



**Healthy Rivers**  
PLAN FOR CHANGE

Wai ora  
HE RAUTAKI WHAKAPAIPAI

# **Case Study I: Lake Taupo catchment property-level nitrogen discharge limits**

**Collaborative Stakeholder Group Healthy  
Rivers: Wai Ora Project**

**Policy work stream report for discussion at  
CSG workshop 2**

## **Disclaimer**

This report has been prepared by Waikato Regional Council policy advisors, implementers and compliance staff for the use of Collaborative Stakeholder Group Healthy Rivers: Wai Ora Project as a reference document and as such does not constitute Council's policy.

# 1 Executive summary

In 2011, Waikato Regional Plan Variation 5 – Lake Taupo Catchment became operative, and was inserted as Chapter 3.10 of the Waikato Regional Plan. It provides long term protection of water quality in Lake Taupo. It was tested and refined through formal council and Environment Court processes from 2005 to 2010. At the time of its public notification, it was the first Resource Management Act planning tool that required pastoral farmers to gain a resource consent that limits the amount of nitrogen leaving the property from point and non point sources. This is often referred to as the nitrogen cap. It was also the first non point source to non point source nitrogen trading regime in the world.

A cap and trade regime for non point source or diffuse<sup>1</sup> discharges has new planning components and underpinning principles. As a result, the council had to develop new processes and build staff capacity and skills, both in policy development and implementation. Implementation of the farm property limits has been undertaken on a one to one basis between farmers and a small team of staff and third party experts in nutrient modelling and farm systems.

As of early 2014, council staff believe that the implementation is progressing well, with all farmers having gained resource consents and operating their farm business within an environmental limit. The farmer group that were involved in policy development retain an active role working with council staff to develop efficient processes that suit farmers. There have been no instances of significant non compliance with the rules, which means the final test of legal robustness of the new regime has yet to occur.

## 2 Purpose

To provide the Collaborative Stakeholder Group with a case study of a policy development and implementation process for property-level limits to meet water quality outcomes.

This case study focuses on the parts of Chapter 3.10 of the Waikato Regional Plan that affect pastoral farmers in the Lake Taupo catchment, and which seek to manage non-point source discharges of nitrogen.

## 3 Methodology

This report draws heavily on previously published Waikato Regional Council Technical Reports and documents prepared for council or Environment Court proceedings. Sections four and five are intended as a factual outline of the policy approach, and sections six and seven offer insights based on staff experience in policy development, implementation and compliance and are intended to stimulate discussion amongst the Collaborative Stakeholder Group.

## 4 Background

Lake Taupo is New Zealand's largest lake and has very high water quality. The lake and its catchment is within the rohe of Ngati Tuwharetoa, who own much of the land in the catchment, including the bed of the lake. The Lake's water and the clear, high quality inflowing streams, are two of the 12 key community-held values that were identified in the

---

<sup>1</sup> Non point source discharges are sometimes referred to as diffuse discharges.

multi agency 2020 Taupo-nui-a-Tia action plan. Variation 5 focused on protecting the existing high water clarity in Lake Taupo.

All land naturally produces diffuse discharges of bacteria, nutrients and sediment. However, when the land is developed and used for purposes other than trees, such as for towns or farmland, it produces discharges in addition to its natural background levels.

In this case, the contaminant discharge of concern was nitrogen. Increases above natural background levels entering the Lake stimulate microscopic algal growth and reduce water clarity. The majority of the nitrogen entering the Lake is through natural processes and therefore cannot be reduced. This includes nitrogen in rainwater and leached into groundwater from native and exotic forestry.

Sources of nitrogen that can be reduced through management are relatively limited, and primarily include human wastewater and pastoral farming. Pastoral farming represents around 40 per cent of the total load of nitrogen to the lake, and 93 per cent of the manageable load. Sewage represents 1 per cent of the total load (Vant et al, 2008). The majority of nitrogen entering Lake Taupo does so slowly through groundwater. Thus, there is a time lag measured in decades between nitrogen leaching land uses and activities and effect on the Lake.

Historically, land use controls to manage water quality in the Waikato Region were focused on reducing contaminants entering water bodies from point source discharges. Farm management of diffuse sources of contaminants from land use activities had focused on fencing of erosion-prone areas and riparian zones. The Waikato Regional Plan was silent on water quality effects of the diffuse nitrogen emissions from pastoral farming (Young and Kaine, 2010).

A significant difference between management of diffuse discharges in the Lake Taupo Catchment and other parts of the Waikato Region is the focus on achieving specific measureable outcomes on properties and in the receiving water body. Objective 1 in Chapter 3.10 is a time bound, numeric water quality objective. Property-based nitrogen limits are regulated, including the methodology for measuring and ongoing farmer record keeping. Allowable amounts of nitrogen are specified in consents to the nearest whole number.

## 5 Outcome of policy review

The policy process began with the decision to cap manageable nitrogen discharges to the lake, and ended with Variation 5 becoming operative in 2011, and inserted as Chapter 3.10 of the Waikato Regional Plan. Rules are designed to manage human-induced discharges<sup>2</sup>, and include the component of a cap-and-trade scheme that limits diffuse nitrogen emissions from moderate to high leaching land uses. A 20 percent reduction of nitrogen from municipal sewage schemes and pastoral land is signalled in objectives and policies. This will be achieved through Taupo District Council's ongoing upgrades to sewage treatment, and public funded buy-back of nitrogen through a specially formed charitable trust (Lake Taupo Protection Trust) respectively.

---

<sup>2</sup> Policies specific to the cap-and-trade scheme include (Waikato Regional Council, 2011):

- Policy 3: Cap nitrogen outputs from land in the catchment
- Policy 5: Review of nitrogen reduction target and its method of achievement
- Policy 8: Determining applications under Rule 3.10.5.9
- Policy 12: Public fund to share costs of reducing nitrogen from rural land in the Lake Taupo catchment
- Policy 13: Effectiveness of the public fund
- Policy 14: Nitrogen trading (offsetting).

In the Taupo cap-and-trade scheme, the cap limits nitrogen use through the resource consenting process. A resource consent, applied for by a farmer, sets the property-level nitrogen limit expressed both as a Nitrogen Discharge Allowance (NDA – kg/ha/yr) and Total annual discharge allowance (TAND – kg/yr). The nitrogen limit is a right to discharge diffuse nitrogen emissions, and is held by farmers to enable them to continue farming activities. Nitrogen can be traded permanently or through a temporary lease agreement. Trading involves formal (consent processes) adjustments to the resource consents held by the purchaser and the seller. All resource consents have a common expiry date of 2036, and are subject to changes that may occur as a result of reviews of the nitrogen removal target and its method of achievement.

Historical allocation, also known as ‘grandparenting’, was the elected method for initial allocation of NDAs. Historical allocation is the distribution of rights based on past use. Establishing the initial nitrogen limit for a property required the benchmarking of previous nitrogen use. This involved modelling farm nitrogen emissions based on nitrogen inputs (including livestock numbers) for the 2001-2005 period.

Farmers are required to prepare a Nitrogen Management Plan that describes how the farm will be managed over the farming year within the nitrogen limit for the property or properties, including livestock levels, nutrient applications and feed regimes.

As of early 2014:

- All farms in the catchment have been benchmarked, nitrogen limits have been set, and farms are now under a resource consenting system.
- The 20 percent reduction target has been met by the Lake Taupo Protection Trust (the Trust) – on budget and within the time limit specified.
- The policy is on-track to achieve the environmental target of 2001 levels of water quality and clarity by 2080.
- The market appears to be operating efficiently (Barnes and Young 2013). Private trades still occurred during the time the Trust was dominant in the market, and are expected to continue to do so.
- The monitoring regime has been established, using desk top audits of farmer-supplied financial information, as a first filter of compliance, and a risk-based approach to the frequency of audits and need for on farm monitoring inspections.

## 6 Effectiveness of the policy

At the council and Environment Court hearings, a cap-and-trade scheme was identified as an effective and efficient policy response for the Lake Taupo catchment, providing certainty of achieving the environmental limit, leaving farmers with the flexibility to make farm business decisions within the bounds of their resource consent, and allowing farmers who can reduce emissions at least cost to do so.

From a monitoring and compliance perspective, the regime of retrospective annual audits and close farmer engagement and farmer education is working well. However, staff are aware that because the non point source property-level limits are a new policy tool for the council, there is still a degree of risk of policy failure associated with enforcing compliance. If significant non-compliance is detected then it is likely that some form of enforcement action will be taken by the council. If that action is challenged through the (criminal) courts, then the regulation as well as its alleged breach would be the subject of intense scrutiny. If the council was not successful with enforcement action then, depending on the nature of the failure, it could impact on the stability of the entire regulatory framework upon which the scheme is founded.

From an environmental outcome perspective, it will be decades before direct water quality measurements in the Lake show whether the regime is effective. The time lag between action on the land and effect on the Lake, required that the water quality objective be achieved by 2080. In the interim, the council has had to rely on implementing a detailed suite of policies and methods that seek to:

- Ensure the nitrogen cap is achieved through monitoring and enforcement of rules
- Ensure the Trust achieves the 20 percent reduction
- Measure and report trends in nitrogen in inflowing streams and in the deep water Lake monitoring site
- Periodically assess groundwater age and therefore review the load of nitrogen from past land use that has yet to enter the Lake
- Periodically review scientific understanding of lake processes.

## 7 Success factors and council learning

### **Initial approach to policy development resulted in ‘one step forward, ten steps back’**

The initial public engagement process by the council could be described as one of consultation where there was no difference in approach between directly and indirectly affected people.<sup>3</sup> An information pamphlet was distributed in early 2000. It set out the environmental issue and accompanying technical information, described the primary policy intervention as regulation of diffuse discharges of nitrogen, and then asked for a response from the local community.

The council did not follow any particular framework or methodology to determine the choice of policy instrument. Policy intervention options included land activities already regulated, such as avoiding direct discharge of fertiliser and animal effluent to waterways. For farmers however, a more far reaching implication was the inclusion of options to limit stocking rates and controls on land conversion to other uses. The council also stated that “restrictions on land use could lead to higher costs to meet environmental protection standards”, but did not specify who would bear the cost of the intervention (Waikato Regional Council 2000a p3). In describing the process, only several months were allowed for consultation, after which the new regulation would be publically notified and start to come into force.

Land owners level of involvement in the various intervention options set out by the council was high, with the attitude toward the intervention being strongly negative (Young and Kaine 2010). Letters to the editor and articles in national and local newspapers and farmer journals quoted farmers as ‘not volunteering to go broke’ and compensation was demanded. At meetings with staff, farmers said they were ‘being seen as the problem’ and believed the intervention would threaten their farm viability and flexibility in the day to day running of their business.

### **Changes made to policy development approach**

The strongly unfavourable attitudes were considered to endanger the policy outcome (Young and Kaine 2010). At this point the council considered complementary policy instruments to lessen, neutralise or change the negative attitudes towards the intervention. Councillors made two key decisions at this point.

First, Councillors pursued cost sharing discussions with central and local government. At about this time, they discussed modelling work showing, amongst other things, that sheep and beef farms in the catchment would not be viable if they bore the full cost of reducing nitrogen leaching to meet the nitrogen target for the lake (Finlayson and Thorrold 2001). A

---

<sup>3</sup> International Association of Public Participation (IAP2) defines a spectrum of increasing level of public impact on policy decision making, from Inform, Consult, Involve, Collaborate and Empower. Each level has a different ‘promise to the public’.

new component was added to the policy intervention. The change was from one of solely regulation, to a combination of regulation and public buy-back of nitrogen.

Councillors second key decision in response to the risk of policy failure was to consider an alternative process proposal by the newly formed Taupo catchment farmer representative group. The council agreed to put resources and time into consultation with affected landowners. Over the next three years thirty-five meetings were held between staff, AgResearch farm systems experts and a small committee of the farmer group Taupo Lake Care.

### **Knowledge of farm context is a key factor in developing policy**

Designing successful policy intervention in the Lake Taupo catchment, required decisions to be informed by objective analysis to understand landowner behaviour in terms of what practices impact the desired public water quality outcome, and why. One approach to do this is methodology (Kaine 2004, 2008) that starts with qualitative analysis to determine groupings of different farm contexts<sup>4</sup> relevant to the policy outcome. This methodology can be used to tailor research and extension processes and communications messages to meet the specific needs of farmers in each segment or group that benefit from the particular technology or practice.

In the Taupo policy development process, this methodology was not used. It was not until the policy began to be implemented that the council fully understood the range of farm contexts amongst the pastoral farmers in the catchment. For instance, implementation staff and AgResearch modellers had to refine the benchmarking approach when working with a farmer with a farm context that had not already been considered and allowed for in the rule drafting and operational decisions.

Both in policy development and implementation, the council was also faced with having to explicitly consider whether changes to the policy instrument were needed in order to get the necessary behavioural change, and whether change will occur at a rate and scope that will achieve the policy outcome. Doing so had important positive consequences for the council in reducing political risk, as it re-designed the process and timing of consultation, as well as making ongoing adjustments to implementation processes.

One council review (Young and Kaine 2010) noted that it may have been faster and more cost-effective for the council to put early effort into understanding firstly the land owner context, and then likely land owner response to an intervention. An intensive traditional consultation process with a small sample of representative land owners can be successful at building relationships and awareness (Yerex 2009). However, the farmers involved are only able to convey a relatively narrow span and interpretation of possible behavioural responses to a policy intervention.

### **Support for farmers to meet regulatory deadlines for new way of farming**

The council justified regulatory controls on the use of land and nitrogen discharges as being within its functions under the Resource Management Act 1991. While the intervention was at a scale that made it possible to achieve the Lake water quality objectives, it became clear to implementation staff and the Lake Taupo Protection Trust that some modifications to the implementation processes were needed to accelerate the rate of change in order to meet rule and nitrogen buy-back deadlines.

---

<sup>4</sup> The farm context can be defined as the mix of farm resources, technologies, management strategies and practices that will influence the benefits sought from the adoption of an agricultural technology or practice. For example, important factors in the farm context for nitrogen mitigation innovations are stock numbers, age classes and gender, the grazing of animals through different seasons, nutrient application, cropping, and supplements brought on the farm and existing infrastructure and management. The number of potential adopters for a given technology or practice is the set of farmers with farm contexts that will benefit from it.

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

Financial assistance to support farmer decision making under the new nitrogen limits, was a significant addition to the regulatory policy instrument by both the council and the Trust to increase the rate of change, and ensure regulatory deadlines were met. The council altered its cost recovery policy and the Trust agreed to fund staff and third party (AgResearch) time to benchmark nitrogen so that farmers were no longer required to pay the entire cost of the resource consent process.

### **Implementation required many changes for both landowners and council staff**

Regulation of diffuse sources of nitrogen across a whole property was a novel and untested approach for both landowners and the council.

Farmers accustomed to managing their business by maximising production within uncertainties about price and weather conditions, had to learn how to farm under property-level nitrogen limits. For instance, from the beginning of the implementation process, difficulties arose for some farmers to provide the minimum level of farming records for benchmarking, especially for farms that had transferred ownership.

Until Variation 5 was notified in 2005, regulatory implementation staff were not required to have competencies in understanding farm systems, nutrient management or farm businesses. An implementation manager was employed prior to the council publically notifying the variation, and staff with farm systems knowledge hired. The new team underwent skills training in nutrient management and developed new processes and procedures for implementation. Whilst some processes and procedures were relatively straightforward, others took considerable time and discussion. As implementation progressed it became apparent that planning or consent processing expertise was needed to align the benchmarking and nitrogen management planning processes within the rule and RMA frameworks.

Many of the implementation challenges were not anticipated by the council, although appear to have been largely overcome by concerted efforts between individuals in the different functional groups in the council and external agencies (Young and Kaine 2010). For instance, benchmarking the historical nitrogen leaching per farm was an iterative process relying on the farmer, AgResearch experts and staff with catchment knowledge. Where information was lacking, judgement calls had to be made between council staff and AgResearch. A monitoring regime for farmer consents had to be developed, using the council’s generic monitoring prioritisation system but adapted and interpreted for Taupo.

### **Constraints on farmer use of nutrient model**

The policy specifies the particular version of the nutrient modelling tool Overseer™ that must be used. New versions of Overseer™ are released more frequently than the rule will be amended through the formal First Schedule process under the RMA.

### **Council costs of implementation**

Cost of non point source nitrogen limits policy implementation on a per farm basis is high compared to the council’s point source rule implementation. The Taupo implementation programme initially had more staff than other programmes which process consents for long

established operations that result point source discharges. Now that consents have been granted and new council processes and procedures are in place, the resourcing demand has reduced significantly.

### **Enforcing compliance**

Compliance is essential to the successful operation of a market; and enforcement must be effective and timely. Where non-compliance is not addressed, the value of rights is likely to decline, the incentives to trade will reduce, and consequently the environmental goal will be jeopardised.

For councils, the costs of prosecutions for non-compliance with regional rules can be high. While some low level enforcement (formal warnings) have been taken against farmers for failing to provide their farm records within the required timeframe, the Taupo cap-and-trade scheme is yet to be tested in terms of prosecutions for significant consent breaches (for example, nitrogen limit exceedances).

In a report on issues around proposed nutrient trading in the Rotorua Lakes, Rive (2012, p.10) contends that lack of knowledge of the precise consequences of non-compliance may mean that people may be more willing to take their chances on a prosecution, delaying putting their own systems in place to monitor and account for their emissions-relevant activities, knowing that the council will have to go through an expensive and time consuming process to enforce the scheme, and at the end of it, even if successful, may only secure a 'token' penalty from the Court. Rive suggests that legislation designed for the purpose of a nitrogen trading scheme, which includes a clear enforcement regime including the ability to initiate debt recovery without the need to establish grounds for a prosecution, would be a useful tool (Rive, 2012).

## **8 Summary**

### **Success factors**

1. Political decision to re-design process, and landowner willingness to engage in developing and implementing new and novel property-level limits.
2. Third party experts and good communicators assisted farmers, councillors and policy writers and implementers (for instance, in the areas of understanding farm systems, and nutrient modelling to achieve property-level limits for non point source discharges).
3. Introduction of trading gave flexibility to farmers allowing for temporary or permanent transfers of nitrogen.
4. Change to increase resourcing for implementation after realisation that the desired rate of change to a new way of farming within nitrogen limits was not able to be achieved (deadlines for all farmers benchmarked and consented and tonnes of nitrogen reduced).

### **Learnings for council**

1. That effort to fully understand landowner context and response to new regulation would be beneficial in any future policy intervention.
2. Many of the new council processes were unanticipated and had to be developed as implementation proceeded. Insights into the different consequences that the changes posed for the council would have assisted streamlined implementation.
3. Council costs of non point source nitrogen limits policy implementation on a per farm basis is high compared to traditional point source rule implementation.
4. Compliance and enforcement staff work with the implementation team on monitoring procedures and practices that ensure the council is well placed to take enforcement action should it be needed in the future. However, they are aware that the effectiveness of the new regulation is untested until this occurs.



## 9 Reviews of the cap and trade scheme<sup>5</sup>

The council has undertaken several reviews of the cap and trade scheme. These have been peer reviewed or co-authored by Dr Geoff Kaine, a consultant economist and policy researcher with experience both in designing frameworks to choose natural resource policy instruments and experience in designing water markets in Victoria, Australia.

**1. Barnes S and J Young 2013. Cap-and-trade of diffuse emissions of nitrogen in Lake Taupo Catchment. Reviewing the policy decisions and the market. Waikato Regional Council Technical Report 2013/34. Document number 2256765.**

This report reviews the decisions that established the cap-and-trade market for NDAs within the RMA regulatory framework of Variation 5, using an economic markets framework. It examines the rights conferred, the conditions in which the market operates, and the functioning of the market to date.

Economic theory on markets defines the pre-conditions required to set up a market for an environmental pollutant as:

- a) establish the environmental target
- b) define the commodity to be traded and assign rights
- c) establish the cap and the means of reduction
- d) set up monitoring and enforcement mechanisms.

This framework is applied to the Taupo cap-and-trade scheme through the identification and discussion of the decisions made in Variation 5.

**2. Young J Kaine G 2010. Application of the policy choice framework to the Lake Taupo catchment. Environment Waikato Technical Report 2010/20. Hamilton, Waikato Regional Council (Environment Waikato)**

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

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

---

<sup>5</sup> There have been no independent evaluations of the process or outcomes of the Taupo regulation.

## 10 References

Barnes S and J Young 2013. Cap-and-trade of diffuse emissions of nitrogen in Lake Taupo Catchment. Reviewing the policy decisions and the market. Waikato Regional Council Technical Report 2013/34. Document number 2256765.

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

Kaine, G., 2004. Consumer Behaviour as a Theory of Innovation Adoption in Agriculture (Social Research Working Paper 01/04), Social Research Working Paper. AgResearch.

Kaine, G., 2008. The adoption of agricultural innovations (Unpublished doctoral dissertation). University of New England.

Rive V 2012. Nutrient trading in Lake Rotorua. Design, implementation and enforcement - legal issues. [www.motu.org.nz/index.php?/publications/](http://www.motu.org.nz/index.php?/publications/) [Accessed 26 October 2012].

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

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

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

Waikato Regional Council (Environment Waikato) 2009. Taupo Implementation Team Meeting – Issues with Implementation 13 January 2009. Document No. 1427549.

Waikato Regional Council 2014. Understanding WRC's grazing management research Unpublished report prepared for the Healthy Rivers Wai Ora project. WRC document number 2820742.

Young J Kaine G 2010. Application of the policy choice framework to the Lake Taupo catchment. Environment Waikato Technical Report 2010/20. Hamilton, Waikato Regional Council (Environment Waikato).

Yerex S 2009. Lake Taupo. The strategy and the lessons. Report prepared for Kellogg Rural Leadership Programme 2008.