region (SIR) is an intensively irrigated area within the Goulburn Broken catchment of Victoria, Australia that supports a number of agricultural industries. The major agricultural industries in the region are dairying and stone and pome fruit production. The area also supports a large food processing industry (Shepparton Irrigation Region Implementation Committee 2003). Salinisation of the region's land and water resources is one of the greatest threats facing the future prosperity of the region (Shepparton Irrigation Region Implementation Committee 2003). While the region has naturally high levels of salt occurring in the landscape, changes to that landscape such as tree clearing have affected the water balance and further increased soil salinity. "Salinity results from a hydrological imbalance where too much water reaches the groundwater systems"; this can lead to an increased concentration of salt in the root-zone of plants which can lead to a loss of production (Shepparton Irrigation Region Implementation Committee 2003, 73).

Salinity management has been a priority issue for the SIR and Goulburn Broken more broadly since the late 1980s when irrigation-induced salinity rendered some areas of productive land unusable. Historically, salinity in the region has been addressed through the SIR Land and Water Salinity Management Plan. The purpose of the plan was to protect and enhance the natural and productive environment of the region while aligning with the state salinity strategies (Shepparton Irrigation Region Implementation Committee 2003).

Since 1997 the Goulburn Broken Catchment Management Authority, specifically the SIR Implementation Committee, has been responsible for the ongoing management and development of the plan. This plan was superseded by SIR Catchment Strategy in 2003. While earlier Plans focussed on salinity, the SIR Catchment Strategy integrates a broader range of natural resource issues. It sets a framework for natural resource management within the SIR and "is aligned with a number of federal, state and regional strategies and plans that protect and enhance natural assets" (Shepparton Irrigation Region Implementation Committee 2003, 19). Further, it provides a "link between the Goulburn Broken Regional Catchment Strategy and the sub-strategies that together make up the SIR Catchment Strategy" (Shepparton Irrigation Region Implementation Committee 2003, 19). The SIR Catchment Strategy contains six integrated programs. Each program has its own goals, policies and principles, targets to achieve, works program and a budget to achieve its targets

(Salinity Pilot Program Advisory Council 1989). The program that we focus on in this case study is the Farm Program.

The Farm Program aims to reduce salinity impacts on an individual property basis to achieve the salinity outcomes set out in the SIR Catchment Strategy. By providing extension advice and a range of financial incentives to landholders the program seeks to encourage voluntary practice change on farm and encourage landholders to adopt a 'whole of farm planning' approach to farm management (Department of Primary Industries 2005).

The SIR Implementation Committee works with a number of stakeholders including other government agencies and the community to deliver the Farm Program. State government departments such as the Department of Sustainability and Environment (DSE) provide funding for the program while the Department of Primary Industries (DPI) provides technical and extension support as well as research and development input in some of the program areas.

3.4.2 *Existing policy instrument*

One of the main tools used by the Farm Program to reduce salinity impacts on a property basis is an incentive instrument. An incentive instrument encourages voluntary practice change by landholders where that change is expected to contribute to catchment targets. It involves financial payments by a CMA to landholders for the adoption of activities prescribed by the CMA. These activities are often known as Best Management Practices, on-grounds works or prescribed activities. Incentive payments are based on set payment rates and cost share ratios for the various prescribed activities. Through the payment the landholder receives a financial benefit for contributing to a public benefit by adopting prescribed activities.

In this instance, payments are made by the Goulburn Broken CMA through the Farm Program to landholders for undertaking private on-ground works that align with the SIR Catchment Strategy and hence the Regional Catchment Strategy. The Farm Program provides incentives for a range of prescribed activities that reduce salinity impacts such as the development of Whole Farm Plans and tree planting. The incentives are overseen by the SIR Implementation Committee which is accountable to the Goulburn Broken CMA Board. Extension staff from DPI are employed to implement the program on-ground through providing advice and assistance to landholders.

Landholders approach either DPI or Goulburn Broken CMA staff to register their interest in accessing a particular incentive (the incentive is a demand driven, voluntary instrument). Once the landholder has registered their interest in an incentive, DPI arranges for one of its extension officers to visit the property, assess the property's eligibility for that incentive and discuss with the landholder the various options for adopting particular prescribed activities. It is then up to the landholder to undertake the required activities and pay for any costs incurred. On completion of the agreed activities an extension officer inspects the property to ensure that the works have met the incentive guidelines before payment is made by the CMA to the landholder. The amount of such payments is based on the pre-agreed cost-share rates.

Fundamental Elements

We now identify the fundamental elements of the incentive program described above, that is, the instrument concept, components and component principles and architectural principles of the incentive program. These elements are summarised in Table 3.

Instrument concept

The instrument concept of the incentive program is that of a financial incentive with prescribed activities and set cost-share rates.

Components and component principles

The components of the incentive instrument include the funds held by the CMA to implement works through the Farm Program, the list of prescribed activities, the site assessment and recommendation of works based on prescribed activities. In addition there are eligibility criteria for each incentive, landholder agreements to perform activities, rules for allocating funds based on the uptake of prescribed activities and value for money of such activities, and payment processes.

These components embody a number of component principles that guide their design and function. For instance, the principle that a financial reward will promote behaviours that contribute to an environmental outcome justifies and defines the function of the funds to implement works.

Table 3: Fundamental elements of existing incentive program

Goulburn Broken salinity policy	
	Existing Instrument
Instrument Concept	• Financial incentive with prescribed activities and set cost-share rates
Components	• Funds • List of prescribed activities • Site assessment and recommendations • Eligibility criteria • Landholder agreements • Rules for allocation of funds • Payment processes • Program evaluation criteria • Monitoring and evaluation processes • Extension
Component Principles	• Financial reward will promote behaviours that contribute to an environmental outcome • Uptake of prescribed activities contributes to environmental outcomes • Sliding scale cost sharing for an activity
Architecture	• Fixed reward management
Architectural Principles	• Reward contribution to salinity outcomes • Similar reward for similar contribution • Voluntary participation

Similarly, the principle that the uptake of prescribed activities contributes to the environmental outcome justifies and defines the function of the list of prescribed activities. This principle is predicated on scientific data linking the activities to salinity outcomes and provides the foundation of the incentive instrument.

Finally, the principle of sliding scale cost sharing guides the design and function of the rules for allocating funds. Given that the prescribed activities provide a public benefit as well as a private benefit to the landholder then the costs incurred by the landholder for undertaking prescribed activities are shared between the public and the landholder.

Architectural principles

We have identified three architectural principles that underpin the arrangement and combined functioning of the components that form the incentive program, that is, the architecture. The first architectural principle is to reward activities that contribute to the salinity outcomes sought in the SIR Catchment Strategy. This principle links the adoption of prescribed activities and the payment of incentives. This provides the CMA with a means of influencing landholders to undertake activities on their property to achieve an environmental benefit and recognises landholders' contribution to public benefit when they adopt prescribed activities.

The second architectural principle is rewarding landholders equally for equal contribution. In this instance contribution is measured in terms of the costs of adopting the prescribed activities as determined by the agency. Hence, all landholders adopting a particular activity receive a similar reward in the form of the same proportional contribution from the CMA to the costs they incurred. Consequently, we describe the architecture of this form of an incentive program as fixed reward architecture.

The third architectural principle is voluntary participation of landholders in the incentive program. This principle limits the CMA to encouraging rather than compelling landholders to undertake activities to reduce salinity impacts. It also recognises the difficulties of enforcing compulsory participation on private land.

In this section we have outlined the fundamental elements of the incentive program used within the Farm Program to manage salinity. We now explore the changes to this instrument made by staff within the Farm Program.

3.4.3 *Proposed policy instrument*

The interviewees related that the incentive program had generally been seen as a successful means of achieving on-farm change to manage salinity and contribute towards catchment targets. However, in early 2001 they related that staff began to question if additional gains could be made. This was influenced by a perceived desire of funders for CMAs to demonstrate 'innovative' approaches to achieving natural resource management outcomes. Subsequently, staff at DPI involved in the Farm Program investigated alternative methods of program delivery. As a result it was decided to implement a cost-share matrix in conjunction with the introduction of two new incentives to encourage water use efficiency. A cost-share matrix is used to calculate the cost-share available for an incentive taking into consideration any catchment works that have occurred on a property over time.

Using a cost-share matrix "the extension officer, together with the landowner, scores the property according to the amount and extent of catchment works that have occurred on the property. Landholders score highly where they have completed more of the catchment works over a large area of their property. This provides a higher cost-share available compared to landowners where less activity has occurred" (Maskey et al. 2004, 16). In this way, the cost-share matrix reflects the variability in landholders' past activities and rewards landowners who have completed other works that contribute to catchment targets. That is, it is a way to encourage landholders to participate in a broader range of incentives and therefore increase the amount of on-ground works completed.

Staff we spoke to from within the Farm Program expressed the view that the matrix provided a means to acknowledge the multiple benefits generated from undertaking new works as well as to enhance the integration of the incentives offered by the CMA. Further, the cost-share matrix was seen by staff as a way to demonstrate the 'innovative' approach to achieving natural resource management outcomes which was encouraged by funders.

Fundamental Elements

Components and component principles

The introduction of the cost-share matrix can be seen as a refinement to a component of the existing incentive program. It is a refinement to a rule for allocating funds whereby the DPI extension officer calculates (based on a pro-forma) the potential cost share offered to the landholder if the landholder adopts various prescribed activities.

The introduction of the cost-share matrix is consistent with the existing component principles of the incentive program such as the principle that financial reward will promote behaviour that contributes to an environmental outcome and the principle that uptake of prescribed activities generates environmental outcomes. However, the introduction of the cost-share matrix does add another principle to the cost-share component, that of cost sharing based on the adoption of multiple practices over time. Previously the cost share for a prescribed activity was calculated independently of the adoption of other prescribed activities.

The introduction of the cost-share matrix is also consistent with the architectural principles of the original incentive program such as the principle of rewarding contribution to salinity outcomes, the principle of rewarding landholders equally for equal contribution and the principle of voluntary adoption. See Table 4 for a comparison of the fundamental elements of the existing and proposed policy instrument.

3.4.4 *Type of policy innovation*

As we have outlined above, the introduction of the cost-share matrix has been a refinement to a component of the existing incentive program used by the Farm Program that does not substantially change the component principles or architectural principles of the existing instrument. Consequently, we classified this change as an incremental policy innovation.

In the next section we explore the organisational implications of this innovation for the Goulburn Broken CMA and DPI extension staff involved in the Farm Program.

Table 4: Comparison of the existing and proposed incentive program

Goulburn Broken salinity policy		
	Existing Instrument	Proposed Changes
Instrument Concept	• Financial incentive with prescribed activities and set cost-share rates	
Components	• Funds • List of prescribed activities • Site assessment and recommendations • Eligibility criteria • Landholder agreements • Rules for allocation of funds • Payment processes • Program evaluation criteria • Monitoring and evaluation processes • Extension	• Rules for allocation of funds – Cost sharing matrix
Component Principles	• Financial reward will promote behaviours that contributes to an environmental outcome • Uptake of prescribed activities contributes to environmental outcomes • Sliding scale cost sharing for an activity	• Variable rate of cost sharing based on adoption of other activities
Architecture	• Fixed reward management	
Architectural Principles	• Reward contribution to salinity outcomes • Similar reward for similar contribution • Voluntary participation	

3.4.5 *Organisational implications*

We have classified the introduction of a cost-share matrix into the existing incentive program of the Farm Program as an incremental policy innovation because the innovation did not substantially change the component principles or architectural principles of the incentive program. This type of innovation is likely to be compatible with the existing competencies of the organisations involved. This means that any new organisational competencies required to implement the innovation are likely to be sourced from within the organisations. Consequently, this type of innovation is unlikely to be organisationally disruptive.

Our discussions with staff involved in the introduction of the cost-share matrix suggest that this innovation has had few organisational implications. In line with the above description of an incremental innovation, the introduction of the innovation has been compatible with the existing competencies of the Goulburn Broken CMA and DPI.

For instance, DPI extension staff from within the Farm Program developed and implemented the cost-share matrix utilising their existing skills and experience. Minor informal training was held once the matrix was finalised to ensure that extension staff were able to use the matrix and understood the full range of incentives offered under the various SIR Implementation Committee programs. Further, DPI extension staff were able to apply the knowledge gained from developing and implementing the cost-share matrix to help staff within the other SIR Implementation Committee programs to develop and implement cost-share matrices. The cost-share matrix was also compatible with the existing processes, procedures and structures of both the Goulburn Broken CMA and DPI.

In combination the above organisational implications suggest that the innovation has not caused significant disruptions to either the Goulburn Broken CMA or DPI.

3.4.6 *Summary*

In this case study we have presented the introduction of a cost-share matrix into the incentive program used by the Goulburn Broken Catchment Management Authority to achieve salinity outcomes in the Shepparton Irrigation Region. We have classified this as an incremental policy innovation based on Kaine and Higson (2006). This innovation has been compatible with the

existing competencies, processes and structures of the organisations and as such has not been organisationally disruptive.

3.5 Water allocation policy: a case of modular innovation

In this case study we use proposed changes to the water allocation policy used to manage water takes from the Waikato River to illustrate the introduction of a modular policy innovation and to explore the implications of this type of innovation for Environment Waikato, the regional council responsible for managing the water resources of the Waikato region in New Zealand. Refer to section 3.3.2 for further information on the New Zealand institutional environment.

3.5.1 *Context*

The Waikato River is a partly-regulated river system in the North Island of New Zealand. The source of the river is a natural lake, Lake Taupo. Water flow in the river is regulated through a series of dams. These dams are used to generate power as well as for flood control. There are no large-scale water storages on the river. To manage water takes from the river there is a cap on the volume of water that may be taken for consumptive use. The remaining flows in the river are reserved for the environment. Under the Resource Management Act (1991) Environment Waikato cannot exact a charge for using water though a charge may be exacted from water users to cover administrative costs.

Until relatively recently the supply of water for consumptive use has exceeded demand. Interviewees related that this has led to a perception that there was sufficient water in the system to more than accommodate existing demand and that the water available for consumptive use would not be fully allocated in the foreseeable future.

3.5.2 *Existing policy instrument*

Water in the Waikato River system is allocated using a regulatory approach that we have termed a 'cap and consent' instrument. The cap limits the total amount of water that can be extracted from the river system and the resource consent is a permit process authorising the taking of water from the river system.

The cap is set at ten per cent of a one in five year low-flow event and applies across the whole river system. The water available under the cap must meet the demands of all water users such as municipalities, industry and agriculture. The remaining flows in the river are judged to be adequate to maintain the river environment and ecosystem. However, staff at Environment Waikato believe many sub-systems or tributaries are able to sustain water takes greater than the ten per cent cap and still maintain their ecological integrity. Over time Environment Waikato has been gradually investigating the river sub-systems in the catchment to determine each sub-systems individual cap.

The water available under the cap is allocated to users on a first-in first-served basis through water take consents, though consents are not required for some purposes (such as stock and domestic use). These consents have a limited life and a number of conditions may be attached to them. Consents may be denied if they can be shown to adversely affect a pre-existing consent-holder's water allocation. The rules governing the issuing of water take consents and consent conditions are outlined in Environment Waikato's Regional Plan.

Fundamental Elements

We now identify the fundamental elements of the cap and consent instrument described above. That is, the instrument concept, components and component principles and architectural principles of the instrument. These elements are summarised in Table 5.

Instrument concept

The instrument concept of the regulation described above is that of a regulated cap and consent instrument.

Components and component principles

The components of the existing water allocation instrument include the cap on water takes from the system, water take consents and the rules set out in the regional plan that govern such things as the method of allocating water consents and eligibility for water take consents. They also include the conditions associated with water take consents including conditions for transferring water consents among landholders.

Table 5: Fundamental elements of the existing water allocation regulation

Waikato water allocation policy	
	Existing Instrument
Instrument Concept	• Regulated cap and consent instrument
Components	• Cap on water takes • Water take consents • Rules related to consents, including: – Method of allocation – Consent eligibility – Conditions of consent – Rules governing consent transfer • Public provision of system capacity investigations • Enforcement processes • Monitoring processes
Component Principles	• Control over the *amount* of water used • Control over *how* water is used • First-in first-served processing consent applications • User discretion in the application of water subject to the conditions of the consent • Public provision
Architecture	• Case management
Architectural Principles	• Priority on ecologically sustainable resource use to conserve resource and the environment, and to prevent harm to others • Compulsory licensing of access to resource • Enabling organisation

These components embody a number of component principles that guide the design and function of the components. For instance, the cap on water takes embodies the principle of limiting resource use and economic activity to ensure an environmental outcome. The resource consents embody the principle of controlling the use of, as well as the quantity of, water in order to control the impacts of resource use on the environment and other users.

Hence, resource consents usually have conditions attached to them dictating what use may be made of the water and the limits of that consent. The principle of first-in first-served processing of consents guides the order, and hence the priorities, with which applications for consents are treated. The application of this principle has the effect of placing applications for renewal of consents at the lowest priority for consideration at the time they are lodged. Renewal of consents is virtually automatic where water resources are not fully allocated.

Another principle is that users have discretion in the application of water subject to the conditions of their consent. This principle means that Environment Waikato does not consider issues such as efficiency of water use when judging the merits of an application for resource consent to take water.

The final principle is that Environment Waikato, on behalf of the public, has a responsibility to provide system capacity investigations. This means Environment Waikato funds investigations into system capacity; we refer to this as the public provision principle.

Architectural principles

We have identified three architectural principles that underpin the arrangement and combined functioning of the components that form the cap and resource consent process, that is, the architecture of the instrument.

The first architectural principle is a priority on ecologically sustainable resource use to conserve the resource and the environment, and to prevent harm to others. This follows from the Resource Management Act which stipulates that natural and environmental resources must be used in an ecologically sustainable manner. The application of this principle entails restricting the use of water, and economic activity, to preserve riverine environments. This principle also means restricting the use of water to prevent other undesirable effects from the use of water on the

environment such as off-site effects, and ensuring existing rights to water are preserved. Through this principle control over access and use of water resources in aggregate is linked with control over access and use of water resources by individuals through conditions on resource consents.

The second architectural principle is the compulsory licensing of access to the resource. This regulatory principle creates the authority for Environment Waikato to control access and use of water through the granting of consents. This principle links access and use of water to the possession of a consent thereby creating a mechanism for Environment Waikato to control individual water takes and to restrict water takes in aggregate to the cap.

Given these two architectural principles, we described the architecture of this form of a cap and consent instrument as case management architecture since each application for a resource consent is judged largely on its own merits with previous applications largely serving to establish precedents.

The third architectural principle is that of being, as far as possible, an enabling organisation. This reflects Environment Waikato's desire to minimise the constraints it imposes on the decision making of landholders. In line with this, the conditions attached to resource consents only prescribe the use to which water may be put. The conditions do not often specify in detail how that use is operationalised. For example, resource consents may be awarded subject to the condition that the water be used for irrigation of agricultural land. The consent does not prescribe the type of irrigation system, management procedures and so on that will be used.

In this section we have outlined the fundamental elements of the water allocation regulation; we now explore the changes to this instrument proposed by Environment Waikato.

3.5.3 *Proposed policy instrument*

Interviewees related that, despite perceptions that there was sufficient water in the system to accommodate existing and future water use, demand for water has increased to the point where parts of the system are now fully allocated. This increase in demand for water has been driven in part by the advent of cost-effective irrigated pasture for an expanding dairying industry. With demand for water continuing to increase, and parts of the Waikato River system becoming fully allocated, Environment Waikato has been forced to review the allocation policy and formulate

changes, in particular in regard to the first-in first-served basis for water allocation when the cap is fully allocated.

When the cap is fully allocated, users seeking new consents must wait for existing consents to expire before their consent is granted. This can mean that renewal of consents is no longer automatic in a fully allocated system. Technically, when water consents expire in a fully allocated system the users must 'go to the back of the line' and wait for all prior consent applications to be processed and expire before their consent may be renewed. This has created uncertainty for those renewing expired consents and created a need to balance the competing domestic, industrial and agricultural demands for water. These considerations have, in turn, prompted increasing concerns by Environment Waikato over the efficient use of water and challenged perceptions around water availability.

In response, Environment Waikato has proposed a number of changes to the policy for water allocation. While the instrument concept of a 'cap and consent' instrument would remain unchanged, a number of changes are envisioned for some of the components of the policy instrument.

Fundamental Elements

Components and component principles

The first set of changes proposed by Environment Waikato relates to the rules surrounding the allocation of water take consents, a component of the water allocation policy. It involves introducing a rule giving certain users or uses priority in the renewal of water take consents. Municipalities would have priority for the renewal of their consents upon expiry ahead of other users. This priority only applies to the volume of water that municipalities are required to provide for the essential health and well being of their residential communities. This priority would apply subject to municipalities meeting a number of conditions including demonstrating the implementation of water saving measures and the development of a water management plan.

Existing consent holders would also have priority for the renewal of their consents upon expiry ahead of those applying for new consents. This priority would apply subject to the consent holder meeting a number of conditions including demonstrating that water has been used efficiently. These changes address Environment Waikato's concerns relating to wasteful water use in the new

context of competing demands for limited water supplies, uncertainty of consent renewal and the provision of adequate incentives for landholders to invest in infrastructure. These component changes introduce two new component principles, that of prioritised uses and users in allocation and that of maximising water use efficiency.

The second set of changes proposed by Environment Waikato relates to the public provision of investigations into system capacity, a component of the water allocation policy. Previously these costs were borne by Environment Waikato. The changes involve making all private consent holders responsible for covering these costs. This is to ensure that private water users bear the increasing costs of investigations into the capacity of individual river sub-systems and the likely impact of new consents on the operation of existing consents. Environment Waikato deemed these investigations to provide a private benefit and as such believed that the costs of these investigations should be borne by users. This change is in line with the Resource Management Act, which allows for regional councils to recover all reasonable and actual costs associated with administering consents. This component change alters the component principle from public provision of investigations to a user pays principle.

A third set of changes proposed by Environment Waikato relates to the expiry date of water take consents, a component of the water allocation policy. It involves introducing a common expiry date for all water take consents. This complements the change to a user pays model to ensure that costs are applied to all existing water users as well as new users. This change effectively eliminates the first-in first-served allocation method on fully allocated systems. It also creates a mechanism for the council to review and evaluate the policy to ensure that it is meeting the environmental target and that the target continues to be appropriate. This component change also gives effect to the new component principle of sharing costs across all system users.

A fourth set of changes proposed by Environment Waikato relates to the rules for transferring water consents, a component of the water allocation policy. The change involves encouraging and facilitating the transfer of water consents among consent holders. The council aims to maximise the use and value of water allocated to consumptive uses by making the transfer of consents easier and more attractive to consent holders. Environment Waikato cannot be a party to financial transactions associated with water trading as the Resource Management Act precludes charging for water. However, the council would be able to recover costs they incur associated with trading

such as monitoring and enforcement costs. Environment Waikato's key role would be facilitating and administering the trading of water consents. This may involve the development of a register to coordinate the buying, selling or leasing of water consents. This change introduces the component principle of maximising the value of water and the earlier introduced principle of maximising water use efficiency.

The four sets of component changes we have presented above remain consistent with the three architectural principles of the original water allocation policy. See Table 6 for a comparison of the fundamental elements of the existing and proposed policy instrument.

3.5.4 *Type of policy innovation*

As we have outlined above, the changes proposed by Environment Waikato represent a change to many of the components of the existing water allocation policy which introduces new component principles but does not change the architectural principles of the existing instrument. As such, we classified this as a modular policy innovation as defined by Kaine and Higson (2006). In the next section we explore the organisational implications of this innovation for Environment Waikato.

3.5.5 *Organisational implications*

We have classified the proposed changes to the water allocation policy of Environment Waikato as a modular policy innovation. A modular policy innovation is a change to a policy instrument that changes its component principles without substantially changing its architectural principles. This type of innovation is likely to be more compatible with some existing organisational competencies than others. Thus the introduction of this type of policy innovation may provide an opportunity to build on some areas of knowledge or skills while also requiring the development of new competencies to implement the new components. Such new competencies are likely to be sourced externally but may be developed through capacity building within the organisation. In addition, this type of innovation may lead to changes in the roles of groups within the organisation that are involved in the implementation of the new components.

Table 6: Comparison of the existing and proposed water allocation regulation

Waikato water allocation policy		
	Existing Instrument	Proposed Changes
Instrument Concept	• Regulated cap and consent instrument	
Components	• Cap on water takes • Water take consents • Rules related to consents, including: – Method of allocation – Consent eligibility – Conditions of consent – Rules governing consent transfer • Public provision of system capacity investigations • Enforcement processes • Monitoring processes	• New rules establishing priority for existing users and municipalities • Common expiration of consents • Water management plans • User contributions to costs of investigations • New consent trading rules • Trading register
Component Principles	• Control over the *amount* of water used • Control over *how* water is used • First-in first-served processing consent applications • User discretion in the application of water subject to the conditions of the consent • Public provision	• Priority to specified uses & users • Maximising water use efficiency • Maximising value of water • User pays • Sharing costs across all system users
Architecture	• Case management	
Architectural Principles	• Priority on ecologically sustainable resource use to conserve resource and the environment, and to prevent harm to others • Compulsory licensing of access to resource • Enabling organisation	

Our discussions with the staff involved in the proposed changes suggest that this innovation has had, or is likely to have, a range of organisational implications in line with the above description of a modular policy innovation. The innovation is likely to be incompatible with some areas of competencies and, as a consequence, will require changes to the roles and responsibilities of some functional groups within Environment Waikato.

For instance, under the proposed changes, demonstrating efficient water use will be a condition for existing consent holders to gain priority in the renewal of consents. However, Environment Waikato staff did not have the relevant competencies to develop guidelines to judge efficient use of water across various land uses and industries. In other words, this aspect of the innovation lay outside their current competencies. Environment Waikato engaged an external consultant to provide these skills.

Similarly, the conditions associated with municipalities gaining priority water take consent renewal required Environment Waikato to engage external experts, as the organisation did not contain the relevant competencies to assess municipal water requirements. Experts from the Ministry of Health were consulted to identify the amount of water required for the essential health and well being of municipality residents. Likewise, consultants were engaged to help develop the guidelines for demand management plans.

The introduction of rules to facilitate the trading of water consents between landholders may challenge the competencies of staff who have not had experience in designing or implementing trading mechanisms. It is likely that these competencies may be sourced internally from other parts of the organisation which have had experience in developing mechanisms for trading consents. However, the council may outsource the monitoring and administering of the trading to a private organisation. If so, this would represent a new mode of operating for Environment Waikato.

The proposed changes also have implications for the roles and responsibility of some groups within Environment Waikato. For instance, new auditing requirements involve skills that differ from those of the existing auditing group. Consequently, responsibility for particular aspects of auditing, such as investigations, is likely to be transferred to another group which is perceived to have a skill set and background that is more appropriate to the new auditing requirements. This

group will still need to build on its existing competencies to perform its new role and an external provider is likely to be engaged to provide the requisite training.

In combination the above organisational implications suggest that the innovation may cause severe disruption for some of the functional areas in Environment Waikato that are involved in implementing the changed policy components. Overall however, the innovation is expected to have little impact on the organisation as a whole.

3.5.6 *Summary*

In this case study we have presented a range of changes to water allocation policy proposed by Environment Waikato. We have classified this as a modular policy innovation based on Kaine and Higson (2006). This innovation is likely to be more compatible with some organisational competencies than others and as such may be disruptive for some parts of the organisation but have little overall organisational impact.

3.6 Biodiversity Policy: a case of architectural innovation

In this case study we use the introduction of a tender instrument to achieve greater biodiversity conservation on private land in the North Central and Goulburn Broken catchments of Victoria, Australia to illustrate the introduction of an architectural policy innovation and to explore the implications of this type of innovation for the North Central and Goulburn Broken Catchment Management Authorities. Refer to Section 3.3.1 for further information on the Australian institutional environment.

3.6.1 *Context*

Significant clearing of woody native vegetation has occurred in Victoria over the past 170 years (Productivity Commission 2003). Much of this has occurred on private land reflecting the suitability of agriculture to the Victorian landscape and climate. Barson (2000), as cited by the Productivity Commission (2003, 333), estimates "that 95 percent of the original tree cover on private land in Victoria has been cleared". Victoria's history of clearing has had a severe impact on the State's ecosystems and the biodiversity that builds and maintains such ecosystems (Victorian Government 2003). In response, protecting, maintaining and restoring biodiversity and native

vegetation have become environmental priorities at both the national and state levels of government. The following case study focuses on native vegetation on private land in terms of either large-scale regeneration in the Goulburn Broken catchment or the protection of remnants in the North Central catchment.

There are a variety of legislative acts and policies in relation to biodiversity management at both national and state levels of government that are administered by several agencies. At a national level one of the key pieces of legislation is the *Environment Protection and Biodiversity Conservation Act (1999)* which provides legislative protection to Commonwealth listed threatened species. This act also provides for the creation and protection of Commonwealth land in the form of protected areas (Goulburn Broken Catchment Management Authority 2006).

At the Victorian State level, key legislation is the *Flora and Fauna Guarantee Act (1988)* (FFG Act), the *Catchment and Land Protection Act (1994)* (CaLP Act) and the *Planning and Environment Act (1987)* (PE Act). The FFG Act regulates biodiversity conservation and the sustainable use of flora and fauna (Productivity Commission 2003). The CaLP Act, "while not focussed solely on the preservation of native vegetation *per se*, establishes a framework for the integrated management of natural resources and the protection of catchments. It recognises and encourages the role of community participation to address natural resource management and sustainability issues" (Productivity Commission 2003, 318). Finally, the PE Act focuses on the management of native vegetation for biodiversity. It regulates native vegetation clearance through planning schemes and related permit requirements (Productivity Commission 2003).

Victoria's Native Vegetation Management Framework was established under an amendment to the PE Act. "The Framework aims to assist councils to develop appropriate responsibilities to land use or development proposals which will involve the removal of native vegetation" (Maddocks 2003, 3). The primary goal of the Native Vegetation Management Framework is net gain in native vegetation across the entire landscape, measured using the habitat hectare concept. The net gain principle seeks to achieve "gains greater than losses on a quality/quantity adjusted basis" (Productivity Commission 2003, 323). The habitat hectare is a tool to assess native vegetation; it is a site-based measure of qualitative and quantitative vegetation with respect to a 'naturalness' benchmark (Department of Primary Industries 2006)[2].

[2] For further information see Parkes D, Newell G & Cheal, D (2003).

Catchment Management Authorities (CMAs) play a significant role in biodiversity conservation at a regional level. As part of their Regional Catchment Strategies, CMAs are required to prepare Regional Native Vegetation Plans. These plans set regional priorities for achieving net gain through "providing strategic directions for protecting and enhancing remnants and establishing regional targets for native vegetation types" (Victorian Government 2003, 10; Productivity Commission 2003). CMAs are seen as a "key mechanism for the engagement of private landholders and the broader community to deliver voluntary natural resources management outcomes" (Victorian Government 2003, 10).

In Victoria the government uses a mix of approaches to provide for biodiversity outcomes and native vegetation on private land including legislation, voluntary schemes, education, grants and more recently market-based instruments. The North Central and Goulburn Broken CMAs have traditionally used three tools to achieve biodiversity targets in their catchments: extension and education programs, regulatory and planning approaches, and incentive instruments. This case study focuses on the incentive instruments and the introduction of the newer, market-based tender process.

3.6.2 *Existing policy instrument*

A range of different incentives have been used for some time by the North Central and Goulburn Broken CMAs to encourage private landholders to undertake on-ground works that lead to biodiversity outcomes. An incentive program enables the CMAs to work in partnership with landholders to achieve biodiversity targets. A partnership approach is important as many of the areas of remaining native vegetation are on private land. The CMAs are responsible for the strategic direction and coordination of the incentive program as well as the administration of payments to landholders. The CMAs deliver the incentive program in collaboration with a number of stakeholders. These include the Victorian Government and the Commonwealth Government, which are a major source of funding for the program, and extension staff from DPI who in some cases liaise with landholders in the on-ground delivery of the incentive programs.

The incentive programs involve the allocation of funds to landholders through incentive payments for the adoption of prescribed activities on private land. These activities have been linked to the achievement of biodiversity outcomes based on available scientific information. Participation in the incentive program is voluntary. In order to participate in an incentive program interested

landholders register with the CMA or DPI. Once a landholder is registered, extension staff visit the property to assess the site. CMA or DPI extension staff then provide the landholder with comprehensive information on the prescribed activities they could perform on their property and the likely payments they would receive. An inspection occurs once the works are completed and the landholder is paid a percentage of the cost of completing the prescribed activity (generally up to fifty per cent) based on the activity performed and in some cases the condition, quality and location of the site; this is a sliding scale cost share based on differences in public benefits. In both cases, there are ceilings on the cost share rates offered for each prescribed activity and payment is made on a once off basis per property.

Fundamental Elements

We now identify the fundamental elements of the incentive program described above, that is the instrument concept, components and component principles and architectural principles of the incentive program. These fundamental elements are summarised in Table 7.

Components and component principles

The components of the incentive program include the funds held by the CMA to allocate to landholders, the list of prescribed activities, and rules for allocating funds to landholders based on the adoption of prescribed activities and value for money of such activities. In addition there are the site assessment criteria, the landholder-agency agreements to perform prescribed activities, payment processes, monitoring and program evaluation processes, and extension processes.

These components embody a number of component principles that guide the design and function of the components. For instance, the component principle that the adoption of prescribed activities contributes to biodiversity outcomes defines the function of the list of prescribed activities. This principle is predicated on scientific data linking the activities to biodiversity outcomes and provides the foundation of the incentive instrument.

The principle that a financial reward will promote behaviour that contributes to an environmental outcome is the rationale for, and defines the function of, the funds to allocate to landholders.

Finally, the principle of sliding scale cost sharing guides the design and function of the rules for allocating funds. Given that the prescribed activities provide a public benefit as well as a private

Table 7: Fundamental elements of the existing incentive program

Goulburn Broken and North Central biodiversity policy	
	Existing Instrument
Instrument Concept	• Financial incentive with prescribed activities and sliding scale cost sharing
Components	• Funds • List of prescribed activities • Site assessment and recommendations • Eligibility criteria • Landholder–agency agreements • Rules for allocation of funds – Based on prescribed activities and value for money of such activities • Payment processes • Program evaluation criteria • Monitoring and evaluation processes • Extension
Component Principles	• Uptake of prescribed activities contributes to environmental outcomes • Financial reward will promote behaviour that contributes to an environmental outcome • Sliding scale cost sharing
Architecture	• Fixed reward management
Architectural Principles	• Reward contribution to biodiversity outcomes • Similar reward for similar contribution • Voluntary participation

benefit to the landholder the costs incurred by the landholder for undertaking prescribed activities are shared between the public and the landholder.

Architectural principles

We have identified three architectural principles that underpin the architecture of this incentive program. The first architectural principle is to reward activities that contribute to the biodiversity outcomes. This principle links the adoption of prescribed activities and the payment of incentives. This provides the CMA with a means of influencing landholders to undertake activities on their property to achieve an environmental benefit and recognises landholders' contribution to public benefit when they adopt prescribed activities.

The second architectural principle is rewarding landholders equally for equal contribution. In this instance contribution is measured in terms of the costs of adopting the prescribed activities. Hence, all landholders adopting a particular activity receive a similar reward in the form of the same proportional contribution from the CMA to the costs they incurred. Consequently, we describe the architecture of this form of an incentive program as fixed reward architecture.

The third architectural principle is voluntary participation of landholders in the incentive program. This principle limits the CMA to encouraging rather than compelling landholders to undertake activities to conserve biodiversity. It also recognises the difficulties of enforcing compulsory participation on private land.

In this section we have outlined the fundamental elements of the incentive program used to encourage biodiversity conservation on private land in the North Central and Goulburn Broken regions of Victoria. We now explore the changes to this instrument made by biodiversity staff within each CMA.

3.6.3 *Proposed policy instrument*

Interviewees related that the incentive program we have described has been relatively successful in achieving uptake of prescribed activities on private properties. However, they related that over time the ability of the North Central and Goulburn Broken CMAs to capture further change has diminished. Further, the large-scale outcomes being sought through the Regional Catchment Strategy (RCS), particularly in the Goulburn Broken, were not being achieved. This led the CMAs

to reassess their investment in incentive programs and to investigate alternative approaches so as to achieve large-scale landscape change, attract new landholders and target parts of the landscape not captured by the existing programs.

These investigations suggested that a tender system offered the potential to achieve higher quality and larger scale biodiversity outcomes at a lower cost than incentive programs. This type of instrument also gave the CMAs the opportunity to learn about the costs landholders associated with managing land for natural regeneration or remnant vegetation. In 2001, the North Central CMA became involved in a trial (led by DSE staff) of a tender instrument called BushTender to protect high value remnants on private land. This trial was part of a number of trials run across Victoria that were funded by the National Action Plan (NAP) initiative led by the Commonwealth Government. Staff from the CMA related that involvement in the trial provided a means to increase the scientific rigour of the assumptions linking prescribed activities to the generation of biodiversity outcomes set out in the Regional Catchment Strategy. They also related that it provided the opportunity for the CMA to access additional funding.

Sometime later, the Goulburn Broken CMA sought to develop and implement a tender trial called BushReturns that focused on targeting large-scale regeneration of native vegetation. In particular, the Goulburn Broken tender trial was aimed at protecting native vegetation that was less than ten years old and not protected by the existing Planning and Environment Act. While the Goulburn Broken CMA was primarily responsible for the implementation of the trial, DSE staff were involved in the design of the trial due to the expertise of their staff in designing and implementing tender mechanisms.

The people we spoke to from both CMAs also considered involvement in a tender trial as an opportunity to demonstrate the 'progressive' or 'innovative' approach to natural resource management that was encouraged by funding bodies.

Fundamental Elements

Instrument concept

The introduction of a tender instrument represents a new instrument concept, which is an incentive instrument with a tender process to allocate funds and payments to landholders.

Broadly speaking, a tender instrument is similar to an incentive instrument in that both are mechanisms to allocate funds to landholders for adopting works that provide public benefits on private land. For both instruments landholder participation is voluntary. However, tender systems allocate funds using an auction process. Landholders participate in this process by bidding for contracts to improve the native vegetation on their property. The resulting bids are ranked according to the biodiversity gains offered and the cost of providing such gains. Funds are awarded to those bids offering the highest biodiversity gains per dollar until the funds are expended or a target of biodiversity gains is reached.

Components and component principles

While the tender instrument is a different instrument concept from an incentive program both instruments have many components in common that perform similar functions. For instance, both instruments include components such as funds to allocate to landholders, rules for allocating such funds, site assessment criteria, agreements to perform works and so on. There is, however, one component that is a particular feature of tender systems. This component is the tenders or bids that landholders make for contracts to provide biodiversity services on their property.

Tenders are used as a basis for allocating funds. Once submitted by a landholder, tenders are ranked based on the quality and quantity of services provided and the cost of providing such services. The tendering system provides a mechanism for giving effect to the new component principle of offering different cost shares to landholders on the basis of differences in their willingness to undertake works and the value of the biodiversity outcomes on offer. The rules for selecting successful tenders embody the component principle of seeking value for money in the provision of biodiversity outcomes by taking advantage of differences in private benefits to landholders.

The tender instruments that were trialed also differed from the incentive programs in that the site assessment criteria for the tender instrument were based directly on the biodiversity gains provided by the landholder. These gains were measured by an index of environmental benefit. In the North Central this was the Biodiversity Benefits Index which measured native vegetation condition and the potential gains from various on-ground actions (Parkes, Newell & Cheal 2003). In the Goulburn Broken this was the Restoration Benefits Index which measured the regeneration potential of a site. This component change reflects a new component principle, which is to directly

measure progress towards biodiversity outcomes. This new principle contrasts with the corresponding principle for the incentive program, which was to identify linkages between particular management activities and biodiversity outcomes. Whereas the incentive program used management activities as a proxy for biodiversity gains, biodiversity gains were directly measured in the trial of the tender instrument.

The tender instrument also required extension officers to take a different approach to liaising with landholders. Specifically, the tender instrument requires extension officers to withhold some information from landholders regarding the value that the CMA places on various activities. This is to ensure that landholder bids reveal the value that landholders place on performing activities independent of the values that the CMAs may place on such activities. In contrast, the incentive instrument required extension officers to provide landholders with comprehensive information on the types of prescribed activities they could undertake on their property and the payments that they would be likely to receive.

The tender instruments that were trialed by the two CMAs also differed from the incentive programs in the formal management agreements successful bidders entered into with the CMAs and DSE. These agreements represented an ongoing commitment by the landholder to perform certain management activities and for the CMA to compensate the landholder for these activities. This has led to a change in payment process from once off payments to ongoing annual payments. In the Goulburn Broken catchment the management agreements are legally binding contracts tied to the property's title. In the instance that a breach of the contract occurs, the agreement and payments will be terminated (Goulburn Broken Catchment Management Authority undated). In the North Central catchment agreements were in the form of common law contracts that were not bound to property title.

A difference between the Goulburn Broken tender trial and the incentive program, as represented in Table 8, is that the Goulburn Broken trial did not involve prescribed activities. In contrast North Central's tender trial did include a list of activities from which landholders could choose to commit to in their management plan.

Architectural principles

We identified two key architectural principles that underpin the tender instrument that differ from those underpinning the incentive instrument. The first new architectural principle is that of maximising cost efficiency. This principle links the tendering process, the ranking of tenders, and the payment of funds to ensure the CMA obtains the highest quality biodiversity outcomes for its investment. Bids are ranked based on the quality and quantity of biodiversity outcome provided per investment dollar. In theory, this allows the CMA to target limited financial resources to high value assets in the landscape.

The second new architectural principle is the differential rewarding of contributions to biodiversity outcomes. This principle links measures of contribution to biodiversity outcomes with differences in landholders' willingness to supply such outcomes. In creating this link the opportunity arises to offer different rates of cost shares to landholders. This principle recognises, and seeks to take advantage of, variability in the public and private benefits and costs to landholder of conserving biodiversity. It also aims to capture the inherent variability in the quality of vegetation across the landscape which was partially captured by the incentive program's cost-share matrix. This principle complements the principle of maximising efficiency.

The two key architectural principles that distinguish the tender instrument from the existing incentive program are differentially rewarding landholders based on the provision of biodiversity outcomes and their willingness to supply those outcomes for a price, and of maximising cost efficiency. Consequently, we describe the architecture of this form of an incentive program as variable reward architecture.

See Table 8 for a comparison of the fundamental elements of the existing and proposed policy instrument.

Table 8: Comparison of the existing incentive program and proposed tender process

Goulburn Broken and North Central biodiversity policy		
	Existing Instrument	Proposed Changes
Instrument Concept	• Financial incentive with prescribed activities and sliding scale cost sharing	• Financial incentive based on a tender process
Components	• Funds • List of prescribed activities • Site assessment and recommendations • Eligibility criteria • Landholder-agency agreements • Rules for allocation of funds – Based on prescribed activities and value for money of such activities • Payment processes – Once-off payments • Program evaluation criteria • Monitoring and evaluation processes • Extension	• No list of prescribed activities • Site assessment and recommendations – Based on the Biodiversity Benefits Index (North Central) or Restoration Benefits Index (Goulburn Broken) • Bids for contracts to provide services • Management Agreements – Contracts tied to property title (Goulburn Broken) • Rules for allocating funds – Based on quality and extent of biodiversity outcome provided and value for money of such provision • Payment processes – Ongoing annual payments
Component Principles	• Financial reward will promote behaviour that contributes to an environmental outcome • Uptake of prescribed activities contributes to environmental outcomes • Sliding scale cost sharing	• Index of environmental change directly measures progress towards biodiversity outcome • Variable rate of cost sharing based on differences across sites in public and private benefit

Table 8 continued: Comparison of the existing incentive program and proposed tender process

Goulburn Broken and North Central biodiversity policy		
	Existing Instrument	Proposed Changes
Instrument Concept	• Financial incentive with prescribed activities and sliding scale cost sharing	• Financial incentive based on a tender process
Architecture	• Fixed reward management	• Variable reward management
Architectural Principles	• Reward contribution to biodiversity outcomes • Similar reward for similar contribution • Voluntary participation	• Differential rewarding of contributions • Maximising cost efficiency

3.6.4 *Type of policy innovation*

As we have outlined above the introduction of a tender instrument to achieve biodiversity outcomes in the Goulburn Broken and North Central regions has introduced new architectural principles that fundamentally depart from the architectural principles of the existing incentive instrument. These new principles resulted in the rearrangement of generally similar components to form a new instrument that functions in a quite different way. Hence, we have classified the introduction of a tender process as a predominantly architectural policy innovation as defined by Kaine & Higson (2006); this is illustrated in Table 9 where the changes associated with the introduction of the modular innovations have been excluded.

The introduction of the tender instrument in this case study was also accompanied by the introduction of at least two modular innovations to particular policy components. These modular innovations included the introduction of an index of environmental benefit to directly measure the biodiversity gains provided by the landholder and the introduction of annual payments for ongoing management activities which are tied to a management plan. These innovations added to the complexity of the change involved in the introduction of the tender trials.

3.6.5 *Organisational implications*

We have classified the introduction of a tender instrument by the North Central and Goulburn Broken CMAs as a predominantly architectural policy innovation. An architectural policy innovation is a change to a policy instrument that changes its architectural principles without substantially changing its component principles. This type of innovation is likely to be compatible with competencies related to individual components of the existing policy instrument yet incompatible with competencies related to the architecture of the existing policy instrument. This incompatibility is likely to be organisationally disruptive as architectural competencies are embedded in the existing processes, procedures and structure of the organisation. This may make it difficult for those within the organisation who are accustomed to the existing processes, procedures and structure to appreciate that change is necessary and should be supported (Henderson & Clark 1990).

Table 9: Comparison of the existing incentive program and proposed tender process (excluding modular innovations)

Goulburn Broken and North Central biodiversity policy		
	Existing Instrument	Proposed Changes
Instrument Concept	• Financial incentive with prescribed activities and sliding scale cost sharing	• Financial incentive based on a tender process
Components	• Funds • List of prescribed activities • Site assessment and recommendations • Eligibility criteria • Landholder–agency agreements • Rules for allocation of funds – Based on prescribed activities and value for money of such activities • Payment processes • Program evaluation criteria • Monitoring and evaluation processes • Extension	• Bids for contracts to provide services • Rules for allocating funds – Based on quality and extent of biodiversity outcome provided and value for money of such provision
Component Principles	• Financial reward will promote behaviour that contributes to an environmental outcome • Uptake of prescribed activities contributes to environmental outcomes • Sliding scale cost sharing	• Variable rate of cost sharing based on differences across sites in public and private benefit
Architecture	• Fixed reward management	• Variable reward management
Architectural Principles	• Reward contribution to biodiversity outcomes • Similar reward for similar contribution • Voluntary participation	• Differential rewarding of contributions • Maximising cost efficiency

Consequently, new competencies may need to be acquired from an external source. The planning and implementation of the new architecture may also require the recruitment of staff from external sources. Successful implementation may also require establishing new relationships and communication channels between functional groups within the organisation to reflect the new architecture of the policy instrument (Henderson & Clark 1990).

Our discussions with staff involved in the introduction of the tender instrument suggest that this innovation has had a range of organisational implications in line with the description of an architectural policy innovation. Some of the competencies in the organisations were incompatible with the innovation. Consequently, the implementation of the trials required the development or acquisition of new competencies. The innovation has also challenged some of the existing procedures and structures of the organisations.

In terms of competencies, the implementation of the tender instrument required extension staff with a different technical skill set. Existing staff did not have the necessary experience to use the new method for site assessments. Both CMAs engaged staff from DSE to provide expertise and competencies in the development of the tender instrument, particularly in the areas of tender design and the site assessment method. In the North Central trial a consultant with experience in using the Habitat Hectares method was employed to perform the site assessments and draft management plans with landholders. However staff had some involvement in site assessment and development of management plans which allowed them to gain exposure to the assessment method and the tender instrument concept. In Goulburn Broken, biodiversity staff from the CMA delivered the trial with support from a DSE extension officer; DPI extension staff were also involved in a subsequent tender round. The experience with the trial provided the opportunity for both CMAs to develop new competencies. For North Central, the experience led to the development and implementation of a tender targeting river health.

While many external sources were used to provide competencies compatible with the innovation, a number of existing organisational competencies associated with the components of the incentive programs were compatible with the innovation. These competencies included the CMAs' experience liaising with landholders, administrative skills and knowledge, and experience in making recommendations to, or negotiating with, landholders on appropriate prescribed activities.

In terms of staff roles, the tender instrument required an alteration in the role of extension staff and how they interacted with landholders. Extension staff were no longer responsible for providing the landholder with full information on the value that the CMA placed on the performance of specific activities. It was important to the CMAs that the tender process ensured that the value of landholders' bids reflected the cost they placed on performing services independent of the value placed on such services by the CMA.

The tender instrument also led to a number of changes to the way the CMAs entered into agreements with landholders. The Goulburn Broken tender trial introduced management agreements that were tied to a landholder's property title. As, the CMA did not have the legislative authority to tie such agreements to the property title a three-way agreement between the landholder, the CMA and DSE was needed for the agreements to be legally binding. The development and implementation of these agreements required extensive consultation with solicitors.

Further, the change in payment arrangements associated with the introduction of the tender instrument has introduced new reporting and payment procedures which had consequences for how the CMAs' liaised with funding bodies. The change to ongoing contract payments has introduced a new way of allocating and managing funds that has challenged the CMAs' existing funding structures. Traditionally investors required CMAs to fully expend funds on an annual basis. The ongoing payments mean that funds can not be completely expended in a given funding period but need to be secured to meet payments for the full term of the management agreement. This raises a number of issues relating to budget management, securing of funds for future payments and how committed payments will be managed in the event of any institutional restructuring. These structural factors are a potential barrier to the full implementation of such payment arrangements and suggest that broader institutional change may be required.

For the North Central CMA, the shift to assessment criteria based on an index of environmental benefit included in the tender trial introduced a new approach to biodiversity conservation on private land. The trial data revealed substantial variability in the biodiversity value of activities occurring on different sites across the landscape. In this way, the tender highlighted the value of a targeted approach to investing in natural resource assets across the region as well as increasing the scientific rigour underpinning the recommendations for uptake of prescribed activities.

The organisational changes associated with the trials suggest that the innovation has been disruptive in a variety of functional areas for both CMAs. Such disruptions need to be considered and balanced against the potential benefits of implementing such an instrument.

3.6.6 *Summary*

In this case study we have presented the introduction of a tender instrument to encourage biodiversity conservation on private land in the North Central and Goulburn Broken regions of Victoria. We have classified this innovation as a predominantly architectural policy innovation accompanied by modular innovations, based on Kaine and Higson (2006). This innovation has caused a moderate level of disruption for the North Central and Goulburn Broken Catchment Management Authorities. Therefore the potential organisational implications of such a change need to be considered against the potential benefits gained from the tender trials.

3.7 Water quality policy: a case of radical innovation

In this case study we use the proposed changes to the water quality policy used to manage non-point source emissions in the Waikato region to illustrate the introduction of a radical policy innovation and to explore the implications of this type of innovation for Environment Waikato. Environment Waikato is the regional council responsible for the quality of water resources in the Waikato region of New Zealand. Refer to section 3.3.2 for further information on the New Zealand institutional environment.

3.7.1 *Context*

Lake Taupo is a lake of national significance in New Zealand prized for its water clarity. It is a major tourist attraction and is an important part of the local and national economy. The lake also has cultural and historical significance for local Maori. Surveys by Environment Waikato have revealed that protecting Lake Taupo is extremely important to people in the Taupo catchment and the wider regional community (Environment Waikato 2003).

Environment Waikato has been monitoring the water quality of the lake since the early 1970s. In 1997 the monitoring data revealed a significant deterioration in water clarity. Environment

Waikato investigated the cause of the deterioration and found that increases in nitrogen emissions from land in the catchment were the main source of the decline in water quality.

Over the past 50 years there has been extensive rural and urban development and an intensification of rural and urban land use. The movement of nitrogen from the land, through ground and surface water, to the lake can take substantial periods of time (Environment Waikato 2003). Hence it is only in recent years that the impact of the large-scale conversion of land from forestry to agriculture in the 1950s has been seen in the lake (Environment Waikato 2003). This has increased the amount of nitrogen entering the lake through rivers and groundwater. The result has been increases in the amount of dissolved nitrogen in the waters of the lake and rapid growth in concentrations of algae and toxic algal blooms in 2001 and 2003 (Environment Waikato 2003).

While nitrogen enters the lake from a variety of sources only a few of these are deemed to be manageable. For example, groundwater draining from under pine forests and water diverted into the lake from a nearby power generation scheme contain concentrations of nitrogen similar to native vegetation. These levels cannot be reduced further and are therefore not deemed to be a manageable source of nitrogen (Environment Waikato 2005b).

Livestock effluent, a non-point source emission, is responsible for approximately 93 per cent of the manageable nitrogen entering the lake. The effluent leaches through farmland soil into groundwater and rivers. The remaining manageable nitrogen comes from urban wastewater, such as sewage and septic tank seepage (Environment Waikato 2005b).

Environment Waikato has estimated that the manageable nitrogen load entering the lake must be reduced by 20 per cent to maintain water quality at its current level (Environment Waikato 2003). To achieve this target requires a change in the way that rural and urban land is managed in the Taupo catchment. Furthermore, due to the time lag between changes in land activities and their effect on the lake, the quality of water in the lake is likely to continue to decline for some time before it improves. The changes in land management required to achieve the target reduction in nitrogen load will have significant implications for the community and economy of the Lake Taupo catchment and the nation as a whole (Environment Waikato 2003).

3.7.2 *Existing policy instrument*

Generally, the Resource Management Act (1991) (RM Act) prohibits the emission of any contaminant into a water body or onto anything that would end up in a water body unless the emission is expressly allowed by a rule in the regional plan of that region.[3] Environment Waikato's regional plan contains well-developed rules for point source emissions but only limited rules for non-point source emissions.

Environment Waikato has traditionally taken a regulatory approach to point source emissions of contaminants. This approach has involved regulating activities through the granting of consents to discharge contaminants. The traditional regulatory approach specifies certain inputs or practices that are to be used or followed. Monitoring is undertaken to check these conditions are met. If the inputs or practices have the potential to produce adverse effects, resource consents are required.

Environment Waikato has also endorsed the polluter pays principle with regard to controlling the discharge of point source contaminants. Environment Waikato has compelled dischargers to bear the cost of implementing suitable abatement measures when the council has considered such measures necessary to avoid, remedy or mitigate adverse effects on the environment. With regard to non-point source emissions of contaminants, the regional plan includes rules for the control of sediment resulting from earthworks in defined high erosion areas and the spreading of dairy shed effluent over pasture. Hence, the emission of nitrogen into ground and surface waters by agricultural enterprises in the Taupo catchment is a technical breach of the RM Act and beyond the scope of the existing regional plan.

Fundamental Elements

We now identify the fundamental elements of the regulation by consents instrument described above, that is, the instrument concept, components and component principles, and the architectural principles of the instrument. These elements are summarised in Table 10.

[3] A contaminant is defined as anything that changes the nature of the water.

Table 10: Fundamental elements of current water quality regulation

Waikato water quality policy	
	Existing Instrument
Instrument Concept	• Regulation by issuing resource consents
Component	• RMA rules controlling activities that discharge contaminants into a water body • Regional Plan rules regarding emissions • Resource consents • Rules related to consents, including: – Consent eligibility – Conditions of consent • Compulsory abatement measures • Auditing processes • Enforcement processes
Component Principles	• Control over *how* contaminant is released • Control over the *amount* of contaminant released by individuals • Polluter Pays Principle • Penalties for non-compliance
Architecture	• Case management
Architectural Principles	• Priority on ecologically sustainable resource use to conserve the environment and to prevent harm to others • Compulsory licensing of activities

Instrument concept

The instrument concept of the regulation described above is that of a regulation by issuing resource consents. This is the traditional approach taken by regional councils across New Zealand to manage natural and environmental resources.

Components and component principles

The components of the existing regulation include the RM Act rules, the relevant rules in the regional plan, the consents, consenting processes, and auditing and enforcement processes. These components embody a number of component principles that guide the design and function of components. For instance, the RM Act and regional plan rules governing activities that discharge contaminants embodies the principle of limiting the volume and timing of contaminants released into the environment by individuals. The resource consents embody the principle of controlling activities that create contaminants in order to control the discharge of contaminants and their impact on the environment and the community.

The polluter pays principle justifies and defines the function of compelling dischargers to bear the cost of implementing suitable abatement measures when the council has considered such measures necessary to avoid, remedy or mitigate adverse effects on the environment.

The principle of penalising non-compliance justifies, and defines the function of, the monitoring and enforcement components.

Architectural principles

We have identified three architectural principles that underpin the arrangement and combined functioning of the components that form the resource consent process, that is, the architecture of the instrument.

The first architectural principle is a priority on ecologically sustainable resource use to conserve the environment and to prevent harm to others. This follows from the RM Act which stipulates that natural and environmental resources must be used in an ecologically sustainable manner. This priority is embodied in the RM Act rule that no contaminant can be discharged into a water body or onto anything that would end up in a water body. The application of this principle entails

restricting the emission of contaminants to preserve riverine environments. This principle also means restricting activities that discharge contaminants or requiring the implementation of abatement measures to prevent undesirable effects on the environment and the community. Through this principle control over emissions in aggregate may be linked with control over emissions of contaminants by individual organisations through rules or conditions on resource consents.

The second architectural principle is the compulsory licensing of activities that discharge contaminants. This regulatory principle creates the authority for Environment Waikato to control emissions through the granting of consents. This principle links the right to discharge to operating activities within the rules of the Act or the regional plan, or to the possession of resource consents. This creates a mechanism for Environment Waikato to control individual activities that produce contaminants and allows the enforceable imposition of abatement measures.

Given these principles, we described the architecture of this form of a consent instrument as case management architecture since each application for a resource consent is judged largely on its own merits with previous applications largely serving to establish precedents.

In this section we have outlined the fundamental elements of the current regulation of water quality policy. We now explore the changes to this instrument proposed by Environment Waikato.

3.7.3 *Proposed policy instrument*

Initially, Environment Waikato responded to the deterioration in the water quality of Lake Taupo with the intention of regulating nitrogen emissions. The proposal was to regulate the emission of nitrogen into ground and surface waters by requiring landholders to obtain resource consents for activities that leached nitrogen if their inputs or farm practices were above a particular threshold. However, this approach of setting blanket restrictions on farm inputs or farm practices was reconsidered as the complex interactions between the drivers of nitrogen leaching made achieving the environmental outcome uncertain. Furthermore, the extremely high costs of nitrogen abatement for some farmers meant that imposing the same restrictions on all farmers would mean that some farms would not remain viable businesses. In other words, imposing the full cost of achieving the Lake Taupo water quality target on landholders would have severe economic and social consequences for at least some landholders.

After some years of community consultation, investigations, and extensive discussions and negotiations, Environment Waikato and its stakeholders developed a strategy to protect the water quality of Lake Taupo. The strategy involves the use of a 'cap and trade' instrument to regulate nitrogen emissions from both rural and urban uses. Once the policy is implemented farming will be defined as a controlled activity and farmers will require a resource consent in order to discharge nitrogen. Each farm will have a nitrogen emission allowance based on estimated emissions during the benchmark period. Activities that discharge nitrogen at rates equivalent to or less than native vegetation, such as lifestyle properties and forestry activities, will not need resource consents as they will be deemed a permitted activity (Environment Waikato 2005b). Undeveloped land will also be exempt.

Fundamental Elements

Instrument concept

The cap and trade with consents instrument is a fundamentally new instrument concept. This new instrument concept is accompanied by a large number of new components and component principles and new architectural principles that are very different from those of the traditional regulatory approach. We go into these in further detail below.

Components and component principles

To begin with, components such as the RM Act and Regional Plan rules controlling activities that discharge contaminants to a water body remain in place under the cap and trade instrument. These components continue to embody the principle of limiting the volume of contaminants released into the environment.

The first new component of the cap and trade instrument is the system of rules to cap the level of nitrogen emissions in the catchment and the cap on nitrogen emissions itself (Environment Waikato 2005b). The cap limits the total amount of nitrogen emissions in aggregate from the catchment with shares in the cap being distributed to landholders across the catchment on a property by property basis. This component reflects the component principle of controlling the amount of contaminants discharged in aggregate. The imposition of a cap restricts the volume of nitrogen emissions available to activities that discharge nitrogen. In doing so nitrogen emissions become an economically valuable resource.

The second new component is the mechanism used to allocate shares in the nitrogen emission cap among landholders in the catchment. Shares may be allocated in a variety of ways depending on the principles are employed. In this example we have assumed that shares will be allocated on the basis of historical emissions. This embodies the component principle of preserving the economic viability of agricultural enterprises in the catchment so as to avoid imposing severe economic and social consequences on landholders (Environment Waikato 2004).

The allocation of shares in the nitrogen emissions cap also embodies the component principle of treating all landholders similarly in regard to increasing nitrogen emissions in the future. Landholders wishing to introduce or expand activities that generate emissions beyond their initial allocation will have to purchase additional shares in the nitrogen cap from another landholder or implement offsetting abatement measures (Environment Waikato 2005b).

This method of allocation is also consistent with the application of the polluter pays principle in regard to the future expansion of activities that generate nitrogen emissions in the catchment. The polluter pays principle justifies and defines the function of compelling new or expanding dischargers to bear the cost of either purchasing additional shares in the cap from other landholders or implementing suitable abatement measures, given that the council has considered such measures necessary to avoid, remedy or mitigate adverse effects on the environment. Emissions in breach of the cap have, by definition, an unacceptably adverse effect on the environment.

Resource consents remain as components in the new instrument and continue to embody the principle of controlling activities that create contaminants in order to control the discharge of contaminants and their impact on the environment and the community. However, consents now constitute a property right that entitles the holder to a nitrogen emission allowance and are now limited in regard to specifying how activities may be undertaken to produce nitrogen emissions. This change embodies the principle that landholders should have discretionary flexibility in managing their activities provided their emissions remain within the bounds defined by their consents. This is one of the key differences between traditional regulation and the proposed cap and trade instrument. Under traditional regulation the conditions governing resource consents embodied the component principle of controlling emissions by directly specifying how activities may be undertaken.

Another new component is the nutrient budgeting model used to estimate the nitrogen discharged from each property during a benchmarking period. This estimate will be used to determine the nitrogen emissions allowed under the cap for each individual property. Every landholder requiring a share of the cap will have to present a nutrient management plan based on the model as part of their consent application. This component embodies the component principle highlighted earlier of controlling the volume of nitrogen discharged rather than controlling the activity generating the discharge.

A number of new components create the means for shares in the nitrogen emissions cap to be traded. These include trading rules, the trading register and the administrative processes associated with revising consents to reflect trades. Landowners will be penalised if they exceed their nitrogen emission allowance. Consequently, landowners wishing to expand or intensify their farming operations will need to offset any increase in nitrogen emissions by acquiring a correspondingly greater share of the cap or by implementing appropriate abatement measures. Trading within the cap allows the transfer of nitrogen emissions between landholders and land uses without a net increase in nitrogen emissions in the catchment. This reflects the component principles of achieving economically efficient use of nitrogen emissions, achieving lowest possible abatement costs and ensuring the highest valued economic use of nitrogen emissions (Kaine & Higson 2004).

Note that the auditing and enforcement components remain in place and continue to perform similar functions in the cap and trade instrument. The principle of penalising non-compliance justifies, and defines the function of, the monitoring and enforcement components as before. However, the penalties for non-compliance also function as a ceiling on the price at which shares in the nitrogen emission cap may trade (Kaine & Higson 2004).

The final new component we will consider is the Public Fund which has been established to permanently remove 20 per cent of the total annual manageable load of nitrogen entering Lake Taupo by 2020 (Environment Waikato 2005b). Environment Waikato has established the fund in partnership with the National Government and the Taupo District Council. The major portion of the fund will be used to purchase land and nitrogen from pastoral landowners in the Lake Taupo Catchment to reduce the current, capped level of nitrogen emissions by 20 per cent. Through the purchase of land and nitrogen emission allowances the fund will be a critical component in

ensuring that the full costs of achieving the 20 per cent reduction in nitrogen emissions are not borne entirely by landholders. The fund will also support research into nitrogen abatement technologies and practices. This reflects the component principle of sharing the cost of achieving the environmental target across the community.

Architectural principles

The two architectural principles underpinning the existing regulation of emissions also underpin the cap and trade instrument. The first of these architectural principles is placing a priority on ecologically sustainable resource use to conserve the environment and to prevent harm to others. The application of this principle in the cap and trade instrument entails restricting the emission of contaminants in aggregate through the cap on emissions and the allocation of shares in the cap. By restricting aggregate emissions to remain within the cap, the undesirable effects of nitrogen emissions on the environment and the community are prevented. Individual activities that discharge contaminants are necessarily restricted unless landholders can either acquire an appropriate share of the cap on emissions or implement appropriate abatement measures. Through this principle control over emissions in aggregate may be linked with control over emissions of contaminants by individual organisations through the operation of resource consents.

The second architectural principle underpinning both the existing instrument and the new one is the compulsory licensing of activities that discharge contaminants. This regulatory principle creates the authority for Environment Waikato to control emissions through the granting of consents. This principle links the right to discharge nitrogen to the possession of resource consents. This creates a mechanism for Environment Waikato to limit the volume of emissions from individual activities that produce contaminants and allows the enforceable acquisition of shares in the emissions cap or the imposition of abatement measures and penalties.

The cap and trade instrument also introduces two new architectural principles. The first new architectural principle is the maximising of wealth generated for the community within the constraint imposed by the cap on nitrogen emissions. In the case of a cap and trade instrument, this architectural principle links the cap on emissions with a range of components including possession of a resource consent, a nitrogen allowance, a nutrient management plan, trading rules and a trading register to create a market in nitrogen emissions. This principle is based on economic theory, which suggests that trading facilitates the transfer of emission permits between different

land uses depending on the economic value of nitrogen in those uses. Economic theory also predicts that trading of emission permits will encourage the most efficient use of emissions and that the lowest cost mix of abatement measures will be implemented should such measures be necessary. In essence, the introduction of a trading mechanism maximises wealth generated for the community from restricted nitrogen emissions by promoting the efficient use of emissions by high value activities while encouraging the lowest cost mix of abatement measures. Given the prominence of this principle, we described the architecture of this instrument as market management architecture.

The second new architectural principle is the principle of shared responsibility for achieving the environmental target. The application of this principle links components such as the imposition of the cap on emissions, the method of allocating shares in the cap and the creation of the public fund to purchase land and nitrogen emission allowances. This architectural principle is intended to ensure the economic and social costs of preserving water quality in Lake Taupo are equitably distributed across the community. The application of this principle recognises that the imposition of the cap creates public benefits for the community but private costs for landholders. It also reflects Environment Waikato's desire to avoid imposing onerous economic and social penalties on any particular group in the community by limiting nitrogen emissions.

These architectural principles guide how the various components of the policy fit together to form the cap and trade instrument. See Table 11 for a comparison of the fundamental elements of the existing and proposed policy instruments.

3.7.4 *Type of policy innovation*

As we have outlined above, the proposed cap and trade instrument in nitrogen emissions is a fundamentally new instrument concept for Environment Waikato. The cap and trade instrument introduces new component principles and architectural principles that are very different to those of the regulated consenting process that has been used to control point source emissions in the past. Consequently we classified this policy instrument change as a radical policy innovation as defined in Kaine and Higson (2006). In the next section we explore the organisational implications of this innovation for Environment Waikato.

Table 11: Comparison of the existing regulation and proposed cap and trade instrument

Waikato water quality policy		
	Existing Instrument	Proposed Changes
Instrument Concept	• Regulation by issuing resource consents	• Cap and trade with consents
Component	• RMA rules controlling activities that discharge contaminants to a water body • Regional Plan rules regarding emissions • Resource consents • Rules related to consents, including: – Consent eligibility – Conditions of consent • Compulsory abatement measures • Auditing processes • Enforcement processes	• Cap on nitrogen emissions • Allocation of cap • Rules related to consents, including: – Consent eligibility – Flexibility for landholders in decision making – Nutrient budgeting model – Nutrient Management Plans • Trading of consents • No compulsory abatement measures • Public fund
Component Principles	• Control over *how* contaminant is released • Control over the *amount* of contaminant released by individuals • Polluter Pays Principle • Penalties for non-compliance	• No control over *how* contaminant is released • Control over *amount* of contaminant released in aggregate to improve certainty of achieving environmental objectives • Maintain viability of landholders • Equal opportunity to increase emissions • Achieving economically efficient resource use • Achieving maximum economic value from limited emissions • Lowest cost mix of abatement measures • Cost of achieving environmental target shared across community

Table 11 continued: Comparison of the existing regulation and proposed cap and trade instrument

Waikato water quality policy		
	Existing Instrument	Proposed Changes
Instrument Concept	• Regulation by issuing resource consents	• Cap and trade with consents
Architecture	• Case management	• Market management
Architectural Principles	• Priority on ecologically sustainable resource use to conserve the environment and to prevent harm to others • Compulsory licensing of emissions	• Maximise wealth generated for the community from limited nitrogen emissions • Shared responsibility for achieving environmental target

3.7.5 *Organisational Implications*

We have classified the proposed introduction of a cap and trade instrument in nitrogen emissions by Environment Waikato as a radical policy innovation. A radical policy innovation is a change to a policy instrument that substantially changes both its component principles and its architectural principles. This type of innovation is unlikely to be compatible with organisational competencies related to both the individual components and the architecture of the existing instrument. This suggests that successful implementation of the innovation requires the organisation to develop new competencies that are compatible with the innovation. This is likely to have a range of consequences for the organisation.

First, the organisation is likely to be forced to rely on external sources with specialist knowledge, skills or experience related to the policy innovation to build capacity among its own staff in the required competencies. Second, the organisation may need to develop new processes, procedures and structures that are more compatible with the policy innovation than its existing processes, procedures and structures. Third, the organisation may also need to rearrange some of the roles, responsibilities and relationships between functional groups within the organisation to be more compatible with the policy innovation. Consequently, a radical policy innovation is likely to create extensive disruption in the organisation and require considerable time and resources to successfully implement.

Our discussions with staff involved in the development and introduction of the cap and trade instrument suggest that this innovation has had, or is likely to have, a range of organisational implications in line with our expectations. Furthermore, the proposed instrument represents a fundamental shift in Environment Waikato's approach to managing social and economic interactions with the environment (Environment Waikato 2003).

In general, many of the existing competencies of the organisation have been incompatible with those required to develop and implement a cap and trade instrument. For instance, Environment Waikato had not had experience in developing policy instruments for controlling non-point source pollution, or in the development and implementation of cap and trade mechanisms. The decision to implement a cap and trade instrument created a need for significant investment within the organisation to address knowledge and information gaps. External sources were relied on to

provide competencies and build capacity within the organisation to support the successful development of the new policy. A major scientific program was required to identify the causes and mechanisms of the deterioration in water quality. There was a need to develop a thorough understanding of nutrient cycling, particularly in regard to estimating nitrogen emissions from agricultural properties and the transit of nitrogen in groundwater and Lake Taupo. An external science organisation was commissioned to work with Environment Waikato to provide this information and to develop a nutrient budgeting model.

Consultants were also employed to provide advice on developing a trading mechanism and to assist in adapting the fundamental concepts underlying a cap and trade instrument to ensure consistency with the principles of the RM Act. External agents were also engaged to provide legal advice on the feasibility and design of a trading mechanism given the legislative constraints of the RM Act, as well as to assist the staff of Environment Waikato to draft policy to control non-point source emissions.

The regulation of farming as an activity requiring consent for non-point source emissions over the whole farm was also a novel policy area for the council. The organisation, for the first time, required a detailed understanding of farming systems. Environment Waikato employed an external agency to assist them in developing an understanding of the complexities and uncertainties of farm contexts and to use that understanding to formulate practical and realistic components for the new policy instrument.

The implementation of a cap and trade instrument will introduce a new role for Environment Waikato that of an organisation managing a trading system. This is likely to have a number of broad organisational consequences as the new component and architectural principles underpinning the new instrument may conflict with the core values of some staff in the organisation and the wider community. For example, the concern to spread the costs of reducing nitrogen emissions across the wider community to protect the viability of farming may be interpreted as inconsistent with the polluter pays principle. These conflicts have had consequences in terms of the time taken to design and implement the instrument, especially due to the need to raise awareness and understanding of the cap and trade approach with stakeholders and the broader community.

The development of the new instrument has also required Environment Waikato to develop new ways of operating. The potentially unprecedented impact on the incomes and wealth of landowners due to the introduction of a cap on nitrogen emissions required a new approach to consultation with landholders and the wider community. The new approach included the development and presentation of an 'Issues and Options' paper to obtain feedback from the community on their preferred course of action. The new approach also involved workshops with various groups in the community to raise awareness of the issues, and of the science underlying the issues, as well as of the details of the cap and trade instrument itself. Finally, Environment Waikato has had to renegotiate relationships with a variety of external partners including Taupo District Council, local Maori and Central Government.

The adoption of a cap and trade instrument has also sparked a change in the way that some functional groups within Environment Waikato relate to each other. Relationships and communication have had to develop across functional boundaries. New working groups with members drawn from a range of functional groups within the organisation were formed by necessity to develop the policy instrument and ensure its feasibility.

In combination, these organisational changes suggest that the introduction of a cap and trade instrument, a radical policy innovation, has challenged Environment Waikato's existing ways of operating. Further, it has forced the organisation to develop new competencies and establish new organisational rules, processes and procedures. This policy innovation has challenged Environment Waikato's historical approach to policy and had unsettling effects in many areas of the organisation.

3.7.6 *Summary*

In this case study we have presented the proposed introduction of a cap and trade instrument by Environment Waikato to protect the water quality of Lake Taupo. We classified this innovation as a radical policy innovation based on Kaine and Higson (2006). As predicted, this innovation has generated a range of consequences for the organisation and has had a disruptive influence in much of the organisation.

4. Conclusion

The purpose of this paper was to explore whether the policy innovation framework could be a useful tool to help government and non-government agencies better anticipate and manage the consequences of changes in policy instruments – changes that we have termed policy innovations. The policy innovation framework classifies policy innovations into four types, namely incremental, modular, architectural and radical. Each type entails different consequences for organisations in terms of the knowledge and skills that are required to implement them.

We explored this research question by applying the policy innovation framework to four real world examples of policy innovation in Australian and New Zealand. This research has shown that the policy innovation framework provides useful insights into the nature of changes in the policy instruments and the likely organisational consequences associated with each type of policy instrument innovation.

This research has demonstrated that the policy innovation framework provides a systematic way to anticipate, and therefore manage, the likely consequences of changes in policy instruments for organisations charged with forming and implementing natural resource policy.

These results raise the intriguing possibility that different organisations will view, and respond to, a policy change in different ways depending on their particular, idiosyncratic experience with policy instruments. In other words, for different organisations a particular policy instrument may appear to be a different type of policy innovation. This possibility raises important implications, which remain to be explored, for government and non-government organisations responsible for implementing changes in natural resource policy that involve a number of partner organisations.

These results also raise the possibility that a particular policy instrument may appear to be a different type of policy innovation to different business or functional groups within an organisation. This possibility raises important implications, which also remain to be explored, for government and community organisations responsible for implementing changes in natural resource policy.

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