
The overall goal of the study was to identify values, attitudes and behaviours that determine farmer's responses to environmental change. The changes that might be required of their land management practices to secure sustainability in an increasingly unstable environment, can appear to be counter-intuitive to the arguments for changes in a farming culture based on cost saving, profitability and market forces. It is unclear the extent to which farmer's acceptance of specific land management practices are linked to their attitudes and beliefs, especially when farmers are considering the long-term uncertainty and risks associated with climate change.

### Understanding the relationship between what people think and what they do

Traditional theories about the diffusion of innovation or technology transfer were based around the premise that the process is a linear movement of ideas, and that seemingly beneficial science and technology is automatically adopted. It is now accepted that the adoption process is complex and iterative.

A focus on technology transfer that creates the quickest, cheapest economic benefits for the land owners has been common since the privatisation of the agricultural extension services in the late 1980s. The successful adoption of new technologies has commonly been expressed in terms of increased profitability for individual farmers. Conversely, the promotion of environmental technologies is commonly viewed as generating a public good and this responsibility has remained with government authorities. In this context the researchers proposed that understanding the linkages between farmer's environmental values, attitudes and behaviour (intention to act or action itself) would be useful.

The characteristics of the innovations themselves also have a bearing on the likelihood of their being adopted. The characteristics identified by the writers were:

- Relative advantage – usually expressed in terms of providing a financial advantage.
- Complexity - how easy the innovation is to use, and how much risk is associated with it.
- Compatibility – how well the innovation will fit within existing farm systems.
- Trial-ability – the possibility of testing the innovation on a small scale without too much investment.
- Observability – seeing the benefits that result from adopting the innovation is a powerful incentive for others to also adopt it.

## The research method and results

Forty dairy farmers in the Waikato, New Zealand (Fig. 1), and a small sample of industry representatives and regional government personnel were studied. They were interviewed about their environmental values, attitudes to environmental change, understanding of climate change mitigation and adaptation practices, as well as their specific experience with the drought that occurred in the region in 2008.

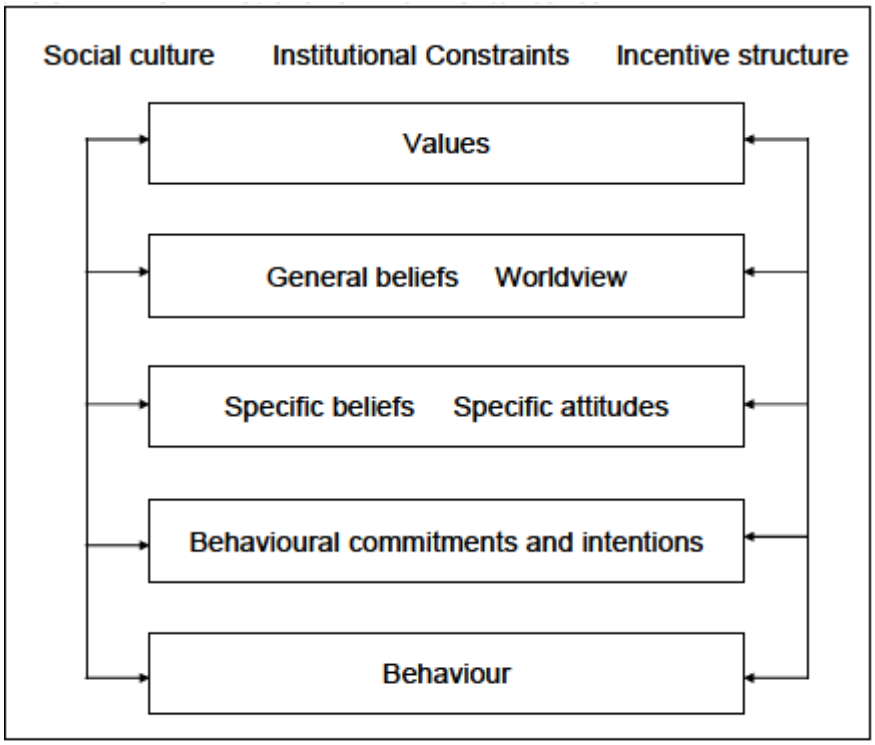



Figure 1: A new model of environmental concern (adapted after Cary, Webb and Barr (2002)

The farmers surveyed generally believed the environmental quality of their farms are good, and they could identify actions they had taken to look after their land. Most of the farmers judged their farms to be better than average. They were aware that intensive, modern dairy farming is associated with more environmental issues than some other farming systems, but they felt it was difficult to make comparisons across different landscapes and farming sectors. The farmers valued their land for its intrinsic qualities as much as they valued the capacity to make a living from the land. The survey results showed that there was a disconnection between the farmer's general environmental values and their belief as to the impact of their particular farm management practices on the environment.

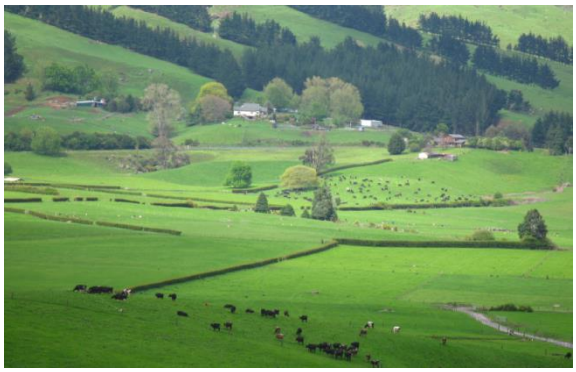
There was a general acceptance of climate change as an abstract concept. But the farmers were not convinced that their farm practices had contributed to the change, and therefore, felt that they would not be able to lessen the impact of climate change by changing their farming strategies. Any of the changes they had made to their farming practices, in response to the drought in 2008, were viewed as completely independent of any adaptation to the impacts of climate change.

The farmers most able to articulate their understanding of climate change were also most concerned about its potential impact on their business. They identified the actions they could implement to reduce any realised impacts of climate change. These actions included:

- Destocking;
- Reducing urea use;
- Maintain greater feed buffers;
- Using nitrification inhibitors;
- Planting trees;
- Not burning balage wrap;

- Recycling;
- Using council landfill instead of on-farm disposal; and
- Wintering stock off farm to avoid vulnerable catchments.

However, these actions were associated with short-term 'issue based' environmental needs, rather than longer term climate change scenarios, which were seen as too big and complex for them to tackle. Market signals and industry leaders were identified as key drivers of change which they responded to, while political pressures and community concerns were discounted. Despite this short term market focused position, a third of the farmers in the study had implemented four or more strategies to reduce the environmental impact of their dairy businesses. These strategies included:

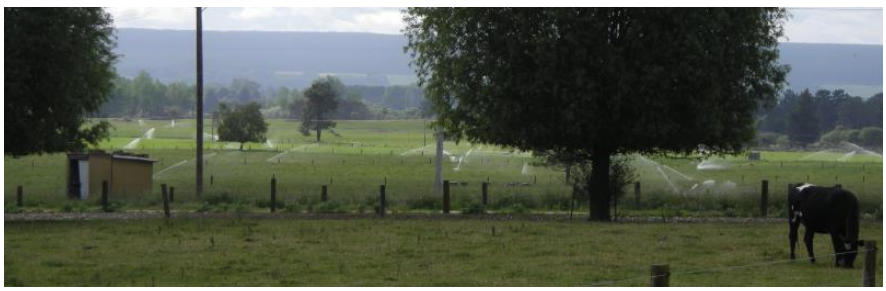


- Improvements to effluent storage and disposal;
- Measures to reduce nitrification;
- Establishment of wetlands or woodland planting;
- Improved resource use efficiency; and
- Addition of protection to waterways.

Despite adopting these practices, most farmers remained unconvinced of the benefits of their actions and seemed to have responded to the demands of others. Some of the farmers cited a lack of confidence in the scientific evidence underpinning the recommended strategies as a barrier to the adoption of new practices. The farmers favoured incentives rather than penalties as drivers of change.

Some of the farmers surveyed believed that extreme climatic events were more common place now than in the past. Since the 2008 drought, many of the farmers had adopted strategies to reduce the impact of future events, even though they did not believe the drought or their farm management changes were part of long-term adaptation to climate change. However, several of the farmers conceded that if there was an increase in the number of droughts in the future, they would be more inclined to believe in climate change. The adopted strategies at the time of the study included:

- Earlier calving to bring forward peak milk production;
- Reduction in stock numbers;
- Having supplement feed on hand;
- Holding larger buffers of feed;
- Having a better inventory of feed levels; and
- Considering irrigation as a possible option if the frequency of droughts increased.



## Conclusions

The survey outcomes show that there is a disconnection, at times, between what farmers believe in and the actions they take. While their values, attitudes and behaviours align in response to site-specific, visible and immediate environmental problems, this was not the case when they considered the long-term impacts of climate change.

An iterative model of environmental concern was proposed by the researchers to illustrate the feedback loops in the relationship between values and behaviour found in this study. The researchers concluded that better alignment between industry, government and science with the needs of farmers and the wider community will help secure sustainability.

## *Further information*

The full paper that this summary is based on is *Information, Decision and Action. The Factors that Determine Farmers Environmental Decision-making*. Smith, W. Kelly, S. & Rhodes, T. (2008) A contract Report of MAF. www.climatecloud.co.nz/CloudLibrary/2008-16-information-decision-action.pdf

Cary, J. T. Webb and N. Barry (2002) Understanding Landholders' Capacity to Change to Sustainable Practices. Insights about Practice Adoption and Social Capacity for Change. Canberra, Bureau for Rural Sciences.