

Regional Collaborative Extension Project

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Abstract. The increasingly regulated management of natural resources in New Zealand provides another dimension for agricultural extensionists to consider, alongside the economic and bio-physical dynamics of farming systems. New processes for on-farm learning and system adaptation are needed that address the legal and statutory obligations being imposed on farmers to reflect the values of communities, industry and central government.

DairyNZ and private consultants have worked together with the Manawatu-Wanganui Regional Council to assist dairy farmers in that region comply with the regulations while improving on-farm productivity. Dairy farmers in the Waikawa Catchment applied for their landuse consents before the end of 2015 to reduce their estimated nutrient contamination in the catchment by between 5-15%. The significant change enabling this to happen has been that extension participants found that by collaborating across organisations they have been able to join up their capabilities for the good of the industry, rural communities and future generations.

Keywords: One-Plan, nutrients, farm-plan, catchment-plan.

Introduction

Resource management legislation in New Zealand has been brought together in one document, the Resource Management Act (RMA; New Zealand Government 1991). The RMA identifies roles for central government, regional government and territorial authorities in the development, administration and enforcement of rules governing the management of air, inshore marine areas, soils, and water. Regional Councils such as the Manawatu-Whanganui Regional Council have the responsibility of developing regional plans every 6-10 years for their regions. In 2014 the latest regional plan for the Manawatu-Whanganui region became operative (the OnePlan; Manawatu-Wanganui Regional Council 2014). Chapter 5 of the OnePlan prescribes “the regionally significant issues for water management within the Region, and sets out the objectives, policies and methods that derive from these issues”. These include that “existing intensive farming landuse activities must be regulated in targeted Water Management Sub-zones to achieve the nitrogen leaching maximums specified” and that “new intensive farming landuse activities must be regulated throughout the Region to achieve the nitrogen leaching maximums specified”.

A table in Chapter 14 of the OnePlan describes the maximum amount of nitrogen that can be leached from different land use classification units (LUC; Hicks & Anthony 2001). The leaching limits decline over time from the first to the 20th year. Leaching limits in the table range from 30 to 2 kg of nitrate nitrogen per hectare.

If intensive farmers can operate within the leaching limits in the Chapter 14 table they apply to the council for a controlled consent. If they can't achieve the limits, they must apply for a restricted discretionary consent.

The OnePlan consenting requirements affects almost 500 farmers in the Manawatu-Wanganui region, mostly dairy farmers. Identifying the farm system changes and preparing the documentation in time, required the support of specialists including extension services from a number of regional and national organisations.

During the late 1980s the public extension services provided by the Ministry of Agriculture and Fisheries in New Zealand were privatised. Since then industry-good organisations such as DairyNZ have continued to provide extension services as have some private farm consultants (Parminter 2011^a). Less than 20% of farmers have contact with farm consultants and they have mainly been involved in providing business advice to farmers to increase their profitability (Botha et.al. 2006). The farm consultants in that study were not interested in contributing to environmental decision making on farms except where compliance issues were involved (ibid). Since the 1980s many of the extension papers in New Zealand have continued to build on the principles of technology transfer (Lissaman et.al. 2013) although there has been some interest in co-learning and collaboration (Allen et.al. 2002). In order to adapt to new natural resource issues it has been suggested that new models of doing extension are needed (Botha et.al.

2006). For some researchers that has meant looking at individual models of extension (Manjala 2006), for others it has been a social model of extension (Turner et.al. 2013). Both individual and social models have been integrated for Australian and New Zealand policy makers by Vanclay and Leach (2011), and Parminter (2011^b) respectively.

DairyNZ is an 'industry-good' organisation owned by institutions within the dairy industry and funded in part by farmer levies to "support on-farm change, create on-farm opportunities, build capability and mitigate risk to achieve the industry's strategic objectives. This is being done through research, development, engagement and leadership." DairyNZ has regional offices and employs about 40 consulting officers throughout New Zealand, working in the field charged with implementing the strategy and addressing the needs of about 1300 dairy farmers. The dairy industry's strategy until 2020 has been for the industry to be globally and locally competitive and to act responsibly towards the environment, staff, communities and the nation.

As an example of this strategy in action DairyNZ has worked with the Manawatu-Wanganui Regional Council to put in place a pilot project that could assist farmers to make farming system changes and create opportunities for industry development within nutrient-limit constraints. The purpose of the pilot project was to build an alignment between regional council staff, DairyNZ consulting officers and private farm consultants so that a uniform approach was in place to assist farmers in obtaining their consents from the Regional Council". The pilot project focussed upon farmers in three catchments including the Waikawa Stream Catchment.

Waikawa Stream Catchment

The Waikawa Stream Catchment contains two rural villages – Manakau in the middle, and Waikawa Beach along the seaside (Figure 1). They have permanent populations of just over 400 and 50 people respectively (Brown, pers comm. 2015).

Figure 1. Map of the Waikawa catchment on the west coast of the Manawatu-Wanganui region



Source: LINZ

The Waikawa Stream is just over 18km long, from the headwaters in the Tararua Ranges to the western shore line of the Manawatu-Wanganui Region. The catchment has two main streams, the Waikawa Stream on the northern side of Manakau and the Manakau Stream to the south of Manakau. The Manakau Stream joins the Waikawa Stream just above Huritini and before it reaches the Waikawa Beach settlement.

In the catchment there are seven dairy farms and a number of rural lifestyle blocks. The catchment is about 8,000ha and dairy farms make up about 24% of the landuse in the catchment (Horizons 2015).

Water testing the Waikawa Stream

The regional council has water testing sites in the upper catchment of the Waikawa Stream at North Manakau Rd, in the middle of the catchment at the Manakau Stream at Manakau itself and then below their confluence and just above the beach settlement at Huritini.

In 2012 the Waikawa Catchment was monitored for soluble inorganic nitrogen levels (SIN), providing a measure of all the inorganic nitrogen compounds in the waterway, including, nitrite, nitrate and ammoniacal nitrogen. The same sites were monitored for dissolved reactive phosphorus to measure soluble phosphorus compounds readily taken up by plants and algae. There were not expected to be discharges from point sources in the catchment but there were potential sources of nutrient contamination from septic tanks, road runoff and agricultural activities.

The catchment had targets for nutrients to keep these below the point at which nuisance growth of plants and algae were likely to occur. Having too much nuisance water plants and algae growing in a waterway can reduce the diversity of aquatic insects, cause large fluctuations in oxygen, and make the water more acid. These changes in water quality can harm aquatic communities, block irrigation intakes and reduce recreational enjoyment.

In 2012 nitrogen results at the top of the Waikawa Catchment near the forest park were well within the target figures. In the middle of the catchment they were twice the target and in the lower catchment they were four times the target (Table 1; Roygard and Clark 2012). Since 2012, catchment loads of soluble inorganic nitrogen have been becoming less each year, although below Manakau they are still above the target.

Phosphorus results were lowest at the top of the catchment and twice the target in the rest of the catchment.

Table 1. Measured nitrogen and phosphorus loads compared to regional council targets for waterways

Monitoring Site	Nitrogen target load (tonnes/year)	Measured nitrogen (tonnes/year)	Phosphorus target load (tonnes/year)	Measured Phosphorus (tonnes/year)
North Manakau	8.1	4.5	0.5	0.5
Manakau	2.0	4.6	0.1	0.2
Huritini	10.0	43.7	0.6	1.2

Collaborative Extension Methodology

Extension strategies for achieving social and human behaviour change can be guided by a number of different models. These have been summarised by an author in previous publications (e.g. Parminter 2013, Parminter 2010). The key elements these publications identified were:

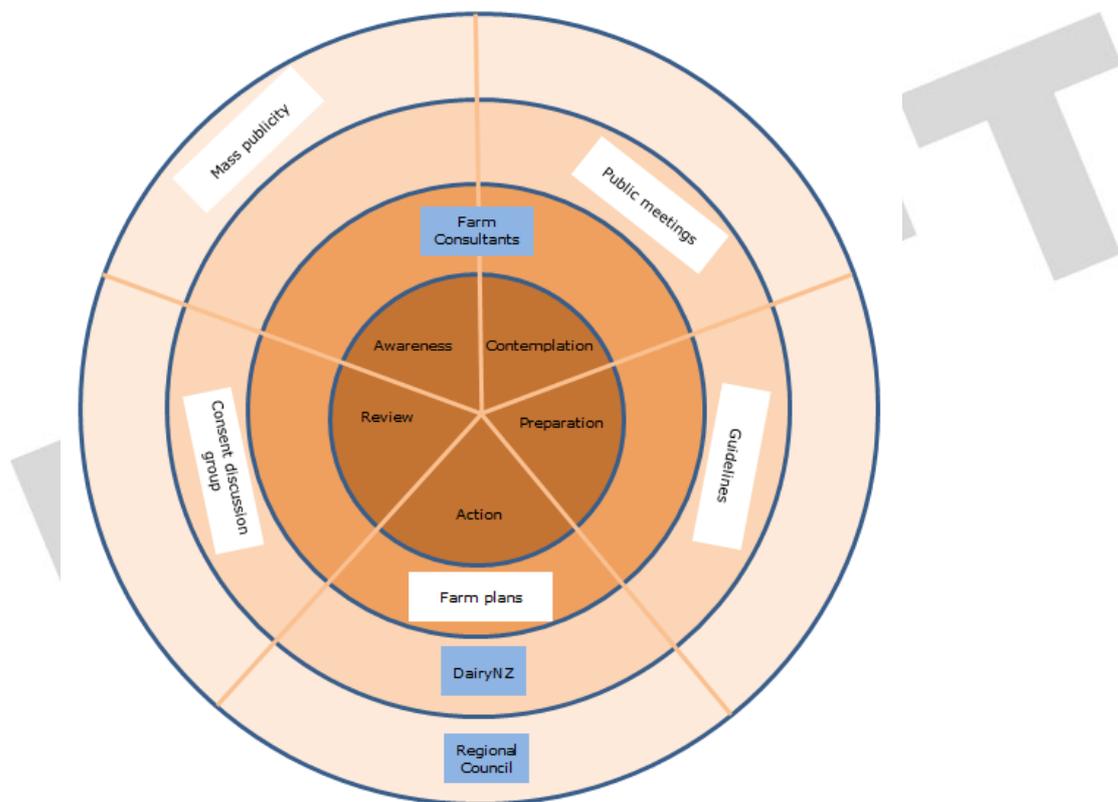
- A mix of resources being available to provide both relationship building and technical support during the introduction and implementation phases of an extension strategy
- Segmentation of farmer participants based on their recognised stages of behaviour change so that different extension interventions can be matched to support each stage
- Establishing a process of on-going feed-back and learning throughout implementation of the strategy so that it can be adapted to meet changing conditions and needs

The strategy for this project was not designed by following the theoretical elements described above. Instead the project was developed around an approach for delivering on-farm and catchment results that reflected behaviour change principles known to the managers in the regional council and DairyNZ (Parminter and Neild 2013). In doing so they intuitively addressed the elements above and the theoretical framework now provides a useful lens for retrospectively reviewing the content of the strategy and its implementation.

In Figure 2 the stages of change are shown as they relate to the interventions developed in this project.

- Awareness stage. During which participants began to notice that the OnePlan existed and that it contained rules that could affect them. Mass publicity about the OnePlan was encouraged by the council and farmer lobby groups. Information during this stage tended to dramatize the situation rather than being technical (Federated Farmers 2012; The New Zealand Farmers Weekly 2013). The information was not specific to Waikawa Catchment, and was widely and readily available at low cost.
- Contemplation stage. When participants recognised that all the dairy farms in the Waikawa Catchment were included in the One Plan provisions. The council and DairyNZ staff held a public meeting in the catchment specifically for dairy farmers to explain how they could be affected and the opportunities provided for them in the pilot project. The information was associated with respected farming leaders and industry experts to assist in building farmer confidence in the information being conveyed.

Figure 2. Extension activities matched to the stages of change segments of farmer participants



- Preparation stage. When participants started to make plans to involve themselves in the consenting process. At this stage they needed to know the level of resources required in order for them to become involved and the sorts of benefits possible for them. For farmers in this stage, DairyNZ provided a comprehensive manual and additional guidelines.
- Action stage. When farmers worked with their local consultants to select and customise a set of management practices suitable for their dairy system.
- Review stage. When farmers began growing in confidence in what they were doing the changes that each of them were making was reinforced by their peers. For this DairyNZ established a local discussion group specifically for consented dairy farmers.

The following part of the paper describes the activities in each of these stages in more detail.

Mass Communication

While the OnePlan was being introduced, the regional council employed their own farm advisory staff to work with farmers in the region. In anticipation of the release of the OnePlan, farmer groups had become quite agitated about the possible policies and rules that it could contain. Farmer lobby groups organised resistance to its introduction. This included the farmers in the Waikawa Catchment. The regional council staff met with these farmer groups and provided written material for agricultural magazines and newspapers about the policies and rules in the OnePlan (The NZ Farmers Weekly 2013). The articles described the purpose of these provisions and how farmers could be affected by them. During this time the council's science staff also provided technical information to land owners and farmer lobby groups to assist them to take an evidence-based approach to presenting their arguments for and against the OnePlan to the public and the council.

Public meetings

The seven dairy farmers in the Waikawa catchment were encouraged by DairyNZ to attend an initial meeting where the OnePlan could be explained by people from both DairyNZ and the regional council. At the meeting the farmers in the Waikawa catchment were able to voice their concerns and discuss the policies, rules and consenting processes with people knowledgeable about the detail in the OnePlan.

The OnePlan and nutrient budgeting required the use of Overseer® decision support software. The content of the farm plans and how the Overseer® results would be used in it was also a point of contention with the farmers and at the meeting this needed additional explanation. At the end of the meeting there was an opportunity for farmers to sign on and join the pilot project. All seven farmers in the Waikawa Catchment agreed to participate.

Guidelines

It was recognised during the public meetings across the region that the amount of information being presented was a bit over whelming for people in the audiences to take in at those events. Therefore a comprehensive manual was developed that outlined the roles and responsibilities of all the parties involved in the consenting processes. This helped to align the expectations of farmers with what was actually going to be happening. In addition, information on mitigation practices how to reduce nitrogen losses and environmental checklists were also made available to them. Using these resources the farmers could consider the likely actions that would be required on their farms before they were visited by farm consultants.

Actions

Each farmer working with their nominated consultant was responsible for preparing a nutrient management plan for their property to support their consent application. The applications had to be submitted before the end of 2015 and had the potential to be granted for periods of up to 25 years. Consents were granted at the discretion of council staff depending on the information contained in the nutrient management plan. The discretion of staff was restricted to only those matters described in the OnePlan. Preparing nutrient management plans involved the following steps:

Step 1: Soil and Land Use Capability (LUC) maps at 1:7,000 scale, for each farm were developed by trained pedologists on contract to the council for this project and provided to each farmer.

Step 2: Using the maps, DairyNZ staff met with the farmers on their properties and established a baseline description of the farms for the 2012/13 season. The baseline was then used as a starting point for each farm to be able to quantify and report on the commitments and subsequent environmental improvements to be achieved on each farm.

Step 3: The farmer with their farm consultant agreed on a set of on-farm mitigation practices. Each set of mitigation practices was modelled through Overseer® to ensure that sufficient reduction in nutrient losses was being accumulated on the farm to achieve the desired catchment results.

A secondary document was prepared by the farm consultants for the on-farm discussions that highlighted both the management and financial considerations for each farm mitigation option being considered.

Step 4: The farm consultant then used the mitigations and associated analysis and baseline modelling to complete a nutrient management plan for the farm. The nutrient management plan then formed the basis of the consent application to council.

Step 5: The nutrient management plan and consent application for each farm was lodged with the council and once approved, a consent was granted. The consent enabled existing dairy farmers to continue dairying over the specified time period, as long as the nutrient reductions were being achieved each year.

The council and DairyNZ established a behavioural scale for evaluating the responses of farmers. It worked on a three colour system – green, yellow and red. Farmers in the green category understood their responsibilities and worked with the team through steps 1-5 in order to submit their consent application. Farmers that were unwilling to make sufficient practice change were in the orange category. These farmers would receive an additional visit by council farm advisory staff to talk through their social responsibility to implement the OnePlan. Farmers that were not prepared to engage with the process at all were visited by council staff and as well as their social responsibilities were warned about the negative consequences for them of continued non-compliance. All the farmers in the Waikawa catchment fitted the green category.

Review

At the time that their consents were being submitted the seven Waikawa farms ranged in nitrogen loss rates from 22-39kgN/ha/yr. The consent applications showed how the different farmers would be reducing these by between 0-18% over a 20 year period (an average of 8%. The actual amount depending upon the type of farming system involved, its rigidity to modification and the starting point (Parminter 2015).

After the consent applications had been submitted and been approved by the council, a 'post-consent support group' was provided for the Waikawa farmers modelled along discussion group lines. The objective of the discussion group was to provide farmers with the confidence that they could continue to farm profitably within their environmental constraints (Parminter and Ridsdale 2015). The discussion group has focussed on practical on-farm solutions to address problems raised by farmers. Farmers have been able to learn from each other and from invited experts.

The discussion group has been provided with information by the council on their results from water quality monitoring. These showed that in the Waikawa stream some parameters such as e-coli have been improving as livestock have been fenced out.

Coordination and Collaboration

The extension strategy for policy implementation could not be delivered by any single organisation. The regional council had the statutory responsibility for catchment management and needed to be included along with DairyNZ to provide an industry perspective. DairyNZ had a mandate from farmers for developing the changes in farming practices that were needed in the farm plans. Farm consultants were included to provide independence and a client focus. Environmental organisations were considered for the project, but were unable to make any technical or mandated contributions to the project.

The project brought together a range of skill sets with the different individuals that became part of the team. These included aspects of resource-consent assessment, stream ecology, nutrient science, farm management, farm systems design, event management, technical writing, agricultural extension, and project management. All of these skill sets needed to be co-ordinated across the organisations so that the intent to collaborate was enhanced throughout the project.

Conclusions

The policy problem being addressed in this project was socially defined through the OnePlan development process. It needed an integrated social as well as a technical response. It would not have been enough to have developed a technical solution without the industry and the affected farmers being part of that development. In this project farm consultants have been resourced to work with separate farm businesses and describe the policy problem as it manifests itself to individual farmers. They have then been able to customise a range of farming practices so that farmers have been able to take their part in a collective catchment response.

Extension principles and best practice have been important to the participants in the project. Although the team have not followed an extension prescription, the various components of

recognised practice-change frameworks have been brought together in an integrated extension strategy.

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