



<http://researchspace.auckland.ac.nz>

### *ResearchSpace@Auckland*

#### **Copyright Statement**

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

This thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of this thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from their thesis.

To request permissions please use the Feedback form on our webpage.

<http://researchspace.auckland.ac.nz/feedback>

#### **General copyright and disclaimer**

In addition to the above conditions, authors give their consent for the digital copy of their work to be used subject to the conditions specified on the Library Thesis Consent Form.

# *Psychology of Environmental Attitudes*

*A cross-cultural study of their content and structure*

*Taciano Lemos Milfont*

M.Sc. (Dist'n), Federal University of Paraiba, Brazil, 2001

B.A., Catholic University of Pernambuco, Brazil, 1999

Supervisor: Professor John Duckitt

A thesis submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy in Psychology

The University of Auckland

• 2007 •

---

# *Abstract*

---

Environmental attitudes (EA) are a psychological tendency that is expressed by evaluating perceptions of or beliefs regarding the natural environment, including factors affecting its quality, with some degree of favour or disfavour. Research on EA has been criticised as being noncumulative and atheoretical. This thesis addresses these critics by taking a systematic approach to the study of the psychology of EA, and had three specific objectives. First, it sets out to investigate the cognitive structure of EA, that is, what kind of perceptions or beliefs regarding the natural environment people have, how these perceptions or beliefs can be operationalized in terms of dimensions, or psychological constructs, and how these dimensions relate to each other. Second, it sets out to investigate the nomological network of EA, that is, to test causal models of antecedents and consequences of EA by investigating their relationships with socio-demographic (e.g., gender, religiosity), psychological (e.g., social desirability, authoritarianism) and environmentally related variables (e.g., ecological behaviour, inclusion with nature). And finally, it sets out to examine the value/threat–attitude–behaviour causal model, in which EA are deemed to fully mediate the influence of values and perceived environmental threat on ecological behaviour.

Three cross-sectional empirical studies were carried out, involving a total of 2,150 student and general population participants. Study 1, conducted in New Zealand, tests the dimensionality and hierarchical structure of EA. Study 2a, also conducted in New Zealand, involves the development of a new culture-general and fully-balanced tool, the Environmental Attitudes Inventory (EAI), for measuring EA. Study 2b, a Web-based survey conducted in Brazil, assesses the validity and reliability of the EAI in this different cultural context. Study 2c, also a Web-based survey conducted with participants from more than fifty countries, describes the development of a short-form of the measure (EAI-S) and assesses its validity and test-retest reliability in this diverse sample. Study 3 tests the validity, reliability and measurement invariance of the EAI-S across samples from Brazil, New Zealand and South Africa. This cross-cultural study also investigates

causal models of antecedents and consequences of EA, and the value/threat–attitude–behaviour causal model across these cultures.

Taken together, these studies demonstrated the following: (1) EA are a multidimensional construct organized in a hierarchical fashion, with first-order factors either loading on a second-order factor (i.e., Generalized Environmental Attitudes) or loading on either one of two correlated second-order factors (i.e., Preservation and Utilization). (2) Individuals with pro-EA are those who are older, female and members of an environmental organization, who attribute greater importance to self-transcendence, biospheric and altruistic values, who conserve the environment by performing ecological behaviours, who feel connected with nature and concerned about threats from environmental problems, and who support sustainability principles. Individuals with anti-EA, in contrast, are those who are Judeo-Christians, who have higher levels of religiosity and beliefs in the Bible, who support economic liberalism and political conservatism, and who attribute greater importance to traditional and self-enhancement values. (3) Altruistic values, perceived environmental threat (both positively), and self-enhancement values (negatively) are strong predictors of EA, and EA fully mediates the influence of values and threat on ecological behaviour.

Overall, this research has a number of implications. These include (1) the development of a research framework for the study of EA that considers their contents in both their horizontal and vertical structures, (2) the development of the EAI for measuring these contents and structures, (3) the indication that pro-EA still tends to be limited to certain groups within society, which would tend to constrain the resolution of environmental problems, (4) the confirmation of the relevance of both human values and perceived environmental threat in the formation and determination of EA, and (5) support for the mediating role of EA on the influence of values and threat on ecological behaviour.

---

# *Acknowledgments*

---

This research would not have been possible without the support of many people to whom and institutions to which I am indebted.

I would like to thank my supervisor, Professor John Duckitt, for agreeing to supervise a thesis in a different area of research of his own, for sharing his knowledge of the area of ideological beliefs and social attitudes, for his unceasing faith in me and in the project, and for his endless advices, encouragement and patience during the thesis preparation. I could not have asked for a better supervisor. I would also like to thank my co-supervisor, Niki Harré, for guidance and support during the thesis preparation and also during my socio-cultural adaptation to New Zealand.

Throughout the long journey of this research there were many people to whom I am grateful for their generous support. Among these, I would specially like to thank Palloma R. Andrade, Raquel P. Belo and Viviany S. Pessoa for collecting data in Brazil, Dr. Claire Wagner for collecting data in South Africa, Professor Valdiney V. Gouveia for his friendship, mentorship and endless support in my academic career, Dr. Ronald Fischer for mentorship, Dr. Margaret Francis and Wei Kim for their computer support, Kamalini Gnaniah, Larissa Isted, Shannon Johnston and Rajni Herman for their administrative support, Lucy Patston for proofreading, and Dr. Ross Galbreath for his help with the language editing.

I would also like to thank the Ministry of Education of Brazil for funding this research with a scholarship from the CAPES Foundation, and the University of Auckland for supporting me with the International Doctoral Fees Bursary and the Faculty of Science's Postgraduate Tuition Fees Bursary.

This research could have never been completed without the love, patience and understanding of my family and friends back in Brazil and my new friends here in New Zealand, who had to cope with a very busy and absent brother, friend, son, and uncle. Thank you for helping me reach this goal. In particular, love and thanks go to my mum and dad, who have always given

their children's health and education priority over their own needs. They have been the greatest mentors in my life with their inspiration and unconditional support.

Special thanks are due to the more than 2,000 participants who, by volunteering and giving their time to take part in this research, helped us to further the understanding of the psychology of environmental attitudes.

Thank you very much!

---

# Table of Contents

---

	Page
<i>Abstract</i> .....	<i>ii</i>
<i>Acknowledgments</i> .....	<i>iv</i>
<i>Table of contents</i> .....	<i>vi</i>
<i>List of tables</i> .....	<i>x</i>
<i>List of figures</i> .....	<i>xiii</i>
<b><i>Chapter One: Introduction</i></b> .....	<b><i>- 1 -</i></b>
<i>The history of human-environment interactions</i> .....	<i>- 2 -</i>
<i>Aim of the thesis</i> .....	<i>- 6 -</i>
<i>Outline of the thesis</i> .....	<i>- 7 -</i>
<b><i>Chapter Two: Psychology of attitudes and environmental attitudes: A general review of the literature</i></b> .....	<b><i>- 9 -</i></b>
<i>Introduction</i> .....	<i>- 9 -</i>
<i>Section 1. Psychological study of attitudes and environmental attitudes</i> .....	<i>- 9 -</i>
<i>Definition of attitudes and environmental attitudes</i> .....	<i>- 10 -</i>
<i>Measurement of attitudes and environmental attitudes</i> .....	<i>- 12 -</i>
<i>Structure of attitudes and environmental attitudes</i> .....	<i>- 18 -</i>
<i>Functions of attitudes and environmental attitudes</i> .....	<i>- 19 -</i>
<i>Section 2. Theoretical approaches related to environmental attitudes research</i> .....	<i>- 22 -</i>
<i>The theories of reasoned action and planned behaviour</i> .....	<i>- 22 -</i>
<i>The theories of norm-activation and human values</i> .....	<i>- 25 -</i>
<i>Other theoretical approaches relevant to environmental attitudes research</i> .....	<i>- 29 -</i>
<i>Section 3. Environmental attitudes across cultures</i> .....	<i>- 32 -</i>
<i>Conclusions</i> .....	<i>- 34 -</i>
<b><i>Chapter Three. Psychology of environmental attitudes: A detailed review of the literature</i></b> .....	<b><i>- 35 -</i></b>
<i>Introduction</i> .....	<i>- 35 -</i>
<i>Section 1. Psychological study of environmental attitudes: The research objectives</i> .....	<i>- 37 -</i>

<i>The dimensionality of environmental attitudes</i> .....	- 37 -
<i>Horizontal Approaches to the Issue of the Dimensionality of Environmental Attitudes</i> .....	- 38 -
<i>Vertical Approach to the Issue of the Dimensionality of Environmental Attitudes</i> .....	- 45 -
<i>The nomological network of environmental attitudes</i> .....	- 55 -
<i>Socio-Demographic Variables</i> .....	- 56 -
<i>Psychological Variables</i> .....	- 59 -
<i>Environmentally Related Variables</i> .....	- 61 -
<i>Overview of the Nomological Network of Environmental Attitudes</i> .....	- 64 -
<i>The value–attitude–behaviour cognitive hierarchy model</i> .....	- 67 -
<i>The Role of Social Situations: Perceived Environmental Threat</i> .....	- 70 -
<i>Section 2. Research questions</i> .....	- 74 -
<i>Conclusions</i> .....	- 79 -
<b><i>Chapter Four: Study 1. Testing the dimensionality of environmental attitudes</i></b> .....	<b>- 80 -</b>
<i>Introduction and outline of Study 1</i> .....	- 80 -
<i>Method</i> .....	- 81 -
<i>Participants</i> .....	- 81 -
<i>Instruments</i> .....	- 81 -
<i>Data analyses</i> .....	- 83 -
<i>Results and discussion</i> .....	- 87 -
<i>Summary and conclusions from Study 1</i> .....	- 94 -
<b><i>Chapter Five: Study 2. Development and validation of the Environmental Attitudes Inventory (EAI)</i></b> .....	<b>- 96 -</b>
<i>Introduction and outline of Study 2</i> .....	- 96 -
<i>Study 2a</i> .....	- 96 -
<i>Method</i> .....	- 103 -
<i>Participants</i> .....	- 103 -
<i>Instruments</i> .....	- 103 -
<i>Results and discussion</i> .....	- 106 -
<i>Descriptive statistics and reliabilities</i> .....	- 106 -
<i>Intercorrelations and social desirability</i> .....	- 112 -
<i>Testing the Environmental Attitudes Inventory (EAI) structural model</i> .....	- 114 -
<i>Testing the convergent and discriminant validity of the EAI structural model</i> .....	- 115 -
<i>Summary and conclusions from Study 2a</i> .....	- 121 -



<i>Study 2b</i> .....	- 122 -
<i>Method</i> .....	- 122 -
<i>Participants, procedure and instruments</i> .....	- 122 -
<i>Producing the Brazilian-Portuguese version of the EAI</i> .....	- 123 -
<i>Results and discussion</i> .....	- 123 -
<i>Descriptive statistics and reliabilities</i> .....	- 123 -
<i>Testing EAI structural model</i> .....	- 124 -
<i>Testing the discriminant validity of the EAI structural model</i> .....	- 125 -
<i>Summary and conclusions from Study 2b</i> .....	- 126 -
<i>Study 2c</i> .....	- 126 -
<i>Method</i> .....	- 127 -
<i>Participants and procedure</i> .....	- 127 -
<i>Instruments</i> .....	- 128 -
<i>Results and discussion</i> .....	- 130 -
<i>Descriptive statistics and reliabilities</i> .....	- 130 -
<i>Testing the structural model of the short-form of the Environmental Attitudes Inventory (EAI-S)</i> .....	- 131 -
<i>Testing the convergent and discriminant validity of the EAI-S structural model</i> .....	- 132 -
<i>Test-retest reliability of the EAI-S</i> .....	- 137 -
<i>Qualitative evaluation of the higher order environmental attitudes dimensions</i> .....	- 139 -
<i>Summary and conclusions from Study 2c</i> .....	- 140 -
<i>General summary and conclusions from Study 2</i> .....	- 141 -
<b><i>Chapter Six: Study 3. Testing the measurement invariance of the EAI-S and the value/threat-attitude-behaviour model</i></b> .....	<b>- 144 -</b>
<i>Introduction and outline of Study 3</i> .....	- 144 -
<i>Method</i> .....	- 147 -
<i>Participants and procedure</i> .....	- 147 -
<i>Instruments</i> .....	- 148 -
<i>Results and discussion</i> .....	- 149 -
<i>Descriptive statistics and reliabilities</i> .....	- 149 -
<i>Intercorrelations of the EAI-S scales</i> .....	- 155 -
<i>Testing the EAI-S structural model</i> .....	- 158 -
<i>Multi-group analysis: Test of measurement invariance of the EAI-S</i> .....	- 164 -
<i>Testing the convergent and discriminant validity of the EAI-S structural model</i> .....	- 171 -

<i>Testing the value/threat → attitude → behaviour model</i> .....	- 178 -
<i>Summary and conclusions from Study 3</i> .....	- 184 -
<b>Chapter Seven: Discussion and conclusions</b> .....	<b>- 186 -</b>
<i>Introduction</i> .....	- 186 -
<i>Outline of the studies</i> .....	- 186 -
<i>Discussion and implications of findings</i> .....	- 187 -
<i>The structure of environmental attitudes</i> .....	- 187 -
<i>The nomological network of environmental attitudes</i> .....	- 192 -
<i>The value/threat-attitude-behaviour model</i> .....	- 197 -
<i>Limitations of this research</i> .....	- 198 -
<i>Suggestions for further research</i> .....	- 199 -
<i>Concluding comments</i> .....	- 202 -
<b>References</b> .....	<b>- 203 -</b>
<b>Appendices</b> .....	<b>- 232 -</b>
<i>Appendix A. Ethic Approvals</i> .....	- 233 -
<i>Appendix B. Additional Information from Study 1</i> .....	- 236 -
<i>Appendix C. Additional Information from Study 2</i> .....	- 240 -
<i>Appendix D. Additional Information from Study 3</i> .....	- 250 -
<i>Appendix E. Questionnaires Used</i> .....	- 253 -

---

# *List of Tables*

---

Table 1 .....	- 11 -
Examples of Environmental Concern and Environmental Attitudes Definitions	
Table 2 .....	- 38 -
Approaches to the Dimensionality of Environmental Attitudes	
Table 3 .....	- 42 -
Kellert's Typology of Human Values for Nature (Kellert, 1993, 1996)	
Table 4 .....	- 48 -
Higher Order Factor Analysis Results from Correlation Matrices of Published Studies	
Table 5 .....	- 64 -
Summary of the Environmental Attitudes Nomological Network	
Table 6 .....	- 88 -
Labels and Number of Items of the Ten Primary Factors Extracted	
Table 7 .....	- 90 -
Means, Standard Deviations, Factor Loadings, and Communalities of Exploratory Factor Analysis of the Environmental Attitudes Primary Factors (Study 1)	
Table 8 .....	- 92 -
Fit Indices for Alternative Models (Study 1)	
Table 9 .....	- 98 -
Content of Environmental Attitudes: The Environmental Attitudes Inventory Scales, their Construct Definition and Content Similarities with Prior Environmental Attitudes Studies	
Table 10 .....	- 107 -
The Environmental Attitudes Inventory (EAI), Its Item Reliabilities based on Study 2a, and the Selected Items for its Short-Form Version	
Table 11 .....	- 110 -
Descriptive Scale Statistics for the EAI Scales (Study 2a)	
Table 12 .....	- 112 -
Descriptive Scale Statistics for the Criterion Scales (Study 2a)	
Table 13 .....	- 113 -
Intercorrelations of the EAI scales (Study 2a)	
Table 14 .....	- 115 -
Fit Indices for Alternative Models (Study 2a)	
Table 15 .....	- 118 -
Correlations Between the Higher Order Factors of the EAI and Criterion Measures (Study 2a)	

Table 16 .....	- 120 -
Beta Coefficients of the Simultaneous Multiple Regressions of the Validity Criteria on the Higher Order Factors of the EAI (Study 2a)	
Table 17 .....	- 124 -
Descriptive Scale Statistics for the EAI Scales (Study 2b)	
Table 18 .....	- 125 -
Fit Indices for Alternative Models (Study 2b)	
Table 19 .....	- 130 -
Descriptive Scale Statistics for the Short-Form of the Environmental Attitudes Inventory (EAI-S) Scales (Study 2c)	
Table 20 .....	- 131 -
Descriptive Scale Statistics for the Criterion Scales (Study 2c)	
Table 21 .....	- 132 -
Fit Indices for Alternative Models (Study 2c)	
Table 22 .....	- 134 -
Correlations between the Higher Order Factors of the EAI-S and Criterion Measures (Study 2c)	
Table 23 .....	- 136 -
Beta Coefficients of the Simultaneous Multiple Regressions of the Validity Criteria on the Higher Order Factors of the EAI-S (Study 2c)	
Table 24 .....	- 138 -
Beta Coefficients of the Simultaneous Multiple Regressions of the Value Clusters on the Higher Order Factors of the EAI-S for the Test-Retest Sample (Study 2c)	
Table 25 .....	- 140 -
Ten Main Definers of the Higher Order Environmental Attitudes Dimensions for the Test-Retest Sample (Study 2c)	
Table 26 .....	- 146 -
Comparison of General, Psychological and Socioeconomic-Political Indicators among the Countries Included in Study 3	
Table 27 .....	- 151 -
Descriptive Scale Statistics for the EAI-S in Brazil, New Zealand and South Africa	
Table 28 .....	- 153 -
Mean Comparison of the EAI-S Scales across Countries	
Table 29 .....	- 154 -
Descriptive Scale Statistics for the Criterion Scales in Brazil	
Table 30 .....	- 154 -
Descriptive Scale Statistics for the Criterion Scales in New Zealand	
Table 31 .....	- 155 -
Descriptive Scale Statistics for the Criterion Scales in South Africa	

Table 32 .....	- 156 -
Intercorrelations of the EAI-S Scales across Countries (Study 3)	
Table 33 .....	- 159 -
Higher Order Factor Loadings of the EAI-S based on a Meta-Analytical Approach (Study 3)	
Table 34 .....	- 162 -
Fit Indices for Alternative Models across Countries (Study 3)	
Table 35 .....	- 168 -
Summary Statistics of Fit Indices for Selected Invariance Constraints Imposed across Groups for Testing Measurement Invariance of the EAI-S Twelve-Correlated-First- Order-Factors Model (Study 3)	
Table 36 .....	- 169 -
Summary Statistics of Fit Indices for Selected Invariance Constraints Imposed across Groups for Testing Measurement Invariance of the EAI-S One-Second-Order-Factor Model (Study 3)	
Table 37 .....	- 170 -
Summary Statistics of Fit Indices for Selected Invariance Constraints Imposed across Groups for Testing Measurement Invariance of the EAI-S Two-Correlated-Second- Order-Factors Model (Study 3)	
Table 38 .....	- 176 -
Correlations between the Higher Order Factors of the EAI-S and Criterion Measures (Study 3)	
Table 39 .....	- 177 -
Beta Coefficients of the Simultaneous Multiple Regressions of the Validity Criteria on the Higher Order Factors of the EAI-S (Study 3)	
Table 40 .....	- 183 -
Standardized Total Effects for the Value/Threat–Attitude–Behaviour Full Latent Variable Model	
Table 41 .....	- 183 -
Standardized Indirect Effects for the Value/Threat–Attitude–Behaviour Full Latent Variable Model	
Table 42 .....	- 194 -
Meta-Analytic Summary of the Correlations between the Higher Order Factors of the EAI and External Variables across Studies	

---

# *List of Figures*

---

Figure 1 .....	- 23 -
Diagram of the Theory of Planned Behaviour. Adapted from Ajzen (2006)	
Figure 2 .....	- 27 -
Theoretical Model of Relations among Ten Motivational Types of Values. Adapted from Schwartz (2006)	
Figure 3 .....	- 36 -
A Schematic Overview of the Areas Addressed in this Research	
Figure 4 .....	- 68 -
A Schematic Causal Model of the Roles of Social Structure, Values, General Beliefs, Attitudes, and Intentions in Determining Ecological Behaviour. Adapted from Stern, Dietz and Guagnano (1995), and Cameron (2002)	
Figure 5 .....	- 75 -
Steps for Assessing the Dimensionality of Environmental Attitudes	
Figure 6 .....	- 77 -
Steps for Assessing the Nomological Network of Environmental Attitudes	
Figure 7 .....	- 78 -
Steps for Assessing the Value/Threat–Attitude–Behaviour Cognitive Hierarchical Model	
Figure 8 .....	- 93 -
Standardized Multiple Regression and Correlation Coefficients for the Full Latent Variable Model of Environmental Attitude’s Ten Primary Factors, Two Higher Order Factors and Self-Reported Ecological Behaviour and Economic Liberalism (Study 1)	
Figure 9 .....	- 116 -
Standardized Multiple Regression and Correlation Coefficients for the Full Latent Variable Model of Environmental Attitude’s Twelve First-Order Factors, Two Second-Order Factors and Self-Reported Ecological Behaviour and Economic Liberalism (Study 2a)	
Figure 10 .....	- 172 -
Standardized Multiple Regression for the Completely Constrained Full Latent Variable Model of Environmental Attitude’s Twelve First-Order Factors, One Second-Order Factor, and Self-Reported Ecological Behaviour and Economic Liberalism across Countries (Study 3)	
Figure 11 .....	- 174 -
Standardized Multiple Regression and Correlation Coefficients for the Completely Constrained Full Latent Variable Model of Environmental Attitude’s Twelve First-Order Factors, Two Second-Order Factors, and Self-Reported Ecological Behaviour and Economic Liberalism across Countries (Study 3)	

Figure 12 .....	- 179 -
Standardized Multiple Regression for the Completely Constrained Full Latent Variable Model of Direct and Mediated (through Environmental Attitudes) Effects of Values and Environmental Threat on Self-Reported Ecological Behaviour across Countries (Study 3)	
Figure 13 .....	- 180 -
Standardized Multiple Regression for the Full Latent Variable Model of Direct and Mediated (through Environmental Attitudes) Effects of Values and Environmental Threat on Self-Reported Ecological Behaviour for the Brazil Sample	
Figure 14 .....	- 181 -
Standardized Multiple Regression for the Full Latent Variable Model of Direct and Mediated (through Environmental Attitudes) Effects of Values and Environmental Threat on Self-Reported Ecological Behaviour for the New Zealand Sample	
Figure 15 .....	- 181 -
Standardized Multiple Regression for the Full Latent Variable Model of Direct and Mediated (through Environmental Attitudes) Effects of Values and Environmental Threat on Self-Reported Ecological Behaviour for the South Africa Sample	

