

# Adapting land for a climate-changed future

Farmers are keen to understand the changing climate at a granular, local level and initiated this project looking at adaptation in mid-Canterbury. Farmers said it makes good business sense to understand what is coming so they can futureproof their business.

Richard Fitzgerald knows that weather and the climate are topics close to every farmer's heart. A farmer himself with an active involvement in an intensive irrigated mid-Canterbury-based family farm, Richard is living proof that a deep understanding of the changing climate is fundamental to successful farming. His experience as an agribusiness executive and consultant, and as a past CEO of NZ Young Farmers and the Red Meat Profit Partnership, means he has first-hand experience of farmers basing critical business decisions on many years of observing and experiencing the local climate.

Alongside his farm work, Richard is currently the Agriculture Portfolio Advisor at the Ashburton District Council. Here he has been working on a project with funding from Our Land and Water's Rural Professionals Fund looking at how the changing climate can be included in farmers' decisions about their business lifecycle, on-farm infrastructure and consent conditions.

Richard and researchers from The Agribusiness Group considered a range of factors, such as the breadth of climate change work currently available, which organisations are involved, and the decision tools available for farmers to use. The purpose of the review was to identify gaps in climate change information and understand if there are barriers that could be addressed to enhance engagement with farmers.

The researchers also gathered data from the Ashburton District Council and Environment Canterbury records, and used this to analyse the economic life of key assets, such as dairy sheds and irrigation consents. This enabled understanding of the timing of major strategic decisions affecting land use.

The project then ran several focus groups in the Ashburton District to gather farmer perspectives

on climate change and explore themes identified in the desktop review. The focus group composition considered farming type (dairying, arable, sheep and beef farming), business career stage (early, mid- and late-career), and the location of their farm businesses (lower-, mid-, upper-plains and high country). Each focus group was facilitated by a respected local farmer.

## Farmers need tailored information

The key finding of the research was that farmers already adapt naturally to changes in the system and are willing to change further once they have a sound reason. Climate information needs to be practical and tailored to farm type and location for farmers to make financial decisions with good environmental outcomes. This was well expressed by a dairy farmer from a focus group:

*I think we've changed; I mean as technology and science have changed in the farms. We put in water monitoring. It wasn't because of climate change; it was just because our water was reasonably pricey. So, we wanted to make sure that we make good use of it. ... I don't know if we've necessarily been doing it for climate change, but it will help if it becomes more noticeable.*

The project found that if farmers better understand the severity, duration and probability of extreme events on their own farm in a climate-changed future, they are better equipped to adapt their farming systems. The research found a willingness to change once their own situation becomes clear. As one livestock farmer said:

*... if the humidity goes up and the cows are hotter ... they're going to struggle with heat and drink more water. They might drop in production. You're gonna have to think about your decision-making and how you*

## Supporting land-use adaptation for a climate-changed future

**Why:** To improve farmers' knowledge of a changing climate and enhance their ability to apply that knowledge to action on-farm.

**Where:** Ashburton (represented by 12 dairy farmers, six arable farmers, five livestock farmers and four agri-industry representatives).

**Who:** Richard Fitzgerald (Ashburton District Council), Andrew Parrish (ECan), Angela Cushnie (Kānuka Canterbury Regeneration Trust), Hamish Marr (farmer), Kerry Harmer (farmer), Louise Webster (Ideas Accelerator), Matt Bently (farmer), Mel Brooks (MHV Water), Nick Giera (farmer), Rebecca Whillans (Ashburton Lyndhurst Irrigation), Richard Bowman (Barrhill Chertsey Irrigation), Steven Bierema (farmer), Tony Finch (DairyNZ), Treena Davidson (Aoraki Environmental Consultancy) and Turi McFarlane (FAR).

### What:

- Existing climate change research was reviewed 'through the eyes of a farmer' by farm business consultants, The Agribusiness Group. The review identified several points to improve farmer engagement and encourage response to a changing climate.
- Meaningful climate information at a granular 5 km x 5 km resolution would give farmers confidence to make change that would improve their farm's circumstances.
- Effective, trusted channels giving practical, evidence-based information can have a significant impact on farmers' decision-making.
- Critical farm infrastructure, access to water and consent conditions strongly influence land use. The timing of large infrastructure consents, such as replacing dairy milking sheds, may drive land-use decisions.
- This project is part of Ashburton District Council's work on economic development, supporting strong and healthy businesses and the four wellbeings of local government. The project forms the early investigative stages of a wider piece of work called the Resilient Business programme.

**Read more:** *Supporting land-use adaptation to climate change:* [ourlandandwater.nz/RPF2022](http://ourlandandwater.nz/RPF2022)

*make things work. You're probably going to have to change your system, and it's a case of what are the sorts of things you might have to change.*

The researchers found that farmers were cautious about some scientific research. One farmer discussed recent scientific findings where they were told that there would be increased winter biomass production, which could enable higher stocking rates and greater livestock production over winter. At the same time, it suggested that summer pasture growth would become less reliable, suggesting stocking rates should be reduced in summer. The farmer decided that a reasonable response was to wait for greater clarity or observable climate change effects on his pasture production before implementing systems change. One arable farmer said:

*We need research that's relevant ... that you can actually do. I want to go home from a field day and say, I can do that. I can do that tomorrow. What I see coming out, it's a lot of big pictures and it's not something that I can change.*

Action in response to a changing climate will range from refinements to the farm system to broad-scale land-use change, also known as climate change adaptation. As one dairy farmer commented:

*How much can we improve the genetics of our herd, dropping our stocking rates to 3.3 cows per hectare and still be as profitable? And that's kind of low-hanging fruit. I see that resource efficiency gain with what seems to be a win-win for the environment and the bottom line.*

Adaptation at a farm level must be driven by farmers as farmers are best placed to respond practically to a changing climate. As with most businesses, farm system change and adaptation will require a positive return on investment and economic profitability for it to be a considered option. As a livestock farmer said to their focus group:

*We think that climate change is pushing the limits of what we can do [in our farming operation], we're going to need to make more investments to cope with the extreme events we are experiencing.*

The research also found that, when looking at implementation of adaptation practices, farmers' kinaesthetic learning style should be acknowledged. As one dairy farmer said, touching and doing is an important enabler for learning and building confidence:

*In order to adopt new technology or new farming systems, you need to see credible examples like demonstration farms.*



Cows on a Canterbury farm with flooding. Source: Kathryn Taylor/TrueStock

### Infrastructure costs and consents

Ashburton District, or mid-Canterbury in the central South Island, is traditionally a sheep and grain-growing district. However, over the past 20 years irrigation has changed the land use. Irrigated farming now covers approximately 65% of the Ashburton District Plains, or 220,000 ha. The plains between the Rakaia and Rangitata Rivers and the hill country swelling into the Southern Alps have seen a shift to dairy farming and specialised crops, such as seeds. Dairy farming now accounts for \$1.13 billion of the local economy and 63% of net farm income for the district.

After examining resource consents, the researchers found that around 40% of all dairy milking sheds in the district were built between 2007 and 2015. Using the IRD calculation of a 33.3-year economic life for a dairy shed, those 230 sheds will reach the end of their economic life between 2040 and 2048, meaning nearly half of all dairy sheds may or may not be replaced during that period. These sheds represent a large proportion of dairy farming in the district.

The research indicated that, before replacing any major infrastructure, dairy farmers will assess the merits of dairy farming compared to alternative land uses. Replacing an aging dairy shed is a significant capital investment, and a decision whether to replace a milking shed will be carefully considered in the light of climate suitability, regulations and the prevailing economics of dairying compared to other land uses.

The researchers found that between 2030 and 2040, 78% of all water use consents in the district will expire. However, the area of land involved in this process will be even greater, as the water consents of all three irrigation companies will fall due (Figure 1). The renewal process is significant because the implementation of the National Policy Statement for Fresh Water Management (2020) may introduce new or different consent conditions for water use. This may change the viability or feasibility of some land uses under those new conditions, especially if the fortunes of dairy farming do not compare as favourably as other land-use options.

The water use consent renewal process is currently underway. An analysis of the location and number of consents shown in the map indicates clusters of consents, particularly near the Ashburton and Hinds Rivers.

The research found the convergence of water use consent renewals and dairy shed renewals may be a catalyst for land-use change around the early 2040s. However, these thoughts didn't appear to faze the farmers in the focus groups. They emphasised that they are business people first, and that business logic drives their land-use decisions. They would change in response to new or different opportunities if they make good business sense. As one dairy farmer reported:

*Market signals have been the strength to date, for driving land-use change in Canterbury. We only go to*



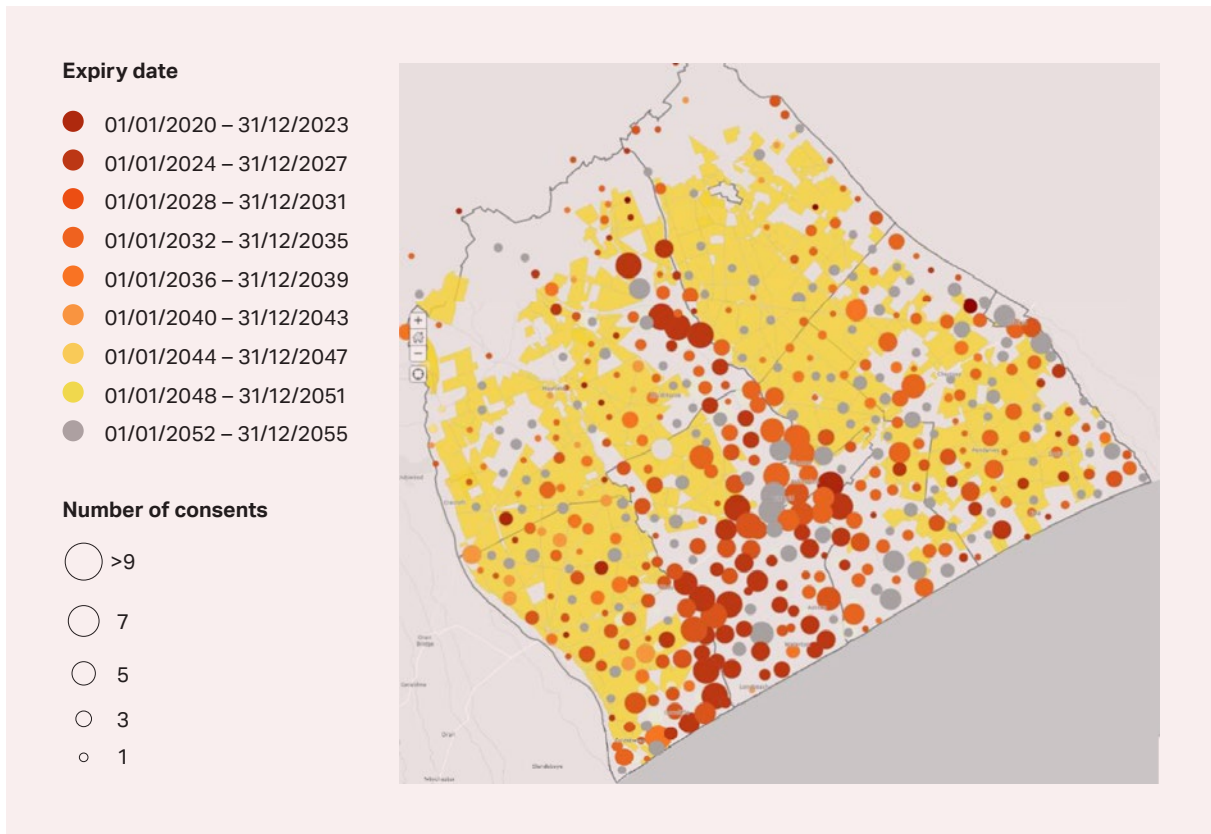


Figure 1: The distribution and timeliness of water use consent renewal in the Ashburton District

*where the profits are, and if the profit is in dairy we will go there. Something else and we will go there as well. [Dairy farming] has been our biggest strength today, but that may not be the case in 5, 10, 15, 20 years' time. Effectively, we're going where the market is.*

The project also examined Ashburton District Council consent records for both arable farming and sheep and beef farming to identify equivalent critical infrastructure, such as grain drying facilities and shearing sheds. Only a small number of building consents have been issued for those structures, and the data set was considered too small to make a credible judgment about infrastructure renewal as it might influence land use.

### Where to next?

From small tweaks to existing practices, to wholesale land-use change, climate adaptation spans a wide variety of action. Determining what land-use response is appropriate ultimately rests with farmers. They need to be supported with quality research and science to make timely, well-informed decisions.

The next step in the Resilient Business Project is to produce a user-friendly report that demonstrates the emergence of new potential growing conditions that

will support alternative land uses or highlight how the future climate will impact some current land uses. This will lead into a land-use options analysis report that explores a range of factors such as agronomy, regulations, value chain and market returns. A matrix will identify the contribution of different land uses to meeting environmental requirements and signal potential unintended consequences with different land uses.

The research will then offer farmers the opportunity to explore diversification, new or alternative land-use options for their businesses in response to the changing climate.

Ashburton District Council's Chief Executive, Hamish Riach, says that by working together supported by industry and the scientific community, farmers can understand what the climate future will look like and what to do about it. "If we give farmers research they can take home and use straight away, rather than high-level theory, then they will minimise risk and utilise the opportunities emerging through a changing climate," he says.

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*Ceridwyn Roberts for the Our Land and Water  
 National Science Challenge*