Trouble on the water: understanding the context of dairy farmers work in Canterbury, New Zealand

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Abstract. In Canterbury New Zealand, water is a contentious issue, especially when irrigation and dairy farming are involved. Our research aimed to determine dairy farmers' understanding and perceptions of water use efficiency in regards to their irrigation system. A comprehensive search of popular press revealed that a negative perception of dairy farming exists, especially in regards to irrigation. While this research did not explore the direct link between public perception and farmers, farmers were very aware of how the urban population perceive dairy farming. However they argued that these non-farmers did not truly understand the benefits farming brings to the region. When asked whether dairy farmers should pay for water, many (90%) argued that they already do so through the resource consent process and infrastructure to take the water. However, 23 of the 27 farmers had modified their practices and on-farm infrastructure because of public perception and perceived difficulty with future water allocation.

Keywords: water efficiency, irrigation, dairy farmers, Canterbury.

Introduction

Water, in Canterbury New Zealand, is a contentious issue, especially when irrigation and dairy farming are involved. The importance of irrigation to Canterbury's overall development has been recognised by local government and has been given priority in the Environment Canterbury Regional Development Strategy. This has a focus on the development of further irrigation schemes in the Canterbury region. A common theme raised in previous research (Payne and Steven 2007a, b) was the negative responses that farmer interviewees received from members of the community about the use of water by dairy farmers. We realised that the context in which they live and make decisions must first be understood before researchers can truly interpret dairy farmers' views on irrigation.

Two key issues which have arisen are water use efficiency and ownership of irrigation water. This research aimed to investigate the views and actions of farmers on improving water use efficiency. It also aimed to understand their views on ownership of water.

Background

Popular press and Canterbury irrigation

An understanding of the context in which dairy farmers work and live is required to gain a better understanding of their perceptions of irrigation water-use efficiency. A search was undertaken looking at public views of water irrigation on dairy farms in the Canterbury region through the popular press. Overall the search revealed that there is considerable opposition to the increased water use by large dairy farm irrigators on the Canterbury plains. In particular, there is much controversy surrounding the planned Central Water Plains irrigation scheme, which opponents see as backing the needs of the expanding dairy industry and threatening the recreational and environmental assets of the region by harming fisheries and reducing water flows. Some also fear that increased irrigation and dairying could lead to an increase in potentially fatal waterborne illnesses. Opponents also include farmers who have their livelihoods and farms threatened by proposed water storage and dams.

The public see farming as one of the main contributors to almost all of New Zealand's environmental problems. When people are asked about irrigation, most New Zealanders think of Canterbury. In Canterbury, dairy farming is perceived to be putting huge pressure on water supplies and the environment. For example Lee (2003, p.14) said 'Dr La Follette an environmental scientist had dire warnings that proposed large-scale irrigation schemes on the plains and the likely dairy development which would follow could have disastrous consequences for the environment and people'. He goes on to say that 'environmentally, the best practice was not to try and beat nature at all, and dry land should be left as it is'.

A State of the Environment report released by the Ministry for the Environment identified 'intensive agriculture and the associated deterioration of lowland water quality [as] the number one issue facing New Zealand's environment' (Fish and Game 2008).

Farmers are perceived, by some individuals in the community, to 'take, take, take', when it comes to water in Canterbury. Table 1 illustrates some of the articles that have been published

between October 2001 and December 2008 on irrigation in Canterbury. Many of the titles portray a very negative view of this industry. For example 'dairying blamed for water crisis', 'dry horrors' and 'water wars'.

Table 1: Articles published on irrigation in Canterbury (Oct 2001- Dec 2008)

Date	Source	Title of article	View point	Reference
Oct 01	NZ Dairy Exporter	Conflict over water in Mid-Canterbury: safeguarding their water resource	negative	(Lee 2001)
26/2/02	The Press	Irrigation: too many unknowns	negative	(Clark 2002)
31/1/03	NZ Environment	Are we reaching the bottom of the bucket?	negative	(Hansford 2003)
15/5/03	The Press	No new irrigation	negative	(Rodgers 2003)
9/8/03	The Press	Draining the well dry	negative	(Henzell 2003)
Mar 04	NZ Dairy Exporter	Allocation in Canterbury reaches a watershed	negative	(Lee 2004a)
Dec 04	NZ Dairy Exporter	IRRIGATION: National benefit from SI schemes	positive	(Lee 2004b)
Jul 05	NZ Dairy Exporter	Irrigation effects felt on lower Canterbury Plains	positive & negative	(Lee 2005)
Oct 05	NZ Dairy Exporter	Testing time for take-up rights	negative	(Anon 2005a)
2/12/05	The Press	Lifeblood of Canterbury	positive & negative	(Cronshaw 2005)
2/2/06	NZ Listener	Dry horrors	negative	(Ansley 2006)
15/4/06	NZ Listener	Condition critical	negative	(Anon 2006)
Nov 06	NZ Dairy Exporter	Irrigation: 'work together' plea in Canterbury	negative & positive	(Lee 2006)
5/6/07	The Green Party	Pull plug on Canterbury water plan	negative	(Tanczos 2007)
24/7/07	The Press	Time to cry outrage over spilt milk and water	negative	(du Fresne 2007)
Sep 07	NZ Dairy Exporter	Water: irrigation for 'whole community'	positive & negative	(Lee 2007c)
13/8/07	Country-Wide	Canterbury water issues boiling over	negative	(Anon 2007a)
13/8/07	The Press	Water plan 'risks health'	negative	(Morrall 2007)
17/8/07	The Press	The downside of dairying	negative	(Williams 2007)
17/8/07	The Press	Dairying debate clouded by misinformation	positive & negative	(Mackenzie 2007)
28/8/07	The Press	Time to talk on dairying	positive	(Penno 2007)
31/8/07	The Press	Groups move to protect river	negative	(Bristow 2007)
19/9/07	The Press	More facts needed in water debate	positive	(Fleming 2007)
21/9/07	The Press	Water debate vital	negative	(Memon and Nicolle 2007)
6/11/07	The Press	Study on health impact of irrigation	negative	(Anon 2007b)
Nov 07	NZ Dairy Exporter	Environment Canterbury farmers: we're clean	positive	(Lee 2007a)
Dec 07	NZ Dairy Exporter	Meeting backs Central Plains	positive	(Lee 2007b)
4/2/08	The Press	Some good news	positive & negative	(Editorial 2008)
1/3/08	NZ Listener	Water wars	negative	(Macfie 2008)
5/3/08	The Press	Water scheme: fears for infants	negative	(Wylie 2008)
7/3/08	ruralnews.co.nz	Irrigation bid off to a bad start	negative	(Carnachan 2008)
25/7/08	Ashburton Guardian	Farmers make case for more water	positive	(Clarke 2008a)
1/8/08	Unlimited	Water – a $40 billion issue	negative	(Anon 2005b)
5/8/08	The Press	Report reveals threat to rivers	negative	(Silkstone 2008)
23/8/08	The Press	The big water grab	negative	(Gorman 2008)
24/10/08	Straight Furrow	Irrigation possible, says water study	positive	(Keene 2008)
22/12/08	Ashburton Guardian	Water survey reveals concerns	negative	(Clarke 2008b)
	Website	Save Our Water	negative	(Save Our Water 2007)

Many stakeholder groups voice their opinion about dairy farming and irrigation in Canterbury (Table 2). There are also many research reports investigating the issue of irrigation in Canterbury. Stakeholder groups take parts of these reports to add weight to their arguments and viewpoints. Fish and Game, an angler and game bird hunter organisation, believe that the Canterbury region is facing 'an additional 100 000+ hectares of irrigated land for intensive agriculture, probably dairying. We all know there's a large mismatch between land capability and land use' (Fish and Game 2008). Fish and Game believe the Central Government must use regulation to pause large-scale water developments until suitable national policies and standards are put into place.

Table 2: Stakeholder groups who have issues with dairying and irrigation as identified in the popular press search

Stakeholder group	Issue with dairying and irrigation
Fish and Game	• Water quality
Green Party	• Climate change
	• Clearance of trees and vegetation
	• It is a public resource and should be there for everyone to use
Save our water	• Quantity and quality of water available in Christchurch
Forest and Bird	• Want to protect bird and fish species which rely on the river
	• Native plants
Kayakers	• Irrigation depletes the Waimakariri and Rakaia Rivers
Other farmers	• Impact new water consents have on their own water allocation
Water Rights Trust	• Central Plains Water scheme
Canterbury District Health Board	• Infant health due to risk of heightened nitrate levels in regions drinking water

In the summer of 2004, Canterbury experienced a drought and the demand for irrigated water increased. Existing dairy farmers defended their irrigation right and objected to new consent applications to draw water from their areas. When an application went in from Te Pirita dairy farm, Lynton Dairy Ltd, to take water from 10 bores across 999ha, Robindale Dairies, a 3,000 cow neighbouring farm asked that conditions be imposed. Robindale wanted conditions put in place to stop major effects the take might have on their own water supply (Lee 2004a). However, not just large corporate farms object to new consent application; smaller units also see new consents as threatening the security of their water supply. As Dairy Holdings general manager Colin Glass said (Lee 2004a, p.26); 'it is farmer having to be pitted against farmer' for this valuable resource.

Literature

Freshwater resources are usually described as a common property resource because they have no specific owner and belong to everybody. In 1968, Hardin (1994) coined the phrase 'tragedy of the commons' to describe the degradation typically associated with common property resources (Hardin 1994; Dryzek, 1997). He used the image (or metaphor) of the medieval village common to illustrate why common property will always be degraded. Each user will attempt to maximise the benefits from resource utilisation by putting as many grazing animals on the commons as possible. This rational pursuit of self interest acts against the collective long-term interest of conserving the commons and results in degradation (or in this case over grazing and erosion). This example highlights the social dilemma present in social debates i.e. the pursuit of rational self-interest acts against the collective good (Karp 1997). It is widely believed that degradation occurs because property rights are poorly assigned (O'Neill and Scrimgeour 1991) thus making self-interest a rational choice. However, because dairy farmers, and/or water schemes, have to apply to local government, i.e. councils, for a resource consent for irrigated water this does imply that the water, although a common property resource, is managed by the Councils.

Methods

The Kaine framework

The Kaine Framework has been designed 'for predicting the adoption of innovations by primary producers' (Kaine 2009, p.52). Consumer behaviour theory and farming management underpin this framework. Kaine (2009) identifies four propositions that underlie this framework:

1. Benefits from adopting agricultural innovations depend on farm context;
2. Farm context can consist of elements that are external to the decision-maker;
3. Producers reasons for adopting innovations will mirror their farm context; and
4. Producers are the most authoritative source of knowledge about their farm context.

The Kaine Framework allows farmers to be placed into segments based on their similarities and differences in 'the purchase criteria that they use to evaluate a product' (Kaine 2009, p. 52). Understanding the key purchase criteria that farmers in a particular segment use, can be used to modify innovations and information to meet the specific needs of people in that segment (Kaine 2009).

The framework developed by Kaine (2009) has two stages, the first is to identify the elements in the farm system that shape the benefits from adopting a particular innovation and form the farm contexts. The first stage is an elicitation process that will (Kaine 2009, p. 101):

yield a set of hypothesised associations between the various elements that constitute the set of farm contexts for an innovation, the adoption of the innovation and the benefits of the innovation.

This process provides the information to design a survey (Converse and Presser 1986 cited in Kaine 2009, p. 101).The second stage identifies the proportion of farmers 'with farm systems that are consistent with the farm context for the innovation is quantified' (Kaine 2009, p. 115).

Research methods

The Kaine Framework provided the conceptual approach for this research. This approach enables the identification of the benefits sought from adopting a particular technology, or in this case, the benefits sought from adopting a particular strategy – improved water use efficiency on farm. In the case of farming, the benefits resulting from adopting a particular technology depend on a range of contextual factors that are specific to the circumstances of each farm enterprise (Bewsell and Kaine 2004). The research questions are designed to elicit details of the farm context and thus the benefits sought from pursuing water efficiency on farm. This information can then be used as the basis for classifying farmers into segments; enabling information to be targeted at specific groups to facilitate adoption.

The use of complex decision making in high involvement purchasing implies that the purchaser develops explicit chains of reasoning to guide their decision making. This suggests that there should be shared and complementary patterns of reasoning among dairy farmers and consistency in the decisions they reach. Hence, to identify the factors influencing dairy farmers decisions we followed a convergent interview process (Dick 1999). Convergent interviewing is unstructured in terms of the content of the interview. The interviewer employs laddering techniques to systematically explore the reasoning underlying the decisions and actions of the interviewee (Grunet and Grunet 1995).

Farmers were asked questions based around four key themes: farm demographics, water irrigation system and efficiency, views on water availability and their thoughts on the future for irrigation water in Canterbury in the next five years. The demographics of their property included the size, number of cows and the ownership structure of the farm. Questions about the water delivery and systems focused on the water scheme the property was involved with, the irrigation system on-farm and how this was monitored. Questions on water availability focused on who farmers believed owns the water in Canterbury and explored whether they felt they have the right to use it once they have a resource consent. Pseudonyms have been used where part excerpt or descriptions from interviews have been inserted. Kaine (2009) recommends identifying the farmer segments in the first instance, and then identifying the proportion of farmers in each segment. Thus, due to the small sample number we were unable to quantify segment size. This will be undertaken with the results of the survey.

Participant characteristics

We interviewed 27 dairy farmers throughout the Canterbury region. Names were provided from a list of past questionnaire participants who indicated that they would like to be further involved. Care was taken to interview a geographical representation of farmers throughout the Canterbury region and to interview farmers across different age brackets. We had a spread from farmers in their late 20's to late 50s. These included farmers from Waimate, Timaru, Ashburton, Rakaia and Oxford. In Table 3, other characteristics of the interviewees are outlined. When organising the interviews 40 farmers were contacted with 13 farmers declining to be interviewed. This is a lower acceptance rate than has previously been experienced in this type of study which has usually been 75 to 85%. This in part could be due to pressure from negative publicity and perceived urban views.

Table 3: Demographics of Canterbury dairy farmer participants

	Size of property (ha)	Number of cows	Years on farm
Average	356	1 369	20
Maximum	1 070	4 300	40
Minimum	162	530	1

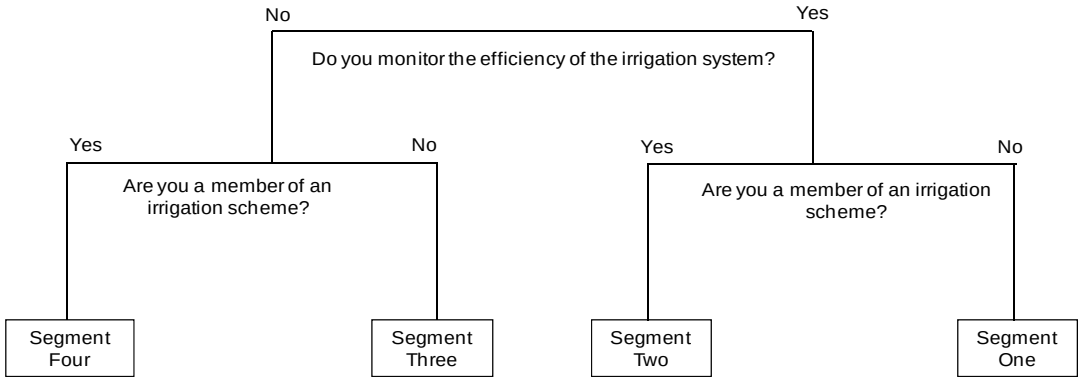
Results

We classified farmers into four segments based on how they received their irrigation water (i.e. via a scheme or from wells), which in turn appeared to influence the amount of control they had over their water, and whether they monitored water use efficiency. The segments are outlined in Table 4 and Figure 1.

Table 4: Segments for water use efficiency on irrigated dairy farms.

	Segment One	Segment Two	Segment Three	Segment Four
Monitor the efficiency of the irrigation system	Yes	Yes	No	No
Member of an irrigation scheme	No	Yes	No	Yes

Figure 1: Typology of segments for water use efficiency on irrigated dairy farms.



Segment one consisted of farmers who had systems in place to test how efficient their irrigation system was. These farmers were not part of an irrigation scheme and therefore tended to have control of their water supply. Alan was an example of a farmer from this segment:

> Alan owns 1 070 hectares and milks 4 300 cows. They have 5 sheds on the property and 20 staff. He tests the efficiency of his system by installing sensors in the ground which measure the water capacity.

Segment two included farmers who had systems in place to test the efficiency of their irrigation system but were on an irrigation scheme and therefore had less control over their water supply. An example of a farmer from this segment was Tony:

> Tony owns 185 hectares and milks 625 cows. The farm gets its irrigation water from the Ashburton-Lyndhurst scheme via a pipe. He has a flow meter on the pipe as the scheme insisted.

The third segment consisted of dairy farmers who did not test the efficiency of their irrigation system and they were not on an irrigation scheme so had control over their water supply. Karl was an example of farmers from this segment:

> Karl runs 1 100 cows on 280 hectares. He does not test the efficiency of his system as the farm has lots of untapped springs and he is not concerned about running out of water. The farms irrigation system is run from a number of bores.

The final segment, segment four, were dairy farmers who did not have systems in place to test the efficiency of their irrigation system and were part of an irrigation scheme so had less control over their water supply. An example of a farmer from this segment was Paul:

> Paul owns 162 hectares and runs 530 cows. He does not have control of his water supply. The farm has border dyke irrigation. His water allocation is every 16 days. He does not test the efficiency of his system because he believes his experience on the property is enough.

Discussion

Generally, most dairy farmers we talked to were aware of the issues around water efficiency and the public perception of dairy farmers in Canterbury. Farmers were very aware of how the urban population perceive dairy farming but argued that these non-farmers did not truly understand the benefits farming brings to the region. Across the four segments there were common views expressed on a number of issues. Every farmer believed that they had the "right" to take water, either from rivers or underground sources, to irrigate their properties, as one respondent noted 'no point sending water to sea'. None of the farmers interviewed believed that they should pay for the water they used for irrigation per se. In fact, the majority believed that they already did pay for water through infrastructure costs and having shares in water

schemes. Furthermore they argued that water was a public good 'no one owns water – like the air'. However one participant commented 'don't know who owns the water...maybe ECan...tell us where we can fish'. When asked about the future of water irrigation in Canterbury, one participant believed that when there are 'enough competitors who demand it [water] than will pay', *although* none of the other 26 participants raised this issue.

All interviewees noted the importance of irrigation to their farming system. Indeed many believed that you could not run dairy cows without water irrigation and this had flow-on effects for the local communities in terms of the business small companies get either directly or in-directly.

However, while every farmer indicated that water use efficiency was important for their system, farmers in segment three and four did not have any systems in place to test the efficiency of their irrigation. The reasons for this are discussed in the following sections.

Many farmers had changed their irrigation systems from border dykes to centre pivots. Although this required a lot of initial capital, farmers noted that they saved water, money and grew more grass than under other irrigation systems. Replacing their systems with centre pivots also saved time in terms of labour. Therefore, although the main motivation for installing centre pivots may not have been water-use efficiency, this has been one of the benefits to adopting this system. Thus, when encouraging farmers to adopt more water efficient irrigation systems, the benefits listed above need to be raised.

When farmers were asked where they saw the future of water allocation in Canterbury over the next five years, the majority indicated that they did not believe the amount of water for irrigation would increase. Many believed that the 'urban voice' would get louder and this would put pressure on farms.

Segment one

Farmers' in segment one, tested the efficiency of their irrigation system in a number of ways. One means of testing efficiency is knowing exactly how much water is used on-farm. This is measured with a meter at the point at which water goes onto the farm. The metering systems will shortly be required by Environment Canterbury as part of the resource consent and farmers must send their records to the Council every year as one of the conditions of their resource consent. However, some farmers noted that this did not always happen 'its low on the list of things to do'. Furthermore, just because farmers have systems in place to test the efficiency of their irrigation system does not mean they are necessarily going to change their system. Some farmers commented that 'it was there to tick the box'. Other voluntary measures included moisture probes and 'dig holes to check water capacity'.

Farmers in this segment had control of their water supply, as they were not involved with a water irrigation scheme. Instead, they had their own bores/wells from which they extracted water. This allowed them the freedom to change the amount of water applied for each irrigation event or to change the timing of an irrigation event more readily than farmers in segment two and four. Although they were not part of an irrigation scheme, this did not guarantee resource consents were awarded. Environment Canterbury still controls when and the amount of water farmers can draw, so although they have more control over their water supply than farmers involved with a water scheme they are still restricted by regulations, as one farmer noted 'can't drill wells down due to the water table level'.

Although water use efficiency was important, as one farmer noted; 'always want more water than you got'. Many farmers believed that there 'is oodles of water', however the media in Canterbury portrayed dairying in a negative way. One participant noted that water is an 'emotional situation' and 'dairy seen as the devil....The Press fault...media loud and influential'. For others, they 'want to grow more grass not by having more water but using your water allocation more efficiently'.

Segment two

Farmers in this segment were part of an irrigation scheme and therefore were perceived to have less control over their water supply. In effect the scheme, via their resource consent, determined how much water farmers received and how often. However, they did test the efficiency of their irrigation system, to save money and time.

Some farmers in this segment were from the Ashburton-Lydhurst scheme. Farmers involved with this scheme have been pro-active in trying to improve water-use efficiency. Due to farmer pressure the scheme has invested a considerable amount of capital in replacing canals with pipes. The estimated saving due to loss of evaporation is 15% before the water is delivered on

farm. At this stage only a small percentage of water is delivered to farms via a pipe, with those farmers involved paying it off over a number of years. Farmers in this segment are aware that their water allocation will not increase in the future, and thus they need to 'get smarter with the water we have'.

Segment three

Farmers in this segment were not on an irrigation scheme and so had control over their water supply. However, they did not test the efficiency of their irrigation system, even though they did believe that water efficiency was important. Belief in the importance of something does not necessarily mean you will do something about it. One farmer from this segment noted that they had 'lots of underground springs untapped'. This farm had centre pivots but noted that 'without irrigation could not farm...land unsuitable...needs more than pivot water, needs rain'. The centre pivot not only irrigates water but effluent goes through the pivot and 'keeps consent people happy'. In effect, farmers in this segment did not have any pressing need to aim for better water use efficiency, and had addressed any need to save time or labour through changes to their irrigation system such as installing a centre pivot.

Some farmers in this segment considered having control over water supply was a bonus but they acknowledged that they 'don't think too seriously about person downstream'. Thus, farmers are aware of the impact which extracting underground water has but it does not bother them enough to incorporate a system for monitoring their water use.

Segment four

Farmers in segment four did not test their system, they were part of an irrigation scheme and so did not have control over their water supply. However, farmers in this segment were relying on the water schemes they were involved with to deal with this issue. Water-use efficiency was still important to this group of farmers; however, they believed that it was up to their water scheme to deal with this issue. It was not a high priority for them compared to other aspects of their farming system. Farmers in this segment tended to have border dyke systems, which are not considered to be the most efficient use of irrigated water.

Farmers argued though that there were many other benefits to border dykes that outweighed putting in new systems perceived to be more efficient. Border dykes were seen as cost effective as they are gravity fed. Farmers argue that the water schemes control the efficiency as a representative will turn up to check every time you take your water allocation, around every 16 days. Furthermore, you can ring and say 'you don't want water' and it does not affect your total allocation.

Environment Canterbury

Individuals who worked with the local government body, Environment Canterbury, and worked on water issues, were also interviewed to gain an understanding of the issues Canterbury faces in regards to water irrigation. Water metering on all consented water takes is becoming law under national legislation, due to be confirmed this year. This means that no matter where the farm is located you must have a water meter. Canterbury holds 60 percent of meters for the entire country. One participant noted that they did not believe farmers used their full water allocation. The current Environment Canterbury plan is for the information from these meters to go to a third party who will then pass on the information to the council. Environment Canterbury do not want this information directly as they do not have the staff to process it all. These third party providers will send information to Environment Canterbury on those farmers not complying. Depending on the severity of the breach of consent (e.g. too much water used, or at the wrong time) a number of actions will be taken. If it is deemed 'green' breach, nothing will occur, if it is 'yellow' breach, farmers will be called and a follow-up visit will take place. If it is considered a red breach, a site visit will occur and potentially a prosecution could follow. They believe at the moment only 5-10% of consent holders are non-compliant. While their view was that farmers are accepting of the metering system, they believed farmers were not accepting of the accountability requirements and reporting of the results from the meters.

There was the general view that most farmers do not have a good understanding about the water they use. One respondent commented that a lot of farmers do not want to know about water-use efficiency and they were not sure what incentives could be used to change this behaviour. However, most believed that farmers had improved their views of water use efficiency recently.

No one we interviewed from Environment Canterbury believed that farmers should pay for water as water is considered a public resource and therefore farmers should be entitled to use it without paying. One participant noted that some people believe making farmers pay for water

will improve their efficiency. However, they argued that this was a simplistic view on how farmers see the issue. One participant believed that in the future, storage of water, either on-farm or not, will occur. Environment Canterbury are aware that they need to work with industry to improve water-use efficiency on-farm as regulation alone will not achieve this.

Conclusions

The aim of this project was to explore dairy farmers views and actions on improving water use efficiency. It also aimed to understand their views on ownership of water. The Kaine Framework was used to see if on-farm context influenced their views and actions of water use efficiency and ownership. While every farmer believed water use efficiency was important only those farmers from segment 1 and 2 had systems in place to test this. Farmers in segment 4 relied on their water scheme to provide them with efficient delivery of water. Thus, water schemes are an important influence for on-farm water use efficiency. However, just because farmers believe that water-use efficiency of their irrigation system is important, and may have systems in place to test it, making substantial changes based on this information does not follow.

Farmers realise that using water for irrigation is a contentious issue in Canterbury, but they believe that water is a public good and they have the right to use it for economic benefits, for not only themselves but also the Canterbury region and New Zealand as a whole. Furthermore, the majority of farmers believed that they had already paid for water through the cost of water shares and/or the infrastructure needed to get the water onto their property. The common view held was that it was a waste to let the water run out to sea and water should be used to increase the Canterbury economy.

Two key learnings from this research were:

1. Urban perceptions influence farmers' decision making as shown by the significant changes farmers have made to their irrigation systems to improve water use efficiency.
2. Farmers believe that a successful resource consent application gives them the right to extract water without further charge.

While these are the views of the farmers, the continued negative publicity around irrigation suggests that the public does not hold the same views. Changes that farmers are making to improve water use efficiency do not appear to be changing the opinion of the public as publicity continues to be negative. Further work is needed to understand the views of the public about irrigation and identify the gap between farmers and the public.

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