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# **Dairy Farmers' Responses to Water Quality Interventions:**

## **A Case Study in the Manawatu-Wanganui Region of New Zealand**

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A thesis presented in partial fulfilment  
of the requirements for the degree of  
Doctor of Philosophy  
in  
Agriculture and Environment



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# Abstract

New Zealand freshwater quality has declined, and dairy farming is one identified contributor to this decline. This research provides insight into dairy farmers responses to the water quality interventions introduced to mitigate diffuse pollution, and the socio-cultural dynamics that shaped their responses. Putnam's (2000) social capital theory was the theoretical framework used to explore how and why New Zealand dairy farmers responded to water quality interventions and the role of social capital in shaping dairy farmers' responses. A single qualitative case-study research design was undertaken in one Water Management Zone of the Manawatu-Wanganui Region. Data was drawn from semi-structured interviews with dairy farmers and key informants, and from documents.

Farmer response is identified as a multi-dimensional rather than a uni-dimensional phenomenon. The dairy farmers responded to water quality interventions as individuals and collectively, and these responses were linked and interwoven. Individual farmer awareness and understanding, emotion and behaviour changed. Collectively, resistance, social learning, formation of a farmer-led action group and changes in accepted farming practices occurred. In addition, social interactions through social networks, trust, social norms and being a 'good' farmer that uses 'best' farm practice (farmer identity) emerged as key influencers of the dairy farmers' individual and collective responses to water quality interventions.

The socially constructed collective agreements on accepted behaviour, or cultural, personal and practice norms, influenced farmers' individual and collective responses to interventions. The identified cultural norms associated with private property ownership, equity and fairness, social responsibility and relationships, and personal norms associated with the stewardship of land and water, reflected the farming culture of the farmers interviewed and the broader group to which they belong. A broad collective change in what farmers believe are the expected farm management practices around farming and water quality (practice norms) influenced individual farm practice change. In addition, informal farmer sanctioning of practice norm violation was found to be a key part of the process by which farm practices that had a negative effect on water quality were challenged, and new practice norms were fostered. The collective farmer resistance to regulation and the actions of a farmer-led collective action group were in fact resistance to an intervention that was perceived to challenge their social norms, their identity as 'good farmers'

and to disregard their local knowledge; not resistance to practice changes that will improve water quality.

Dairy farm management practice change is a social process of exchanging information and knowledge, questioning, challenging current practice and reinforcing what is considered accepted practice around farming and water quality. This understanding provides a valuable contribution to the design and implementation of environmental policy interventions.

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I am an off-road endurance runner and off-road triathlete. I love mountains, the bush, the sea and being in the back country. Training for and competing in long distance endurance events was an integral part of my PhD. Endurance training, racing, and doing a PhD all require the same mental and physical endurance that keeps you going on the tough days, and makes your heart sing on the good days. A PhD is just like running an ultramarathon or doing an ironman – one foot in front of the other until you reach the finish line.

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## Abbreviations and Symbols

AES	Agri-environment scheme
CAP	Common Agricultural Policy
cm	centimetre
DCSA	Dairying and Clean Streams Accord
EU	European Union
FDE	Farm dairy effluent
FDEA	Farm Dairy and Environmental Assessment
GPS	Global Positioning System
GST	Goods and services tax
ha	hectare
kg	kilogram
km	kilometre
km <sup>2</sup>	area measurement
LAWF	Land and Water Forum
l	litre
LUC	Land use capability
MS	Milk solid
M	million
m	metre
m <sup>3</sup>	volume measurement
mg	milligram
mm	millimetre
NPS	National policy statement
NPSFM	National Policy Statement Freshwater Management
NZ	New Zealand
NVZ	Nitrate Vulnerable Zone
N	Nitrogen
NIWA	National Institute of Water and Atmospheric Research
OAD	Once a day
OECD	The Organisation for Economic Co-operation and Development
PCE	Parliamentary Commissioner for the Environment
PKE	Palm kernel extract
P	Phosphorous
POP	Proposed One Plan
QCONZ	Quality Consultants New Zealand Ltd
RMA	Resource Management Act 1991
RPS	Regional policy statement
SDWA	Sustainable Dairying Water Accord
SOE	State of the Environment
SMP	Supplementary Minimum Price
TAD	Twice a day

## Abbreviations and Symbols

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TCEIS	Tararua Community Economic Impact Society
WMZ	Water management zone
WMSZ	Water management sub-zone
yr	Year
®	Registered trademark
™	Unregistered trademark



