Farmer nutrient management & water quality regulation in New Zealand

POLICY BRIEF

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POLICY TARGETING AGRICULTURAL NONPOINT SOURCE POLLUTION STRIVES TO IMPROVE WATER QUALITY BY CHANGING FARMER BEHAVIOR ACROSS THE LANDSCAPE. What farmers are doing on their land and the drivers that influence these behaviors are signals of whether water quality will improve and if behavior is changing as intended. This study compares farmer behavior change and perceptions in three areas: the Taupo and Rotorua regions of New Zeland and Vermont, U.S.A.

IN BRIEF

- The 2005 policy "Variation No. 5 – Lake Taupo Catchment" became operational in 2011 to clean up Lake Taupo. Additional rules, known as 2005's Rule 11 and 2016's Plan Change 10 were also proposed to improve water quality in Lake Rotorua.
- From 2016-2018, we interviewed 38 farmers in New Zealand and Vermont to compare farmers' reported behavior change and perceived outcomes
- Taupo and Rotoura both have mandatory performance-based policies requiring farms to stay below a nutrient leaching limit, but give farms flexibility to achieve the limit via a nitrogen trading market. In comparison, Vermont implemented mandatory rules requiring farms to enact a specific practice to improve water quality (see Figure 1).

KEY TAKEAWAYS

- Practice- and performance-based regulatory contexts are associated with different types of nutrient management changes across the landscape.
- Taupo's performance-based regulation resulted primarily in functional changes (e.g. switch from pasture to forestry).
- Vermont's practice-based regulation resulted primarily in physical changes (e.g. fencing or buffers).
- Across all regulatory contexts, farmers needed financial resources or assistance to achieve physical or functional changes.
- In New Zealand, regulation was noted as a key driver of farm changes. Conversely, in Vermont, the water quality regulation serves as a back-stop because farmers have used existing incentives to make changes.

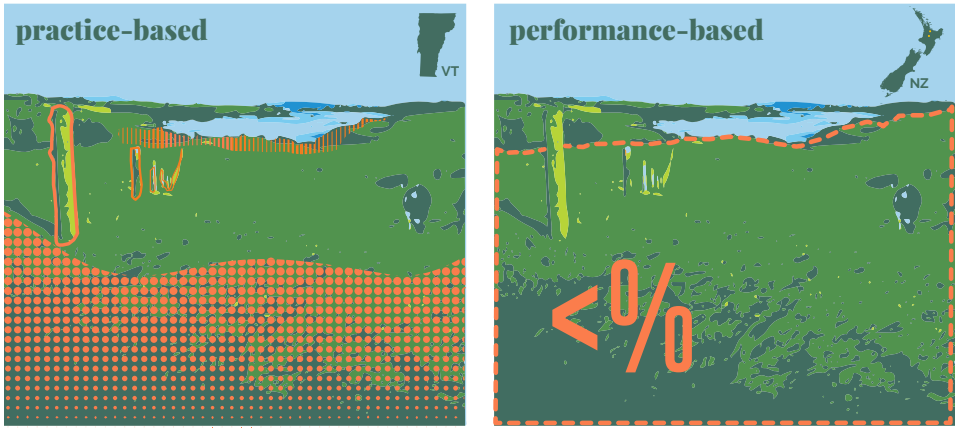

Figure 1. Foci of Practice-Based and Performance-Based policies.

WHAT WE LEARNED - NEW ZEALAND

Interviewed Taupo farmers reported making on average 4.5 different nutrient management changes in the past 5-10 years while Rotorua farmers reported making on average almost four (see Table 1). The top reported management changes for Taupo farmers were reduced stocking rate, change in seeding varieties or cropping and reduced fertilizer use. For Rotorua, the top management changes were reduced fertilizer use and stocking rate. Reported physical changes in Taupo were installing fencing and upgrading milking parlors, and in Rotorua they were fencing and manure

pit upgrades. Top functional changes in Taupo were a switch to a lower intensity farming system and purchase of new land. In Rotorua, the top functional changes were switch to a lower intensity farm system.

DRIVERS OF BEHAVORIAL CHANGE

In Taupo, farmers reported that water quality policy is the main behavioral driver, coupled with farm economics and the voluntary nitrogen market. The voluntary nitrogen market appears to promote functional changes rather than physical changes.

In Rotorua, our study captured a time of high uncertainty for farmers with proposed, but not yet operational rules. Rotorua's farmers noted fewer drivers and fewer behavior changes. Water quality policy was reported as the top driver of behavior change in the region. This suggests that proposed rules were perceived as changing behavior even before becoming operational.

WATERSHED OUTCOMES

In Taupo, many farmers are at the margin economically and do not have access to financial assistance. The new policy fostered entrepreneurship and innovation in a way that was not seen in the other two regions. In Rotorua, farmers had highly negative perceptions of social and economic outcomes of the water quality policy. This is likely related to the high level of uncertainty that remains about what final form the policy will take and the current absence of incentives or access to capital to make management changes.

COMPARISON: VERMONT

Taupo's performance-based regulation encourages functional changes (e.g., switch from pasture to forestry). Vermont's practice-based regulation encourages physical changes (e.g., fencing or buffers). Rotorua farmers reported lower levels of changes overall, most likely due to the current policy status.

Farmer experience with policy differed in each region (see Figure 2). In contrast to Taupo and Rotorua, Vermont farmers described an incentive-based context that supports farmers with financial and technical assistance. Vermont farmers generally reported a lack of negative social and economic impacts in large part due to the availability of funding to ease transition to changes.

One thing was clear across all areas: farmers needed financial access or assistance to achieve physical or functional changes to their farms. In Taupo, farmers sold nitrogen. In Rotorua, there were much lower levels of physical and functional changes. In Vermont, farmers used financial assistance and cost sharing.

It is unclear, however, how physical or functional changes will differ in their ecological impact over the long term. What this research does show us is that different types of nutrient management changes are emerging in these practice-based and performance-based regulatory contexts. We need a better understanding of what these differences mean for achieving water quality improvements.

Figure 2. The three study locations: Vermont, USA; Rotorua, and Taupo, New Zealand.

Region	Vermont (n=16)	Taupo (n=11)	Rotorua (n=11)
Behavior Change	Average Per Farm	Average Per Farm	Average Per Farm
Management Changes	2.88	3	1.73
Physical Changes	2.5	0.36	1.27
Functional Changes	0.63	1.73	1
Total Changes	5.81	4.55	3.64

Table 1. Average Number of Nutrient Mangement Behavioral Changes per Farm

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