Farmers’ attitudes and behaviour towards the natural environment: a New Zealand case study

A thesis presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Ecology at Massey University, Palmerston North, New Zealand.

Dorothée Durpoix
2010
Abstract

Scholars from the natural and social sciences have sounded the alarm regarding the future of our productivist society, calling for a change in worldview towards our relationship with the environment. Agriculture rests at the centre of such an issue. Relying on natural resources, it fulfils our basic need for food, yet has caused great damage to this same environment it depends on. Sustainability of farming lies increasingly today in farmers’ ability to generate and export ecologically sound products, while remaining competitive on the international market. The New Zealand farming population represents a particularly good case study. New Zealand’s short human history is associated with one of the highest rates of natural habitat destruction, enabling the country to develop a strong agricultural sector. Today, due to a lack of a comprehensive national legislation, management of native ecosystems on private land depends mainly on private owners’ goodwill.

The first of the four objectives of the present research was to assess the general and specific environmental attitudes of farmers in New Zealand. Farmers’ general attitudes towards the natural environment were measured using the New Ecological Paradigm (NEP) scale and the Environmental Motives scale (EMS). Farmers’ specific attitudes towards New Zealand native forest were assessed using the tripartite model of attitude composed of affective, cognitive and conative dimensions. The second objective was to compare the attitudes and context affecting the pro-environmental attitudes of farmers with and without native forest on their farm. The third objective was to assess the pro-environmental attitude-behaviour relationship in farmers with native forest. Finally, the fourth objective was to investigate the context affecting the relationship between pro-environmental attitudes and behaviour in farmers with native forest.

It was found that farmers with and without native forest responded to different models of attitude towards native forest. The attitudes of farmers without forest were more cognitively based than those of farmers with forest. Farmers without forest tended to distinguish between native forest on and off the farm, while farmers with forest tended to hold more holistic environmental attitudes. Farmers’ environmental attitudes predicted their behaviour towards their native forest fragments to a similar extent to that usually found in the literature. Direct experience with nature, interactions with one’s family and objective and subjective knowledge were instrumental in predicting the environmental attitudes of all groups of farmers and the behaviour of farmers with native forest.
Acknowledgements

I would like to thank my supervisors, Doctors Mike Joy and Paul Perry, and Professor Brian Springett, whose guidance, support and passion have kept me going over the years.

I would especially like to thank Robbie Andrew, whose tremendous help with editing made the last part of this journey so much more bearable and this thesis, more readable. His friendship is dear to me.

I would also like to thank Viv and Tony McGlynn who opened their door to me at the most stressful time of this degree. Living with them and Jaime Dörner was one of the highlights of the end of my PhD. They, along with my other friends, have been a wonderful support over all these years. Jean-Baptiste Gardebled, Natacha Frison, Sebastien Wagner, Carlos Lehnebach, Jay Gedir and Eloise Pulos, Jay McCartney and Mary Rossiter (with Milla and Nikau), Pete McGregor, Arne Schwelm, France Grenaudeau-Klijn, Rich Seaton and Jesse Concklin, Clare Browne and Ian Johnston, Melanie Kiessner and Marco Wenzel, Deb Anthony, Becky Lewis, Jean-Luc Dupuis and Carolina Concha, Barbara and Andrea, Julia Whelan, Arved Schwendel, Barbara Just, Erica Dahya, the family at the Celtic Inn with a special mention of Paul Turner, Collin Caddick, and Jackie, plus all others I have not mentioned explicitly: you have been fabulous friends!

I greatly appreciated the help Alasdair Noble, Senior Lecturer in Statistics and Postgraduate student consultant at Massey University, and the SEMNET forum, especially Cameron McIntosh, have provided me with statistics.

My thoughts are with my family. This thesis would not be without them.

And last but not least, Yvan Richard whose mind has always stimulated, challenged, and inspired me and whose affection kept me sane.

This research would not have been possible without the help of Marnie Carvis from Agriquality, James Lambie from Greater Wellington, Jeff McNeill and Helmut Janssen from Horizons. This research would also not have been possible without the financial help of a Massey scholarship, Horizons, Robert C Bruce Trust and Forest and Bird Manawatu.

Approval for this research has been obtained from Massey University Ethics Committee for the survey.

Finally, I would like to dedicate this thesis to my grand-father, Raymond Bastendorff, mon étoile du Berger…
# Table of Contents

Abstract.................................................................................................................................................... ii  
Acknowledgements.................................................................................................................................... iii  
Table of Contents ..................................................................................................................................... iv  
List of acronyms and definition of key terms ............................................................................................ ix  

## Chapter 1: Introduction......................................................................................................................... 1  
I. Rationale of the thesis........................................................................................................................... 1  
   1. The historical background of humans’ relationship with nature.................................................. 1  
   2. Anthropocentric perception of nature ......................................................................................... 2  
   3. Modern environmentalism ............................................................................................................ 3  
   4. Farmers and nature ...................................................................................................................... 4  
II. Aim of the thesis ............................................................................................................................... 5  
III. Thesis outline .................................................................................................................................... 6  

## Chapter 2: The social-psychological framework ............................................................................... 9  
I. Introduction .......................................................................................................................................... 9  
II. Context: Attitude theories .................................................................................................................. 9  
   1. The topical context of the study .................................................................................................... 9  
   2. Definition of attitude .................................................................................................................. 10  
   3. Attitude: predictor of behaviour ................................................................................................. 11  
   4. Environmental attitude .............................................................................................................. 12  
III. General-specific attitudinal model ..................................................................................................... 14  
   1. General measures of attitude towards the environment ............................................................. 14  
   2. Specific measure of attitude towards the environment: tripartite attitudinal model ................ 15  
   3. General-specific attitudinal model .............................................................................................. 26  
IV. Conclusion ......................................................................................................................................... 28  

## Chapter 3: Farmers’ attitudes and behaviour towards the natural environment................................ 29  
I. Introduction .......................................................................................................................................... 29  
II. Agriculture-natural environment issues ............................................................................................ 29  
   1. General context .......................................................................................................................... 29  
   2. In New Zealand .......................................................................................................................... 30  
III. Relevance of the social-psychological framework ........................................................................... 33  
   1. Economic models ....................................................................................................................... 33  
   2. Social-psychological models ...................................................................................................... 34  
   3. Cognitive, affective, conative dimensions and tripartite attitude model .................................... 36  
IV. Conclusion ......................................................................................................................................... 40  

## Chapter 4: Effects of situational variables on farmers’ attitudes and behaviour towards the natural environment......................................................................................................................... 43  
I. Introduction .......................................................................................................................................... 43  
II. Attitude-behaviour relationship: the need for situational variables ............................................... 43  
III. Situational variables effects on farmers’ pro-environmental attitudes and behaviour .................. 45  
   1. Socio-demographic variables ...................................................................................................... 45  
   2. Direct experience with nature .................................................................................................... 51  
   3. Knowledge .................................................................................................................................. 54  
   4. Social influence of family and fellow farmers ......................................................................... 56  
   5. Institutions ............................................................................................................................... 58  
IV. Conclusion ......................................................................................................................................... 60
Chapter 5: Research design

I. Introduction
II. Sample Design
   1. What, when, where, who
   2. Characteristics and representativeness of the sample
III. Description of the questionnaire
   1. The psychological variables
   2. The situational variables
   3. Issues with the variables
IV. Statistical methods
   1. Factor analysis
   2. MIMIC analysis
   3. Model fit indices
   4. Internal consistency

Chapter 6: Preliminary analysis: distinctions between farmers with and without native forest

I. Introduction
II. Analysis
   1. Description of the method
   2. Description of the predictor variables
   3. Multiple imputation of the predictor variables
III. Results: Who were the respondents with and without native forest?
   1. Statistical issues
   2. What predicts the presence of native forest on farms?
IV. Discussion
V. Conclusion

Chapter 7: Farmers’ value-based environmental concern towards the environment

I. Introduction
II. Analysis
   1. Model hypotheses
   2. Analysis framework
III. Results
   1. Variable frequency
   2. Dimensionality and reliability analysis
   3. Mean responses
IV. Discussion
V. Conclusion

Chapter 8: Farmers’ core beliefs towards the environment

I. Introduction
II. Analysis
   1. Model hypotheses
   2. Analysis framework
III. Results
   1. Variable frequency
   2. Dimensionality and reliability analysis
   3. Mean responses
IV. Discussion
V. Conclusion

Chapter 9: Farmers’ specific attitude towards native forest: tripartite model
Chapter 10: Farmers’ general and specific attitudes towards native forest: Schultz’ scale, NEP scale, and tripartite attitude model

I. Introduction .......................................................................................................................... 157
II. Analysis framework ............................................................................................................ 158
III. NEP and tripartite attitudinal responses of farmers ...................................................... 159
   1. Model hypotheses ............................................................................................................. 159
   2. Results: NEP and tripartite attitude responses of farmers without native forest .......... 159
   3. Results: NEP and tripartite attitude responses of farmers with native forest by choice and farmers with native forest by chance ............................................................ 160
IV. Environmental Motives Scale and tripartite attitudinal responses of farmers ......... 164
   1. Model hypotheses ............................................................................................................. 164
   2. Results: Environmental Motives Scale and tripartite attitude responses of farmers without native forest ............................................................ 165
   3. Results: Environmental Motives Scale and tripartite attitude responses of farmers with native forest ............................................................ 166
   4. Results: Environmental Motives Scale and tripartite attitude responses of farmers with native forest by choice and farmers with native forest by chance ............................................................................................................. 167
V. Environmental Motive Scale, NEP and tripartite attitudinal responses of farmers ... 169
   1. Model hypotheses ............................................................................................................. 169
   2. Results: Environmental Motives Scale, NEP and tripartite attitude responses of farmers without native forest ............................................................ 170
   3. Results: Environmental Motives Scale, NEP and tripartite attitude responses of farmers with native forest ............................................................ 171
   4. Results: Environmental Motives Scale, NEP and tripartite attitude responses of farmers with native forest by choice and farmers with native forest by chance ............................................................................................................. 172
VI. Discussion ........................................................................................................................ 176
   1. NEP-tripartite attitude model ........................................................................................... 176
   2. Value-based environmental concerns – tripartite attitude model............................... 177
   3. Value-based environmental concerns – NEP-tripartite attitude model ....................... 178
VII. Conclusion ...................................................................................................................... 180

Chapter 11: Effects of situational variables on farmers’ general and specific attitudes towards native forest

I. Introduction .......................................................................................................................... 185
II. Hypotheses ....................................................................................................................... 188
   1. Direct experience with nature (Recreational activities & Direct contact with New Zealand forest) ............................................................ 188
Chapter 12: Relationship between general and specific environmental attitudes and behaviour towards New Zealand native forest of farmers with native forest 215

I. Introduction .............................................................................................................. 215

II. Do farmers with native fragments of 1 ha or more differ from farmers with fragments less than 1 ha? ...................................................................................... 216
   1. Do the two groups of farmers differ in environmental attitude? .................. 216
   2. Do the two groups of farmers differ in their situational answers? .............. 219
   3. Conclusions ........................................................................................................ 220

III. Reasons of farmers with ≥ 1 ha fragments to keep native forest fragments on their property ................................................................................................. 221
   1. Results ................................................................................................................ 221
2. Conclusions.................................................................................................................................222

IV. The attitude-behaviour relationship in farmers with native forest fragments of
1 ha or more ........................................................................................................................................222
   1. Behaviour variables description .................................................................................................222
   2. Analysis of the Behaviour variables .........................................................................................223
   3. General-Specific Attitude & Behaviour ....................................................................................223
   4. General-Specific Attitude & Behaviour – MIMIC .....................................................................225
   5. Attitude – Behaviour relationship: conclusions .........................................................................226

V. Effects of situational variables on the attitude-behaviour relationship in farmers
with native forest fragments ≥ 1 ha ......................................................................................................227
   1. Model Selection ............................................................................................................................227
   2. Hypotheses ...................................................................................................................................228
   3. Results ........................................................................................................................................229

VI. Discussion ....................................................................................................................................243
   1. Sample choice .............................................................................................................................243
   2. Reasons for keeping native forest fragments on the farm .........................................................244
   3. Psychological Models ..................................................................................................................244
   4. Predictors of farmers’ behaviour towards native fragments on farms ......................................246

VII. Conclusion ...................................................................................................................................253

Chapter 13: Discussion & Conclusions ...............................................................................................255

I. Introduction ......................................................................................................................................255

II. Outlines of the study .......................................................................................................................255

III. Discussion and implications of findings .......................................................................................256
   1. The situational context of the different samples of New Zealand farmers ...........................256
   2. Findings about attitudes structure ..............................................................................................257
   3. Findings about the structure of farmers’ behaviour towards New Zealand native
      forest ..............................................................................................................................................260
   4. Findings about the attitudes-behaviour relationship ...............................................................261
   5. Findings about situational variables .........................................................................................263
   6. Recommendations .......................................................................................................................276

IV. Limitations of the study ................................................................................................................277
   1. Measures .....................................................................................................................................277
   2. Missing data .................................................................................................................................279
   3. Area of ill-fit .................................................................................................................................279

V. Future Directions ...........................................................................................................................280

VI. Conclusions ...................................................................................................................................281

References ...........................................................................................................................................283

Appendices .........................................................................................................................................311
List of acronyms and definition of key terms

* **Affect**: feelings towards an attitudinal object (e.g. forest)

* **Altruistic environmental concern**: one evaluates the consequences of an environmental issue in reference to a human group

* **Biospheric environmental concern**: one is concerned for the natural environment out of concern for the whole biosphere

* **CFA**: Confirmatory Factor Analysis, a statistical method of analysis

* **CFI**: Comparative Fit Index, an index to measure models’ statistical fit to data

* **Cognition**: beliefs towards an attitudinal object

* **Conation**: behavioural intentions towards an attitudinal object

* **DIF**: Differential Item Functioning

* **DSP**: Dominant Social Paradigm

* **EFA**: Exploratory Factor Analysis, a statistical method of analysis

* **Egoistic environmental concern**: one is concerned for the natural environment out of concern for oneself or close kin

* **EMS**: Environmental Motives Scale, also referred to as Schultz’ Value-based environmental concern scales

* **Environmental attitude**: people’s feelings and/or beliefs and/or intentions towards the natural environment

* **Environmental behaviour**: people’s actions towards the natural environment

* **Environmental concern**: the degree to which people are aware of problems regarding the environment and agrees with efforts to solve them and/or indicate a willingness to contribute personally to their solution

* **ESEM**: Exploratory Structural Equation Modeling, a statistical method of analysis.

* **Farmers with native forest**: respondents with New Zealand native forest fragments of any size (unless specified otherwise) on their farm

* **Farmers with native forest by chance**: respondents for whom the presence of New Zealand native forest on the farm did not influence their choice to take over the property

* **Farmers with native forest by choice**: respondents who chose to have New Zealand native forest fragments (of any size, unless specified otherwise) on their farm
Farmers without native forest: respondents who did not have New Zealand native forest on their farm.

General environmental attitude: attitude towards the natural environment as a broad concept (see specific environmental attitude)

HEP: Human Exemptionalism Paradigm

MIMIC: Multiple Indicators Multiple Causes, a statistical method of analysis

Native forest: New Zealand indigenous forest.

NEP: New Ecological and/or Environmental Paradigm, a scale measuring people’s core environmental beliefs

RMA: Resource Management Act, New Zealand's main piece of legislation on the management of the environment

RMSEA: Root Mean Square Error of Approximation, an index to measure models’ statistical fit to data

SEM: Structural Equation Modeling, a statistical method of analysis

Situational variables: external factors that can influence psychological processes

Specific environmental attitude: attitude towards a specific environmental object, such as in the present thesis, New Zealand native forest.

SPSS: Statistical Package for Social Sciences

SRMR: Standardized Root Mean Square Residual, an index to measure models’ statistical fit to data

TLI: Tucker-Lewis index, an index to measure models’ statistical fit to data

TPB: Theory of Planned Behaviour, an attitude-behaviour model

TRA: Theory of Reasoned Action, an attitude-behaviour model

Tripartite attitude: an attitudinal model where attitude is defined by feelings (affect), beliefs (cognition) and behavioural intentions (conation) towards an object.

Value: high-order, general guiding principles reflecting one’s life goals or standards

WLSMV: Weighted Least Squares Mean- and Variance-adjusted, an index to measure models’ statistical fit to data

WRMR: Weighted Root Mean Square Residual, an index to measure models’ statistical fit to data