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# *Psychology of Environmental Attitudes*

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

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# *Abstract*

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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.

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# *Chapter One*

## *Introduction*

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During the past few decades, rising concern about environmental problems has led to intensified international scientific debate about environmental issues. The international community has recognized that natural resources are being used up at a faster pace than they can be restored, that the Earth's resources are not limitless, and that ecosystem preservation is closely related to the preservation of the human species. These concerns are exemplified by the Millennium Ecosystem Assessment project (Millennium Ecosystem Assessment, 2005). In this initiative, nearly 1,400 experts from 95 countries joined a four-year project to compile a global inventory of the state of Earth's ecosystems. There were four main conclusions:

- First, in trying to meet the growing demands for goods (i.e., food, fresh water, timber, fiber, and fuel), humans have changed ecosystems faster and more extensively over the past 50 years than in any equivalent period of time in history. For instance, about 60 percent of ecosystem services that support life on Earth (e.g., fresh water, and air and water regulation) are being damaged or used unsustainably.
- Second, although economic development and human health and well-being have increased in the past 50 years, these gains have been achieved at the cost of degradation to many ecosystem services, expanded risk of unexpected environmental changes, and increased poverty for some groups of people.
- Third, the expectation for the next 50 years is that the degradation of ecosystem services could grow significantly worse.
- Finally, the project concluded that significant changes in policies, institutions and practices are necessary to reverse the degradation of Earth's resources.



It can be concluded therefore that environmental problems have become an important issue in the past several decades, and research has demonstrated that these problems seem to be linked to human actions. As pointed out by Wilson (1993), what “humanity is doing now in a single life-time will impoverish our descendants for all time to come” (p. 37). Consequently, the history of environmental change could be understood through the effect of humans upon their environments.

### ***THE HISTORY OF HUMAN-ENVIRONMENT INTERACTIONS***

Simmons (1993) has classified the history of human-environment interactions into five stages. The first stage refers to the hunting-gathering economy and early agriculture, and is believed to have been fully established around 7500 BC in Asia regions. This stage was characterized by sedentism and the development of initial skills for the domestication of both animals and plants by hunter-gatherer populations. This first stage covers at least 99 per cent of human history (Wilson, 1993), making its impact on the history of human-environment interactions considerable. Although permanent impacts of hunter-gatherers upon their environments are documented, such as the reduction or extinction of animal species and the use of fire for land clearance, by and large those humans had little or no lasting impact upon the environment. However, whether this low impact was a result of early environmental preservation tendencies or merely a result of low population densities is not clear.

Riverine civilizations represent the second stage of the history of human-environment interactions. This stage refers to a period from about 4000 BC until about the first century AD, and was characterized by pastoralism and technological achievements to control and store large quantities of water. Advances in water supplies extended the growing season, and, as a result, large scale land transformation, settled agriculture, and population growth were documented. Thus, while the use of fire for land clearance was important in the first stage, the use and storage of water was the highlight of the second stage.

The third stage encompasses the agriculture empires, comprising the period from about 500 BC to 1800 AD. This stage was characterized by city-centered regions with political and

commercial power. Given the concentration of human populations in these centralized regions, the demand for food was higher. This increased demand led to technological advances in food production, such as water storage, irrigated agriculture, terracing, and selective breeding in centralized areas. Another important characteristic of this stage was the distinction between place of production and place of consumption, with goods, such as plant crops and animals, being transported over long distances from one empire to another. Although pre-industrial, the impact of human populations upon their environments increased substantially during this stage, as evidenced by erosion from quarries, a high production of waste, management of woodland for charcoal supply, and the dependence of several animal species on human intervention for their survival as a result of their domestication. However, some preservationist actions were also documented during this period, such as the management of preserved areas (e.g., royal forests), the creation of commissioned parks and gardens, and the use of legislation for the protection of certain species.

The fourth stage in the history of human-environment interactions was the Atlantic-industrial era. This stage encompasses the period from the full industrial revolution (1800 AD) to about the 1960s, and represents a period of very high human impact on the environment. It is estimated, for instance, that from 1800 to 1985 the world population multiplied five-fold, and the proportion of people living in urban areas rose from 2% to nearly 50%. This urban-industrialized stage witnessed several technological advances, such as the clock, computers, and use of fossil fuel for high speed transportation. This stage also witnessed unprecedented environmental transformations. These transformations include changes in ecological processes (e.g., the accumulation of natural materials in large concentrations and the creation of new materials unknown in nature, such as pesticides), expansion of cultivated areas resulting in erosion, deforestation and the extinction of several species, and the creation of large conglomerates of humans living in urban cities, resulting in water shortages and increases in waste production.

The Pacific-global era, which began in the 1960s, is the most recent stage in the history of human-environment interactions. This stage has been characterized by an economic expansion into countries on the Pacific Rim, global communication resulting in globalization, economic

interdependency among countries, and the recognition of regional diversity. This stage has also witnessed a change in people's perceptions of the natural world and of the human-environment relationship, which has resulted in international environmental concern.

Thus, according to Simmons (1993) permanent impacts of humans upon their environments are documented in all stages of the history of human-environment interactions. It seems, however, that only during the last few decades have natural resources been used up at a faster pace than they can be restored. This has led to increased environmental concern. Barbieri (1997) has outlined three stages for the evolution of environmental concern. In the first stage the concerns were about specific environmental issues, which were understood to be caused by the ignorance, neglect or irresponsibility of producers and consumers of goods and services. In the second stage, environmental degradation was recognised as a widespread problem, but this concern was still confined to the territorial limits of each country. The last stage comprises the present situation in which environmental degradation is considered to be a planetary problem that involves everyone, and led to the international community's concern about the limits of the planet's development which dates back to the 1960s.

The 1960s was a critical period for increasing international environmental concern. During this decade there were important contributions to the discussion of the risks of environmental degradation, such as the first Earth Day, and important publications, such as Carson's (1962) *Silent Spring* on the link between pesticides and environmental pollution, Ehrlich's (1968) *The Population Bomb* on the issue of overpopulation, White's (1967) *The Historical Roots of Our Ecologic Crisis* on the link between Christian axioms concerning human-nature relations and anthropocentric attitudes towards the environment, and Hardin's (1968) *The Tragedy of the Commons* on the risks of overexploitation of natural resources as a result of the conflict between individual interests and the common good.

In subsequent decades concern has continued to grow with important international events organized by the United Nations in each decade. The first United Nations conference on the environment was held in Stockholm in 1972. The World Commission on Environment and

Development was established in 1983 and issued a document titled *Our Common Future* (often referred to as the Brundtland Report) defining a sustainable society as one that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987, p. 363). The Earth Summit conference was held in Rio de Janeiro in 1992 (ECO-92), which sanctioned a global plan of actions for the 21<sup>st</sup> century called Agenda 21. Then in 2002 the World Summit on Sustainable Development conference was held in Johannesburg.

Environmental problems have therefore become important topics of international debate. As this debate has intensified, many social science disciplines have begun focusing on environmental research, with studies in sub-disciplines such as environmental history (e.g., Hayashida, 2005; e.g., Simmons, 1993), environmental anthropology (e.g., P. E. Little, 1999; Townsend, 2000), environmental sociology (e.g., Buttel, 1987; e.g., Dunlap & Michelson, 2002) and environmental psychology (e.g., Bechtel & Churchman, 2002; Stokols & Altman, 1987; Sundstrom, Bell, Busby, & Asmus, 1996). Environmental problems are viewed by many as caused by maladaptive human behaviour (Maloney & Ward, 1973), and thus to have an anthropogenic origin (Stern, 1992; Takala, 1991). Psychology, therefore, can play an important role in the amelioration of these problems by improving ecological behaviour (see, e.g., Oskamp, 2000; Pawlik, 1991; Schmuck & Schultz, 2002; Schmuck & Vlek, 2003; Weigel & Weigel, 1978). One way to contribute to the amelioration of environmental problems is through the study of environmental attitudes, since these may underlie peoples' behaviour in preserving or damaging natural resources. The psychological study of environmental attitudes is therefore the aim of this thesis.

## *AIM OF THE THESIS*

Environmental attitudes are a crucial construct in the field, with more than half of all environmental psychological publications dealing with it.<sup>1</sup> However, it has been claimed that research on environmental attitudes has largely been “atheoretical and noncumulative” (1981, p. 241). This claim was endorsed at the beginning (Stern, 1992) and the end of last decade (Dietz, Stern, & Guagnano, 1998), and still seems to remain true. The overall aim of this thesis is, therefore, to advance knowledge through a more systematic approach to the study of the psychology of environmental attitudes. It is hoped that the research framework developed here will contribute to research on environmental attitudes becoming more theoretical and cumulative.

This thesis has three specific objectives. First, it sets out to investigate the cognitive structure of environmental attitudes, that is, what kind of perceptions and beliefs regarding the natural environment people have, how these perceptions and 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 (Cronbach & Meehl, 1955) of environmental attitudes, that is, to test causal models of antecedents and consequences of environmental attitudes by investigating their relationships with criterion variables, such as socio-demographic (e.g., gender, religiosity) and psychological variables (e.g., social desirability, authoritarianism). And finally, it sets out to examine Homer and Kahle’s (1988) value–attitude–behaviour cognitive hierarchy model, that is, to test whether values influence ecological behaviour both directly and indirectly through environmental attitudes.

Heberlein (1981) points out that technically “any object outside of self exists in the individual’s environment, so all attitudes except those beliefs about self could be correctly called

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<sup>1</sup> Updating Kaiser et al.’s (1999) literature review, a search in the PsychINFO database from 1967 to 2006 yielded 4001 publications dealing with environmental problems. The psychological index terms used were: environmental attitudes ( $n = 2276$ ), conservation (ecological behaviour) ( $n = 921$ ), pollution ( $n = 488$ ), and environmental education ( $n = 316$ ). Given the multiple use of index terms, the total number of publications is reduced to  $n = 3326$ . Of these, the majority (50.2%) refer to environmental attitudes. Note that this represents a reduction in the proportion of studies dealing with this construct given that Kaiser et al. found that the majority (62.2%) of the publications from 1967 to 1995 refer to environmental attitudes. Nevertheless, it highlights the importance of this construct to the field.

environmental attitudes” (p. 243). Thus, environmental attitudes may refer to attitudes toward all external objects of one’s reality. Moreover, “environment” may refer to both built environments and non-human environments. To avoid over-generalization and confusion, the concept of environmental attitudes is here used to designate only attitudes toward the natural (biophysical or non-human) environment.

The basic methodological approach used in all the empirical studies in this thesis is that of attitude scale development. This involved selecting statements related to environmental attitudes from well-known measures and generating new statements based on research and literature on the topic, getting participants to indicate their degree of agreement with these statements, factor analyzing their responses to detect mathematical patterns that could be meaningfully interpreted in terms of the research literature, and confirmation of factor structures by means of structural equation modeling.

## ***OUTLINE OF THE THESIS***

Chapter Two consists of a literature review of research and theory on the psychology of attitudes in general and on the psychology of environmental attitudes in particular. The definition, structure, function, and measurement of attitudes are discussed and theoretical approaches related to environmental attitudes are reviewed. Chapter Three consists of a more extensive review of the literature on environmental attitudes, specifically addressing the three main research objectives, namely the dimensionality and nomological network of environmental attitudes, and the value–attitude–behaviour cognitive hierarchy model. This chapter concludes by outlining the research questions to be investigated.

Chapters Four, Five and Six report empirical studies. Chapter Four describes research conducted in New Zealand (Study 1) testing the dimensionality and hierarchical structure of environmental attitudes. Chapter Five describes three specific studies. The first of these (Study 2a) was also conducted in New Zealand and describes the development of a new tool, the Environmental Attitudes Inventory (EAI), for measuring environmental attitudes. The second study

(Study 2b) was a web-based survey conducted in Brazil, and assessed the validity and reliability of the EAI in this different cultural context. The final study (Study 2c) was also a web-based survey conducted with participants from more than fifty countries, and describes the development of a short-form of the measure (EAI-S) and assesses its validity and reliability in this diverse sample.

Chapter Six describes a cross-cultural study (Study 3) to test the validity, reliability and measurement invariance of the EAI-S across samples from Brazil, New Zealand and South Africa. This chapter also describes research investigating the value–attitude–behaviour cognitive hierarchy model across cultures.

Chapter Seven summarizes and discusses the empirical findings. Implications for the dimensionality and hierarchical structure of environmental attitudes are noted. This chapter concludes with suggestions of possible directions for future research based on the findings and hypotheses generated by the empirical studies.

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*Chapter Two*

***Psychology of attitudes and  
environmental attitudes: A general  
review of the literature***

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***INTRODUCTION***

This chapter briefly reviews the psychological literature on attitudes and environmental attitudes. It is not intended to be a comprehensive review of the study of attitudes, but rather an introduction to the most essential issues addressed in Chapter Three regarding environmental attitudes. The present chapter has three sections. The first provides a more general review of the definition, measurement, structure and functions of attitudes and, specifically, environmental attitudes. The second provides a brief review of theoretical approaches relevant to environmental attitudes research. The final section provides a succinct review of studies examining environmental attitudes across cultures.

***SECTION 1. PSYCHOLOGICAL STUDY OF ATTITUDES AND  
ENVIRONMENTAL ATTITUDES***

Attitude, from Latin *aptus* (i.e., fit and ready for action), has been one of the main psychological constructs studied in social psychology. Indeed, many prominent psychologists have referred to social psychology as the scientific study of attitudes (Thomas & Znaniecki, 1918; J. B. Watson, 1930), or at least have elected attitude as the most indispensable concept of this discipline (Allport, 1935). This section gives a brief overview of the definition, measurement, structure and functions of attitudes in general and environmental attitudes in particular.



## ***DEFINITION OF ATTITUDES AND ENVIRONMENTAL ATTITUDES***

### *Definition of attitudes*

There are many definitions of attitudes, however, the traditional definition is one given by Allport (1935), who defines attitudes as “a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual’s response to all objects and situations with which it is related” (p. 810). There have been many other definitions, and attitudes have been conceptualized and researched in different ways. However, there seems to be a general consensus that attitudes can be viewed as an evaluative judgement summary of attribute dimensions (e.g., good-bad, likable-dislikable) of a particular psychological object (Ajzen, 2001; Albarracín, Zanna, Johnson, & Kumkale, 2005; Crano & Prislin, 2006; Eagly & Chaiken, 1993, 2005). Following this approach, Eagly and Chaiken (1993) have defined attitudes as “*a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor*” (p. 1, emphasis in original). This definition is regarded as the “most conventional contemporary definition” (Albarracín, Johnson, & Zanna, 2005, p. 4) and it will thus be used in this thesis.

### *Definition of environmental attitudes*

“Environmental concern” is the term typically used in empirical literature to refer to environmental attitudes (Dunlap & Jones, 2002; Fransson & Gärling, 1999). Many researchers have used “environmental concern” and “environmental attitudes” synonymously (Dunlap & Jones, 2003; Van Liere & Dunlap, 1981), whereas others have differentiated them (Heberlein, 1981; Schultz et al., 2005; Schultz, Shriver, Tabanico, & Khazian, 2004; Stern & Dietz, 1994). As a result, several definitions have been proposed for both terms. Some examples of definitions are shown in Table 1.

Table 1

*Examples of Environmental Concern and Environmental Attitudes Definitions*

<b>Environmental concern is...</b>	<b>Environmental attitudes are...</b>
“the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate a willingness to contribute personally to their solution” (Dunlap & Michelson, 2002, p. 485).	“an organization of beliefs, including an overall evaluation, linking and disliking for some aspects of the environment, the environment as a whole, or some object which has clear and direct effects on the environment, such as power plants” (Heberlein, 1981, p. 5)
“the affect (i.e., worry) associated with beliefs about environmental problems” (Schultz, Shriver, Tabanico, & Khazian, 2004, p. 31)	“people's orientations toward environmentally related objects, including environmental problems themselves and problem-solving actions, and divide environmental attitudes into three types: cognitive, affective, and evaluative environmental orientations” (Yin, 1999, p. 63)
	“perceptions of or beliefs regarding the physical environment, including factors affecting its quality (e.g., overpopulation, pollution)” (Gallagher, 2004, p. 97)
	“concern for environmental quality or ‘environmental concern’” (Dunlap & Jones, 2002, p. 483)
	“the collection of beliefs, affect, and behavioral intentions a person holds regarding environmentally related activities or issues” (Schultz, Shriver, Tabanico, & Khazian, 2004, p. 31)

It was decided to use the term “environmental attitudes” for two main reasons. First, this seems to be the best term in psychological research. For instance, “environmental attitudes” is the psychological index term generally used (Gallagher, 2004), and also the preferred term in psychological studies of environmental issues (Dunlap & Jones, 2002). Second, and more importantly, researchers now view “environmental concern” as only one aspect of environmental attitudes. For instance, Bamberg (2003) concluded that “environmental concern” seems to be part of a general attitude, and Schultz and colleagues (Schultz et al., 2005; Schultz, Shriver, Tabanico, & Khazian, 2004)(2004, 2005) have referred to “environmental concern” as the affect associated with an environmental attitude. Taking this into account, “environmental concern” will be used here only to refer to people’s worries about environmental issues, as distinct from the more general concept of “environmental attitudes”.

Taking into account Eagly and Chaiken's (1993) attitudes definition discussed above, a new and more economic definition of environmental attitudes is proposed: *Environmental attitudes 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.* Environmental attitudes will be referred to hereafter as EA.

## ***MEASUREMENT OF ATTITUDES AND ENVIRONMENTAL ATTITUDES***

### *Measurement of attitudes*

Attitudes are a latent construct and as such cannot be observed directly. Thus, rather than being measured directly, attitudes have to be inferred from overt responses (Himmelfarb, 1993). The techniques of attitude measurement can be broadly organized into direct self-report methods and implicit measurement techniques (Krosnick, Judd, & Wittenbrink, 2005).

*Direct self-report methods.* Direct self-reports are based on questionnaires that explicitly ask participants to indicate their own attitudes, and hence may be referred to as explicit measurement techniques. These techniques are the most used procedure for measuring attitudes and three main techniques have been used. These are: Thurstone's method of equal-appearing intervals, which seems to be hardly ever used today; Likert's method of summated ratings, which is by far the most widely used technique; and Osgood's semantic differential, which is only sometimes used. Likert's method was used in this thesis and will be briefly reviewed (for reviews of the other two techniques, see Krosnick, Judd, & Wittenbrink, 2005).

In Likert's technique, a series of attitude statements are formulated expressing either strongly favourable or unfavourable positions toward the attitude object. These favourable and unfavourable attitude statements are termed pro- and con-trait items, respectively. These items may consist of statements of belief, statements about affective reactions, or statements about behavioural reactions (Himmelfarb, 1993). Participants are then asked to indicate agreement or disagreement to each of the items on a self-rating scale. The response options for the widely used 5-point rating scale are usually *strongly disagree*, *disagree*, *undecided*, *agree* and *strongly agree*, and coded 1, 2,

3, 4 and 5 for pro-trait items and 5, 4, 3, 2 and 1 for con-trait items. The scores on all of the items are then summed providing a single quantitative index of participants' attitudes to the object.

Theoretical and empirical advances in the field of attitude measurement have led to guidelines for the optimal development of direct self-report attitude measures using the Likert technique. A detailed research review by Krosnick et al. (2005) suggests that data quality improves when 7-point scales are used, the labels of the scale points are explicitly displayed, the order in which response choices are presented to participants is counterbalanced, and no-opinion filters are not included.

*Implicit measurement techniques.* In direct self-report methods, participants are consciously aware of the attitude researchers are measuring and the purpose of the measurement, and this may influence their evaluative responses. To reduce such self-presentation biases, researchers have developed implicit techniques. These include unobtrusive behavioural observation, physiological measures and response latency measures (for reviews, see Himmelfarb, 1993; Krosnick, Judd, & Wittenbrink, 2005). Researchers have used behavioural observations to infer people's attitudes. For instance, studies have used non-verbal behaviours (e.g., body posture, eye contact), helping behaviour and how close people sit when choosing a chair in waiting rooms as measures of intergroup and racial attitudes. Researchers have also used physiological measures, such as galvanic skin conductance, papillary responses, facial subtle muscle activity, eyeblink reflexes, and brain activity, for measuring people's attitudes. Researchers have assumed that participants would express their true attitudes through such physiological automatic evaluative responses.

Response latency measures, another type of implicit measurement technique, are based on the assumption that attitudes can be measured through the speed with which a person's judgment toward a given attitude object is produced. Priming measures are one type of response latency techniques. Researchers expose participants to the attitude object to prime their evaluative responses before asking them to perform other tasks. The difference in speed with which the participants perform tasks associated with the prime and tasks not associated with the prime are used to assess attitudes activation. Response competition measures are another kind of response

latency technique. The Implicit Association Test (Greenwald, McGhee, & Schwartz, 1998) is a well-known measure of this type (Fazio & Olson, 2003; Krosnick, Judd, & Wittenbrink, 2005). In this test, the participants' task is to categorize target concepts along attribute dimensions as they appear on a computer screen. For example, Schultz and colleagues (2004) used this test to measure peoples' connection with nature by using two target concepts (i.e., Nature and Built) and two attribute dimensions (i.e., Me and Not me). Participants were asked to match an item with the appropriate category in each of ten specific trials. The categories and their respective items were "Nature" (animals, birds, plants, whales, trees), "Built" (building, car, city, factory, street), "Me" (I, me, mine, myself, self) and "Not me" (it, other, their, them, they). The degree of connection with nature was measured by the difference in response time between compatible (Nature/Me and Built/Not me) and incompatible (Built/Me and Nature/Not me) trials, on the basis that the compatible trials should be easier than the incompatible trials if there is a stronger association with nature. In contrast, if the association between the self and the built environment is stronger, incompatible trials should be easier than the compatible trials. Schultz and colleagues (2004) found that participants tended to associate themselves more easily with nature than with built environments, and that this implicit measure of connectedness with nature correlated with explicit measures of EA.

However, it has been argued that the Implicit Association Test lacks a clear theoretical basis and that it is not clear whether the implicit-explicit distinction actually relates to the construct being measured, or merely to the technique used to measure it (Fazio & Olson, 2003). Thus, findings based on this test should be interpreted with caution.

#### *Measurement of environmental attitudes*

Studies in environmental psychology have relied more on subjective measures such as attitudes and cognitions about the environment, than objective measures such as direct measures and manipulations of objects (Sundstrom, Bell, Busby, & Asmus, 1996). Following this tradition, studies measuring EA have generally used direct self-report methods (e.g., interviews and

questionnaires), and much less frequently implicit techniques (e.g. observation, priming and response competition measures) techniques.

A few studies have used observations and priming measures for measuring EA and/or ecological behaviour. For instance, Corral-Verdugo (1997) used self-report and unobtrusive observation to measure re-use and recycling behaviour. He found a low correspondence between the reported and observed re-use/recycling behaviour, which indicates that self-reports are not completely reliable measures of actual behaviours. In another study, Van Vugt and Samuelson (1999) used scenarios priming the severity of water shortage to study the effect of individual water metering on conservation intention. They found that willingness to conserve was higher when a water shortage seemed severe and when water use was known to be metered. To date, the only study using response competition measures to study EA was conducted by Schultz and colleagues (2004), as reviewed above.

By comparison, a greater number of studies have used direct self-report techniques for measuring EA (Corral-Verdugo, 1997). There are an extraordinary number of EA measures, with at least 700 that have been used (Dunlap & Jones, 2002). Stern (1992) has described this as an “anarchy of measurement” (p. 279). In an attempt to organize the field, Dunlap and Jones (2002) have proposed a four-fold typology of environmental measures based on environmental issues (e.g., water pollution, population growth) and expression of concern (i.e., beliefs, attitudes, intentions, and behaviours related to environmental issues). There are:

1. Multiple-topic, multiple-expression instruments that focus on both multiple environmental issues and multiple expressions of concern;
2. Multiple-topic, single-expression instruments that focus on multiple environmental issues and a single expression of concern;
3. Single-topic, multiple-expression instruments that focus on a single environmental issue and multiple expressions of concern; and

4. Single-topic, single-expression instruments that focus on a single environmental issue and a single expression of concern.

This typology is useful for classifying EA measures, as exemplified below. Despite the large number of EA measures, only three have been widely used and had their validity and reliability assessed (Dunlap & Jones, 2003; Fransson & Gärling, 1999). These are the Ecology Scale (Maloney & Ward, 1973; Maloney, Ward, & Braucht, 1975), the Environmental Concern Scale (Weigel & Weigel, 1978), and the New Environmental Paradigm Scale (Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig, & Jones, 2000). These three scales examine multiple phenomena or expressions of concern, such as beliefs, attitudes, intentions and behaviours. These scales also examine concerns about various environmental topics, such as pollution and natural resources. Hence, according to Dunlap and Jones' (2002) typology these measures are all multiple-topic/multiple-expression assessment techniques.

Maloney and Ward's (1973) original Ecology Scale has 130 items divided into four multi-item subscales: verbal commitment, actual commitment, affect and knowledge. The verbal commitment subscale has 36 items (e.g., "I'd be willing to ride a bicycle or take the bus to work in order to reduce air pollution"), the actual commitment subscale also has 36 items (e.g., "I save some waste materials for recycling"), the affect subscale has 34 items (e.g., "I get depressed on smoggy days"), and the knowledge subscale has 24 items (e.g., "Which of the following materials usually takes longest to decompose, tin, iron, aluminium, copper or steel?"). Maloney and colleagues (1975) also proposed a short-form version of this scale, consisting of 45 balanced items measuring the same four subscales: ten items for each of the verbal commitment, actual commitment and affect subscales, and 15 items for the knowledge subscale.

The Environmental Concern Scale developed by Weigel and Weigel (1978) has 16 items (7 pro-trait and 9 con-trait items) tapping a range of environmental topics, and comprising cognitive, evaluative and conative expressions of concern. This measure includes items such as "We must prevent any type of animal from becoming extinct, even if it means sacrificing some things for

ourselves” and “Even if public transportation was more efficient than it is, I would prefer to drive my car to work”.

Although widely used, both the Ecology Scale and the Environmental Concern Scale include items tapping specific environmental topics that have become dated as new issues emerge, such as ozone depletion (Dunlap & Jones, 2002, 2003). Dunlap and Van Liere’s (1978) New Environmental Paradigm (NEP) scale avoids this issue by using only general environmental topics that do not become dated, and measuring the overall relationship between humans and the environment. The NEP scale measures an ecocentric system of beliefs (i.e., humans as just one component of nature) as opposed to an anthropocentric system of beliefs (i.e., humans as independent from, and superior to, other organisms in nature) (Bechtel, Corral-Verdugo, Asai, & Riesle, 2006; Dunlap, Van Liere, Mertig, & Jones, 2000). This scale is the most widely used measure to investigate environmental issues (Dunlap & Jones, 2003; Stern, Dietz, & Guagnano, 1995) and has been updated recently (Dunlap, Van Liere, Mertig, & Jones, 2000). The revised NEP scale has 15 items (8 pro-trait and 7 con-trait), with three items for each of five hypothesized facets of an ecological worldview. These facets are:

- the reality of limits to growth (e.g., “We are approaching the limit of the number of people the earth can support”);
- antianthropocentrism (e.g., “Humans have the right to modify the natural environment to suit their needs”);
- the fragility of nature’s balance (e.g., “When humans interfere with nature it often produces disastrous consequences”);
- rejection of exemptionalism (e.g., “Human ingenuity will insure that we do NOT make the earth unlivable”); and
- the possibility of an ecocrisis (e.g., “Humans are severely abusing the environment”).



Despite presenting these five facets, Dunlap et al. (2000) actually summed all 15 NEP items to give a single score instead of using five subscales. Not surprisingly, therefore, the dimensionality of both the original and revised NEP scales has sometimes occasioned disagreement (see further discussion on this issue below).

In summary, direct self-report techniques, such as scales and inventories, are the most widely used methods for measuring EA. Three scales measuring EA have been usually employed, but there is no accepted gold-standard measure in the literature.

## ***STRUCTURE OF ATTITUDES AND ENVIRONMENTAL ATTITUDES***

### *Structure of attitudes*

The most widely-held view of the structure of attitudes has been the three-component model. This model assumes that attitudes have cognitive, affective and behavioural components. Contemporary theorists, however, tend to hold that cognition, affect and behaviour are in fact the bases from which the general evaluative summary of a particular psychological object is derived, instead of being constituents of attitudes (Eagly & Chaiken, 1993; Fabrigar, MacDonald, & Wegener, 2005). It is argued, for instance, that “affect, beliefs, and behaviors are seen as interacting with attitudes rather than as being their parts” (Albarracín, Zanna, Johnson, & Kumkale, 2005, p. 5). Therefore, even though the three-component model remains the traditional view of attitude structure, new theoretical approaches prefer to conceptualise attitudes as evaluative tendencies that can both be inferred from and have an influence on beliefs, affect, and behaviour.

### *Structure of environmental attitudes*

Following the attitude research tradition, some researchers have used the three-component attitude model as an approach for specifying the structure of EA (Cottrell, 2003). These researchers have postulated that EA have cognitive, affective, and behavioural components. This approach is clear, for instance, in Yin’s (1999) and Schultz et al.’s (2004) definitions shown in Table 1. Yin (1999) specifically argues that people’s perception and awareness, feelings or emotional responses,

and judgments or opinions about environmental problems refer to the cognitive, affective and evaluative environmental orientations, respectively.

In summary, the three-component attitude model has been the traditional approach used to conceptualise the structure of both attitudes in general and EA in particular. However, following the most contemporary approach to attitude structure (Albarracín, Johnson, & Zanna, 2005), it is argued that the structure of EA is instead based on evaluative tendencies that can both be inferred from and have an influence on beliefs, affects, and behaviours regarding human-environment relations. The structure and dimensionality of EA is further discussed in Chapter Three.

## ***FUNCTIONS OF ATTITUDES AND ENVIRONMENTAL ATTITUDES***

### *Functions of attitudes*

Attitude functions are “the psychological needs that attitudes fulfil” (Maio & Olson, 2000a, p. 417), and several attitude functions have been proposed (see Maio & Olson, 2000b; Pratkanis, Breckler, & Greenwald, 1989). The classical analyses of attitude functions were proposed originally by Smith, Bruner and White (1956) and Katz (1960). Smith and colleagues proposed the three functions of object appraisal, social-adjustment and externalization, and Katz proposed the four functions of adjustive/utilitarian/instrumental, ego-defence, value-expressive and knowledge. Given the similarities between Smith et al.’s and Katz’s approaches, their attitude functions can be reduced to three main purposes that indicate why people hold and express attitudes. These main purposes are:

1. People hold and express attitudes to understand, structure and find meaning in the world by summarizing information, maximizing rewards and minimizing punishments from objects in the environment (i.e., Smith et al.’s object appraisal, and Katz’s knowledge and adjustive functions). Hence, attitudes help us to understand the world, and Fazio (2000) has suggested that this is the basic function of all attitudes, representing the principal value of having an attitude. This function also seems to represent the functionality of attitudes in a broader sense, that is, attitudes facilitate adaptation to the environment (Ajzen, 2001). This attitude

function helps one's adaptation to the environment by providing knowledge structures that are motivationally relevant (E. P. Thompson, Kruglanski, & Spiegel, 2000).

2. People hold and express attitudes to facilitate self-expression and social interaction, and express their central values and self-concept (i.e., Smith et al.'s social-adjustment, and Katz's value-expressive functions). Hence, attitudes help us to express our basic values. Researchers have also differentiated between those attitudes that serve individual's self-interest and utilitarian concerns (instrumental attitudes) and those that serve the expression of deep-rooted values and prejudices (symbolic attitudes) (Ennis & Zanna, 2000; Prentice, 1987). Instrumental attitudes have evaluative functions and have two main domains (Herek, 1986). The first domain of the instrumental function of attitudes is the attitude object's features and attributes. The second domain is the utility of the attitude object in providing better functioning in the environment. Symbolic attitudes have expressive functions and can be divided into socio-expressive and value-expressive functions (Herek, 1986). The social-expressive symbolic function includes those attitudes that serve social needs, and the value-expressive symbolic function included those attitudes that serve value needs.
3. People hold and express attitudes to defend the self from intrapsychic conflict and to have high self-esteem (i.e., Smith et al.'s externalization, and Katz's ego-defensive functions). Hence, attitudes also help us to enhance and maintain our self-esteem.

#### *Functions of environmental attitudes*

As reviewed above, the types of attitude functions can be grouped into three main attitude functions. A similar classification can be used to formulate a functionalist view of EA.

1. Object appraisal, knowledge, and adjustive functions. One of the functions of EA is to help us to understand the world by simplifying knowledge about objects in the environment (e.g., physical objects, people, ideas or issues), and by providing a summary evaluation of the natural environment. For instance, Holahan (1982) argues that residential choice is a function of EA, and that residential choice is related to residential satisfaction and scenic preference. In relation to residential satisfaction, EA are important in understanding why some people prefer living in flats

rather than in houses, or what causes satisfaction/dissatisfaction among students who live in university accommodation (Holahan, 1982). In relation to scenic preference, EA are important in understanding why some people prefer scenes of nature to scenes of urban features (Ulrich, 1993).

2. Social-adjustment and value-expressive functions. Another function of EA is to help us to establish our self-identity and express our values. This function is better conceptualised as the instrumental-symbolic function of EA, because utilitarian and symbolic aspects are recognized as dimensions of human values of nature (Kellert, 1993). Instrumental attitudes have evaluative functions, while symbolic attitudes have expressive functions (Herek, 1986). Therefore, the instrumental function of EA addresses instrumental needs and utilitarian beliefs regarding the natural environment. The symbolic function of EA facilitates social interaction and acceptance by others (i.e., social-expressive symbolic function) and permits articulation with important central values of the individual (i.e., value-expressive symbolic function) (Ennis & Zanna, 2000). Thus, in the symbolic function of EA the natural environment is evaluated for more than its utilitarian attributes.

3. Externalization and ego-defensive functions. Attitudes also help us to defend the self from intrapsychic conflict. The ego-defensive function of EA may be expressed by egoistic environmental concerns (Schultz, 2001; Stern & Dietz, 1994), in which environmental issues are judged in terms of the costs or benefits to oneself. The ego-defensive function of EA may therefore be related to the genetic predisposition in humans to respond in negative/avoidance ways to dangerous natural phenomena, or biophobia (Ulrich, 1993).

From this overview of the definition, measurement, structure and functions of EA, it can be summarised that: (1) EA are an evaluative tendency to respond in a favourable or unfavourable manner to perceptions of or beliefs regarding the natural environment, (2) the main methods for measuring EA are scales and inventories, but there is no gold-standard measure, (3) cognition, affect and behaviour are the bases from which EA are derived rather than being their constituents, and (4) EA serve several functions. In the following section, theoretical approaches relevant to the study of EA are discussed.

## ***SECTION 2. THEORETICAL APPROACHES RELATED TO ENVIRONMENTAL ATTITUDES RESEARCH***

Two main theoretical approaches have been used to study EA. The first is the theory of reasoned action (Ajzen & Fishbein, 1985) and its extension, the theory of planned behaviour (Ajzen, 1991). The second theoretical approach is the norm-activation theory (Schwartz, 1977) and its extensions, the theory of human values (Schwartz, 1994a) and the value-basis theory (Stern & Dietz, 1994). The theories of reasoned action and planned behaviour emphasise self-interest motives in dealing with environmental issues, while the theories of norm-activation and human values emphasise pro-social motives (Bamberg & Möser, 2007). These theories are reviewed in turn.

### ***THE THEORIES OF REASONED ACTION AND PLANNED BEHAVIOUR***

The theories of reasoned action and planned behaviour have typically been used to predict ecological behaviour from EA. These rational-choice theories are the main theoretical frameworks used in attitude research on recycling behaviour (Thøgersen, 1996), and have been claimed to be a unifying framework for different EA approaches (F. G. Kaiser, Ranney, Hartig, & Bowler, 1999). Figure 1 shows the theory of planned behaviour diagrammatically. According to this theory, the immediate antecedents of behaviour are intentions and perceptions of behavioural control, and intentions are a result of one's attitudes toward the behaviour, subjective norms and perceptions of control (Ajzen, 2001). Therefore, behaviour is a function of intentions and perceptions of behavioural control, and these perceptions can either moderate the effect of intention on behaviour (as shown in Figure 1) or have main effects on behaviour (Ajzen, 2006).

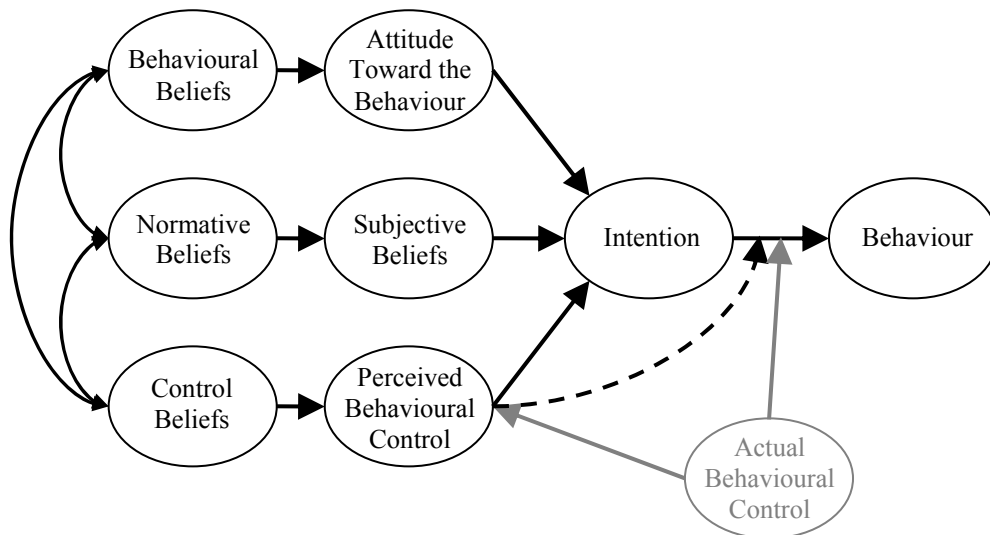


Figure 1

*Diagram of the Theory of Planned Behaviour. Adapted from Ajzen (2006)*

Research adopting this approach has shown that EA predict behavioural intention to behave in a responsible ecological way (see, e.g., F. G. Kaiser, Ranney, Hartig, & Bowler, 1999; F. G. Kaiser & Scheuthle, 2003; F. G. Kaiser, Wölfing, & Fuhler, 1999; Oreg & Katz-Gerro, 2006). In a review of recycling behaviour studies, for instance, Thøgersen (1996) found that the intention to recycle depends on the attitude toward recycling, while the normative beliefs are either not significant or have less influence than the attitude.

However, although rational-choice theories are a widely used approach for studying the link between EA and ecological behaviour, it has been claimed that these theories fail to sufficiently predict ecological behaviour (F. G. Kaiser, Ranney, Hartig, & Bowler, 1999). This seems to be a result of two shortcomings. First, these theories only analyse the relationship between specific attitudes and behaviours. For instance, only specific attitudes toward recycling would be analysed to predict behavioural intention to recycle. It seems very likely that specific recycling attitudes would predict recycle intentions more strongly than general EA would, and more generally that the relationships between general EA and specific ecological behaviours would typically yield weak effects (Bamberg, 2003). However, the strong relationship observed between specific attitudes and behaviours could be merely a result of content overlap between the measures employed. Kaiser

(2006) supported this when pointing to the complementarity of behaviour-based EA and ecological behaviour. Moreover, the attitudes investigated are so specific and so tied to the behaviour examined that predictions of the conditions under which the behaviour is initiated are limited (Baldassare & Katz, 1992, Note 2). Therefore, it seems preferable to use general EA to predict ecological behaviour, even if this relationship yields weak effects, because this would show real rather than methodological associations. Another approach is to test the indirect prediction of EA on ecological behaviour. For instance, Bamberg (2003) showed that general EA are an important indirect determinant of specific behaviour in rational-choice approaches. General EA had a direct effect on the perception and evaluation of situation-specific cognitions, particularly the personally salient behavioural consequences, rather than a direct effect on intention or behaviour.

It is also argued that rational-choice theories seem to fail in predicting ecological behaviour because these theories are not specific to altruistic or cooperative behaviours (Blamey, 1998). Ecological behaviours can be considered moral behaviours because they imply that individuals should forego their immediate self-interest in order to do good for the group or the community (F. G. Kaiser, Ranney, Hartig, & Bowler, 1999; Thøgersen, 2006). Also, although self-interest motives are linked to ecological behaviour (Bamberg & Möser, 2007), research has found no support for a positive influence of self-enhancing orientations on such behaviour (cf. Schultz, 2006). Thus, internalised moral or personal norms seem to be more relevant for ecological behaviour than self-interest motives (Gärling, Fujii, Gärling, & Jakobsson, 2003). As a result, ecological behaviours are classified within the domain of morality, and attitudes towards such behaviours are partly the result of one's moral beliefs (Thøgersen, 1996). For this reason, Schwartz's (1977) norm-activation theory of altruistic behaviour has been used as an alternative framework to predict ecological behaviour from EA because it belongs more in the moral domain than theories of reasoned action and planned behaviour (but see F. G. Kaiser, Hübner, & Bogner, 2005).

## ***THE THEORIES OF NORM-ACTIVATION AND HUMAN VALUES***

According to Schwartz's (1977) norm-activation theory, behaviour is a function of both people's assignment of responsibility for their actions (i.e., ascription of responsibility), and people's understanding that their actions might have consequences for the welfare of others (i.e., awareness of consequences). Therefore, there are two necessary components for activating moral norms: (1) ascription of responsibility, or norms about personal responsibility for the actions, and (2) awareness of consequences, or beliefs about the consequences of the actions (see also Schwartz, 1968). Hence, the activation of norms of helping are most likely when an actor is both aware of the positive consequences that the helping behaviour would have for an object in need, and ascribes responsibility to himself or herself for providing that help (Blamey, 1998).

Schwartz's norm-activation theory explains altruistically motivated helping behaviour, and has also been used to explain environmental issues (see, e.g., Dietz, Fitzgerald, & Shwom, 2005; Heberlein, 1977; Van Liere & Dunlap, 1978). The theory holds that awareness of consequences must induce an ascribed responsibility, which in turn activates a personal norm in order to perform the behaviour. Given that awareness of consequences may be understood as EA in the domain of environmental issues (Gärling, Fujii, Gärling, & Jakobsson, 2003), the following is implied: EA must induce ascribed responsibility that in turn activates a personal norm to perform an ecological behaviour. In general, research supports this (Blamey, 1998; Milfont, Sibley, & Duckitt, 2007; Schultz et al., 2005). Blamey (1998) reported findings from a qualitative study that supported the norm-activation model, and also expanded the model to be used in the context of contributions to public goods. Other studies have demonstrated the cross-cultural generalizability of the moderating role of the norm-activation components on the relationship between values and environmental behaviour (Milfont, Sibley, & Duckitt, 2007; Schultz et al., 2005).

Stern and associates (Stern & Dietz, 1994; Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Stern, Dietz, Kalof, & Guagnano, 1995) extended Schwartz's norm-activation theory to develop a value-basis theory for understanding EA. They argue that there are three types of awareness of consequences: awareness of egoistic, social-altruistic, and biospheric consequences. According to



this theory, therefore, these are the underlying values that determine EA (see discussion in Chapter Three).

Another extension of Schwartz's norm-activation theory that has been widely used to predict EA and ecological behaviour is his values theory (Schwartz, 1992, 1994a; Schwartz & Bilsky, 1987, 1990). This value theory is an expansion of Rokeach's (1973) theory of values. Rokeach classified human values into instrumental and terminal values. Instrumental values are modes of conduct (e.g., "honest", "self-controlled") and terminal values are end states of existence (e.g., "a world at peace", "freedom").

Expanding on Rokeach's (1973) work, Schwartz (1994a; Schwartz & Bilsky, 1987) developed a universal typology of human values, defining values as "desirable transsituational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity" (p. 21). Schwartz (1994a) concluded that the 56 values considered formed 10 motivationally distinct types of values across 97 samples in 44 countries: achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security. These, in turn, could be located in a two-dimensional value space, grouped into four higher order value clusters: openness to change (values favouring change and independent thought and behaviour), conservation (preservation of traditional practices and stability), self-transcendence (concern for the welfare of others), and self-enhancement (pursuit of one's own relative success and dominance over others). The spatial organization of this model is in the form of a circular structure, as shown in Figure 2. Tradition and conformity are located in the same area because they share the same broad motivational goal, and tradition is more toward the periphery because it conflicts more strongly with the opposing values (e.g., stimulation). Hedonism is within dotted lines because it shares elements of both openness to change and self-enhancement clusters (Schwartz, 2006).

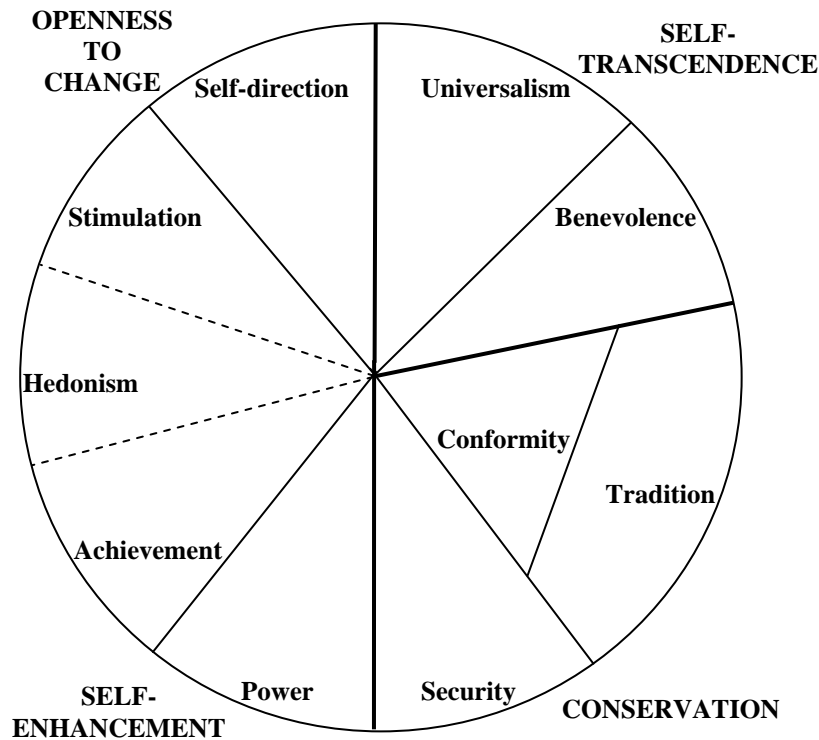


Figure 2

*Theoretical Model of Relations among Ten Motivational Types of Values. Adapted from Schwartz (2006)*

Values have been related to EA at both individual and cultural levels of analysis. At the individual level of analysis, research has linked Rokeach's (1973) instrumental and terminal values to EA and pro-environmental behaviour (Dunlap, Grieneeks, & Rokeach, 1983; Neuman, 1986). Neuman (1986) linked Rokeach's terminal values to individuals' energy conservation beliefs and behaviour. He subjected the terminal values to factor analysis, and found that four of the five factors obtained (environmental values, personal growth, security, and well-being, but not traditional success) were weakly but positively and significantly associated to both conservation beliefs and behaviour. The positive impact of values on these variables was, however, smaller than the impact of other individual and contextual variables, such as personal belief about the efficacy of conservation and living in a neighbourhood in which people know each other.

Schwartz's (1992) typology of values has also been widely used to predict EA and ecological behaviour (see, e.g., Coelho, Gouveia, & Milfont, 2006; Karp, 1996; Schultz, 2001;

Schultz et al., 2005; Schultz & Zelezny, 1999; Stern & Dietz, 1994; Stern, Dietz, Kalof, & Guagnano, 1995). Briefly, the results have shown that conservation and openness to change value clusters were not consistently related to EA and ecological behaviour. However, the results have consistently shown that the self-transcendence value cluster correlated positively with EA and ecological behaviour, while the self-enhancement value cluster correlated negatively.

Values have also been related to EA at the cultural level of analysis. Schwartz (1999) argues that one of the basic issues confronting societies is the relation of humans to the natural and social environment. This basic issue leaves societies with two possible solutions: either to fit harmoniously into the world, trying to preserve it (i.e., harmony values) or to exploit and change the world (i.e., mastery values). Inglehart (1995) also relates cultural values to EA. He argues that the increasing affluence and security achieved by industrial societies, especially after World War II, has resulted in a shift from materialist (e.g., “personal and national security”, “economic well-being”) to post-materialist values (e.g., “quality of life”, “self-expression”). He argues that this shift has resulted in societies becoming more environmentally concerned. Although some variations were found across different countries, the overall findings indicated that there were stronger relationships between postmaterialist values and environmental protection than between materialist values and environmental protection. Supporting this, recent research has shown that Inglehart’s post-materialist values, but not Schwartz’s harmony values, were related to EA (Oreg & Katz-Gerro, 2006), and that individuals holding post-materialist values showed more environmental concern than those holding materialist values did (Olofsson & Öhman, 2006). Other researchers have also considered materialist and post-materialist values at the personal level of analysis (e.g., Grob, 1995; Pierce, Lovrich, Tsurutani, & Abe, 1987).

Therefore, studies have shown that individual and cultural values have an effect on EA, and that this effect seems to be consistent across social and cultural variations (McFarlane & Hunt, 2006; Schultz et al., 2005; Schultz & Zelezny, 1999). These results strongly support the use of value theories to predict both EA and ecological behaviour.

In summary, the theories of reasoned action and planned behaviour as well as the theories of norm-activation and human values have been important frameworks to study EA, and also to understand the relationships between EA and ecological behaviour. However, research has suggested that Schwartz's norm-activation and human values theories provide a better theoretical framework to study environmental issues because these issues pertain to the moral domain.

### ***OTHER THEORETICAL APPROACHES RELEVANT TO ENVIRONMENTAL ATTITUDES RESEARCH***

Although the theories reviewed above have been the main theoretical frameworks for the study of EA in general and the study of the link between EA and ecological behaviour in particular, other theoretical frameworks are also relevant to the study of EA. One relevant theory is Wilson's biophilia hypothesis (Kellert & Wilson, 1993; Wilson, 1984). According to this hypothesis, humans have a biological need to relate to life and natural processes, or an "innate tendency to focus on life and lifelike process" (Wilson, 1984, p. 1). Therefore, under this hypothesis humans have a biological tendency to relate to natural environments. Supporting this, research has shown that contact with nature is beneficial for people's health and well-being (Ulrich, 1993).

Another theory relevant to EA is the social dilemma approach. Environmental issues are understood as social dilemmas because they represent a social conflict between the collective interest of society and the individual interests of its members (Hardin, 1968; Osbaldiston & Sheldon, 2002; Van Vugt, 2001; Van Vugt & Samuelson, 1999). Joireman et al. (2004) have recently expanded this conceptualisation by proposing a temporal conflict (short- vs. long-term interests). In fact, Messick and Brewer (1983) have long recognized a temporal conflict in social dilemmas with relevance to environmental issues. In this expanded conceptualization, environmental issues may be understood as social dilemmas because they represent a conflict between short-term individual interests and long-term collective interests. This expanded conceptualisation of social dilemmas has received theoretical (Joireman, 2005) and empirical (Milfont & Gouveia, 2006) support. For instance, Milfont and Gouveia (2006) found that both values and time perspective dimensions accounted for significant non-overlapping variance in

explaining EA. This led them to conclude that environmental issues represent both a social and a temporal conflict.

Terror management theory has also been linked to EA. The core proposition of this theory is that “cultures allow people to control the ever-present potential terror of death by convincing them that they are beings of enduring significance living in a meaningful reality” (Pyszczynski, Solomom, & Greenberg, 2002, p. 16). This theory therefore tries to understand the way cultures and individuals deal with death-related anxieties. In a study relevant to the present topic, Goldenberg et al. (2001) used this theory to understand the human desire to distance one’s self from other animals. In line with the theory, the findings indicate that the desire to distinguish humans from animals can be influenced by the effect of mortality salience (i.e., the awareness of death). Reminding people of their mortality increased the need to distance from animals. It was also claimed that this theory would be useful for understanding individual and cultural differences in people’s perceptions of humanity as separate from versus part of the natural world (Goldenberg, Pyszczynski, Greenberg, & Solomom, 2000). However, this approach contradicts Schultz’s (2002b) inclusion with nature proposition and Wilson’s (1984) biophilia hypothesis. As discussed earlier, Schultz and Wilson assume connection with nature, and not distinction between humans and nature as assumed by terror management theory.

Developmental theories have also been linked to EA. Robbins and Greenwald (1994) used Kegan’s (1982) ego development theory to examine women’s EA. Based on qualitative data from interviews, they grouped the participants according to three stages of ego development: imperial (i.e., emphasis on concrete thinking, and impulses and perceptions are the object), interpersonal (i.e., increased abstract thinking, and needs are the object), and institutional (i.e., emphasis on abstract thinking, and relationships and mutuality are the object). They found that women grouped in these three ego development stages manifested different EA reasoning. For instance, institutional women differed from imperial and interpersonal women by emphasizing the responsibility of both individuals and institutions for the solution of environmental problems. Kahn (1999) also used

developmental theories to understand EA in children. He specifically assessed the ways in which children in Brazil and Black communities in the USA learnt about nature and how EA were formed.

Another theoretical link with EA was proposed by Opatow and Weiss (2000), who showed the theoretical significance of denial and moral exclusion for understanding environmental conflict. They argue that when individuals see themselves as unconnected to and outside of nature, environmental protection is less likely to occur because once nature is excluded from one's scope of justice, forms of denial appear. They propose three forms of denial related to environmentalism: outcome severity (denial of severity, extent and irreversibility of environmental destruction), stakeholders inclusion (denial of entitlements of other people, future generations, and nonhuman entities to natural resources), and self-involvement (denial of our own role, as individuals and collectives, in increasing environmental degradation). They then propose three tenets that, if kept in mind, could reduce the effect of denial and moral exclusion on environmental conflict: "First, we are all victims in that we are recipients of pollution generated by others. Second, we are all violators in that we create pollution that has an impact on others. Third, we all need to work at ongoing, constructive problem solving and dialogue" (Opatow & Weiss, 2000, p. 488).

Deci and Ryan's (1985; Ryan & Deci, 2000) self-determination theory has also been linked to EA and ecological behaviour (Osbaldiston & Sheldon, 2003). This theory posits that three innate psychological needs must be addressed for the understanding of goal-directed behaviour, psychological development and well-being. These are needs for competence, relatedness, and autonomy. This theory also presents a continuum to distinguish different levels of self-determination underlying the behaviour. This continuum extends from amotivation (i.e., nonself-determined behaviour) to extrinsic motivation to intrinsic motivation (i.e., self-determined behaviour). Pelletier and colleagues (Green-Demers, Pelletier, & Ménard, 1997; Pelletier, Tuson, Green-Demers, Noels, & Beaton, 1998) have used this theoretical framework for investigating individuals' level of amotivation, extrinsic and intrinsic motivation for environmental behaviour, and developing the Motivation Toward the Environment Scale (see also Villacorta, Koestner, &

Lekes, 2003). Their findings have indicated that intrinsically motivated, autonomous individuals show positive, pro-EA and ecological behaviour.

In summary, several theoretical frameworks have been related to EA. However, as mentioned earlier, value theories seem to be the most appropriate theoretical framework for studying environmental issues because EA and ecological behaviour pertain to the morality domain (Thøgersen, 1996). Moreover, research has shown that individuals' underlying value structure influences both attitudes and behaviours (Homer & Kahle, 1988). Indeed, one of the two consensual functions of values in the psychological literature is that values guide human actions, the other being that values give expression to human needs (Gouveia, Fischer, & Milfont, 2007). As a result, the impact of human values on EA and ecological behaviour has been widely studied (see, e.g., Lévy-Leboyer, Bonnes, Chase, & Ferreira-Marques, 1996; Milfont & Gouveia, 2006; see, e.g., Poortinga, Steg, & Vlek, 2004; Schultz & Zelezny, 1998; Stern & Dietz, 1994), and the study of environmental values has also been proposed (Dietz, Fitzgerald, & Shwom, 2005; Reser & Bentrupperbäumer, 2005). Therefore, the present research uses value theory, specifically Schwartz's (1992, 1994a) theory, as the theoretical framework for studying EA. Given that this research also encompasses a cross-cultural study, the study of EA across cultures is briefly discussed next.

### ***SECTION 3. ENVIRONMENTAL ATTITUDES ACROSS CULTURES***

Schultz (2002a) has suggested that culture influences the type of EA that people are likely to develop. Despite this suggestion, most research to date has not taken into account environmental differences across cultures (Lévy-Leboyer, Bonnes, Chase, & Ferreira-Marques, 1996). However, this seems to be changing with several recent empirical studies examining EA across ethnic groups or cultures (e.g., Aoyagi-Usui, Vinken, & Kuribayashi, 2003; Diekmann & Preisendörfer, 1998; Dunlap, Gallup, & Gallup, 1993; Eisler, Eisler, & Yoshida, 2003; Gouveia, 2002; Harris, 2006; Ignatow, 2006; Kahn, 1999; Korfiatis, Hovardas, & Pantis, 2004; Meseke, 1994; Olofsson & Öhman, 2006; Oreg & Katz-Gerro, 2006; Pierce, Lovrich, Tsurutani, & Abe, 1987). For instance,

using national-level data from the USA, Johnson, Bowker and Cordell (2004) found that environmental beliefs and behaviours vary with ethnicity. They compared Whites and four ethnic minority groups (Blacks, USA-born Latinos, foreign-born Latinos, and Asians) on environmental beliefs and behaviour. They found that the ecological behaviour of the ethnic minorities differed significantly from that of Whites. The differences between Whites and the minority groups varied depending on the environmental behaviour assessed (environmental reading, recycling, environmental group joining, and nature participation), but the differences remained significant even when environmental beliefs, measured by the NEP scale, were controlled for.

Leung and Rice (2002) also found cultural differences in biospheric concern, measured by the NEP scale, between two ethnic groups in Australia. Anglo-Australians were more environmentally concerned, scoring higher in the NEP scale, than Chinese-Australians. They also found that for Anglo-Australians the NEP scale was positively and significantly correlated with a measure of ecological behaviour, while for Chinese-Australians this correlation was not significant. Schultz (2002a) also found cultural differences in EA between samples from the United States and samples from other countries, including Brazil, Colombia, Costa Rica, El Salvador, the Dominican Republic, Paraguay, and Venezuela. U.S. samples showed higher egoistic environmental concern than biospheric environment concern, while an opposite pattern was found in all other countries. Cultural differences in EA were also obtained in Canada (Deng, Walker, & Swinnerton, 2006), where Chinese-Canadians endorsed more altruistic environmental concern than Anglo-Canadians did. Ethno-cultural variations have also been observed between European New Zealanders and Asian New Zealanders in relation to EA and their prediction of ecological behaviour (Milfont, Bizumic, & Duckitt, 2004; Milfont, Duckitt, & Cameron, 2006). It was found that Asian New Zealanders were significantly higher than European New Zealanders on egoistic environmental concern, whereas European New Zealanders were significantly higher on biospheric environmental concern. For European New Zealanders, biospheric environmental concern predicted ecological behaviour positively while egoistic environmental concern predicted it negatively. For Asian New



Zealanders, in contrast, both biospheric and altruistic environmental concerns predicted ecological behaviour positively.

In summary, studies have found cultural differences in the importance attributed to EA. It seems, however, that the structure of EA is quite stable across cultural groups (Schultz, 2001; Schultz et al., 2005). In spite of this apparent consistency, it is still not clear in the literature the actual structure of EA.

## ***CONCLUSIONS***

This chapter has broadly reviewed the psychological literature on attitudes and EA. From this review it can be concluded that EA are a summary of evaluating perceptions of or beliefs regarding the natural environment, that survey questionnaires are the typical method used for their measurement, that they fulfil psychological needs, and that there are consistencies in how people from different cultural contexts hold and express them. Many theories have been adopted for EA research, with most emphasis on rational-choice theories and norm-related theories. The latter seem preferable for EA research because they address pro-social motives that underlie both EA and ecological behaviour. These perspectives regarding the conceptualization, measurement, structure and functions of EA as well as theoretical and cross-cultural approaches to their study are considered in the context of the present research. Chapter Three presents a detailed review of literature related to the three main topics addressed in this research.

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## *Chapter Three*

# ***Psychology of environmental attitudes: A detailed review of the literature***

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### ***INTRODUCTION***

The aim of this chapter is to present a more extensive review of literature on EA. The first section provides a specific review of the literature on the research objectives of this research, namely the dimensionality and nomological network of EA, and the value–attitude–behaviour cognitive hierarchy model. An overview of the research objectives is depicted in Figure 3. The second section provides a discussion of the research questions of the present research. This chapter therefore provides the theoretical background to the empirical studies described in the subsequent chapters.

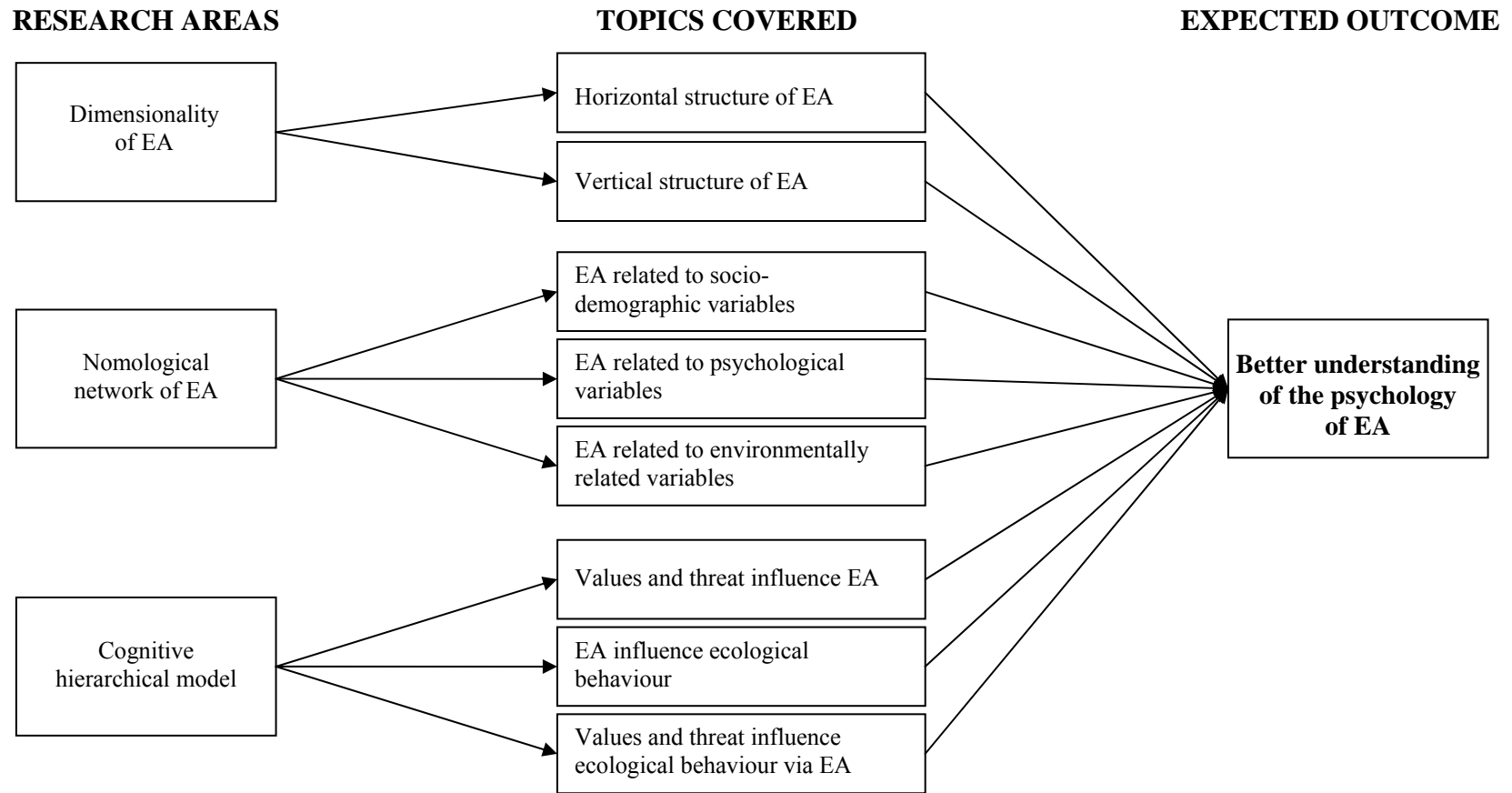


Figure 3

*A Schematic Overview of the Areas Addressed in this Research*

## ***SECTION 1. PSYCHOLOGICAL STUDY OF ENVIRONMENTAL ATTITUDES: THE RESEARCH OBJECTIVES***

### ***THE DIMENSIONALITY OF ENVIRONMENTAL ATTITUDES***

It has been claimed that the dimensionality of EA has not yet been resolved (Dunlap & Jones, 2002). The present research addresses this critical gap in the literature through a systematic investigation of this issue. Even though the question of the dimensionality of EA is still unresolved, some important approaches have been proposed. These approaches can be grouped into studies examining either the horizontal or the vertical structure of EA (Heberlein, 1981). The former refers to the primary order or first-order factor(s) forming the structure of EA, and the latter refers to the higher order or second-order factor(s) forming the hierarchical structure of EA. Horizontal approaches can be grouped into studies that see EA as either a unidimensional or multidimensional construct, while vertical approaches can be grouped into studies examining either one or two higher order factors. Table 2 provides an overview of these approaches, which are discussed below.

Table 2

*Approaches to the Dimensionality of Environmental Attitudes*

Type of approach	Definition	Example of research
Horizontal approach	Refers to the primary order or first-order factor(s) forming the horizontal structure of EA	
<i>Unidimensional construct</i>	<i>The horizontal structure of EA consists of a single, bipolar dimension, from low EA at one end to high EA at the other</i>	(Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig, & Jones, 2000)
<i>Multidimensional construct</i>	<i>The horizontal structure of EA consists of several empirically-based or theoretically-based dimensions</i>	(Baldassare & Katz, 1992; Bechtel, Corral-Verdugo, Asai, & Riesle, 2006; Bechtel, Corral-Verdugo, & Pinheiro, 1999; Schultz, 2001)
Vertical approach	Refers to the higher order or second-order factor(s) forming the hierarchical structure of EA	
<i>One higher order factor</i>	<i>The hierarchical structure of EA consists of only one second-order factor (i.e., Generalized Environmental Attitudes)</i>	(Heberlein, 1981, Note 4; Pierce & Lovrich, 1980)
<i>Two higher order factors</i>	<i>The hierarchical structure of EA consists of two second-order factors (i.e., Preservation and Utilization)</i>	(Wiseman & Bogner, 2003)

## Horizontal Approaches to the Issue of the Dimensionality of Environmental Attitudes

The horizontal structure of EA refers to the number of specific evaluating perceptions of or beliefs regarding the natural environment that underlie the overall EA (Heberlein, 1981). The issue here is whether EA are inherently multidimensional or whether it is legitimate to treat them as a unidimensional construct (Dunlap & Jones, 2002). These two approaches are discussed below.

*Unidimensional approach.* Dunlap and Jones (2002) estimated that there are over 1,000 published studies that have measured EA. It seems very likely that the majority of these studies have used the more traditional unidimensional approach. In this approach, the horizontal structure of EA has only one bipolar dimension, ranging from *unconcerned* about the environment at the low end to *concerned* about the environment at the high end (Pierce & Lovrich, 1980; Schultz, 2000).

The typical example of this approach is that taken by Dunlap and colleagues in using the NEP scale (Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig, & Jones, 2000). As discussed previously, this scale measures the overall relationship between humans and the environment, and it is normally used as a unidimensional measure of EA. Therefore, high NEP scores indicate an ecocentric orientation reflecting commitment to the preservation of natural resources, and low NEP scores indicate an anthropocentric orientation reflecting commitment to exploitation of natural resources.

Several other studies have used the unidimensional approach. They range from single item (e.g., Blake, 2001; e.g., Theodori & Luloff, 2002) to multi-item scales (e.g., Forgas & Jolliffe, 1994; e.g., Kilbourne, Beckmann, & Thelen, 2002; Oreg & Katz-Gerro, 2006) to measure general environmental concern or EA. However, several researchers have challenged this unidimensional approach by showing that EA seem to be a multidimensional construct.

*Multidimensional approach.* Here, EA are viewed as a multidimensional construct. Studies following this approach have either been empirically-based or theoretically-based.

1. Empirically-based studies. In these studies, scales are developed either in terms of substantive environmental issues rather than on a priori theoretical approach (i.e., subjectively constructed measures), or the scales are constructed ex post facto, based on results from factor analysis (i.e., methodologically derived measures) (Dunlap & Jones, 2002). For example, Buttel and Flinn (1976) proposed two EA dimensions: awareness of environmental problems, and support for environmental reform. The first dimension taps the perceived seriousness of several environmental problems, whereas the second measures support for governmental regulation of polluters. Even though these two EA dimensions were only weakly correlated ( $r = .25$ ), the apparent distinction between them seems more a result of the factor analytic technique employed rather than a substantive content distinction. For example, both dimensions were negatively correlated with an economic growth measure, and these correlations were not statistically different between the samples considered (i.e., overall, working class, and middle class samples). There is therefore no strong support for the discriminant validity of these dimensions. In two other studies, Tognacci and

colleagues (1972) developed five scales to measure EA (conservation, pollution, power plant pollution, overpopulation, and individual population control), and Van Liere and Dunlap (1981) developed six scales to measure different issues central to the environmental literature (population, pollution, natural resources, environmental regulation, environmental spending, and environmental behaviour). Again, the scales of these studies were constructed to measure substantive environmental issues rather than theoretically based dimensions of EA (see further discussion of these two studies below).

In another empirically-based study, Kuhn and Jackson (1989) used a 21-item attitude scale to measure Dunlap and Van Liere's (1978) dominant social paradigm (DSP) and NEP. They subjected this scale to factor analysis and extracted four factors: negative consequences of growth and technology, relationship between mankind (*sic.*) and nature, quality of life, and limits to the biosphere. This study therefore illustrates a methodologically derived measure, constructed *ex post facto* (Dunlap & Jones, 2002). This approach is also illustrated by several studies examining the dimensionality of the original and revised NEP scale (e.g., Bechtel, Corral-Verdugo, Asai, & Riesle, 2006; Bechtel, Corral-Verdugo, & Pinheiro, 1999; Bostrom, Barke, Turaga, & O'Connor, 2006; Corral-Verdugo & Armendáriz, 2000; Floyd & Noe, 1996; Geller & Lasley, 1985; Hunter & Rinner, 2004; Ji, 2004; Milfont & Duckitt, 2004a; Noe & Snow, 1990; Nooney, Woodrum, Hoban, & Clifford, 2003; Rideout, Hushen, McGinty, Perkins, & Tate, 2005; Thapa, 2001). These studies rely on factor analytic results to derive factors underlying the NEP items. The items of these factors are typically combined to form subscales that are then correlated with other variables.

Empirically-based studies are open to three main criticisms. First, they lack an integrative theoretical perspective, so the EA dimensions tend to vary from one study to another. Second, these studies focus on more volatile and superficial dimensions rather than on fundamental EA dimensions (cf. Kuhn & Jackson, 1989). Finally, the dimensions obtained in these studies are usually comprised of items measuring EA in only one direction (i.e., pro- or con-trait items) (see, e.g., Bechtel, Corral-Verdugo, Asai, & Riesle, 2006; Corral-Verdugo & Armendáriz, 2000; see,

e.g., Thapa, 2001). Thus, the dimensions obtained may reflect methodological artefacts rather than fundamental EA dimensions (cf. Dunlap & Jones, 2002). These criticisms (in particular the first two) have been addressed by theoretically-based studies using attitude theory and value orientations approaches to develop EA dimensions.

2. Theoretically-based studies. Studies in this category typically develop EA dimensions according to attitude theory or value-based orientations. Maloney and colleagues (Maloney & Ward, 1973; Maloney, Ward, & Braucht, 1975) used attitude theory to develop their EA measure. As described in Chapter Two, both the original and shortened versions of their Ecology Scale has items divided into four multi-item subscales that measure specific attitude components: The verbal commitment subscale measures behavioural intention or commitment, the actual commitment subscale measures self-reported behaviour, the affect subscale measures emotional aspects of EA, and the knowledge subscale measures beliefs related to ecological issues.

In another theoretically-based study, Braithwaite and Law (1977) developed a 24-item questionnaire to examine the underlying structure of belief statements regarding doomsday issues. They also tested the notion of a general factor of doomsday consciousness in which beliefs about overpopulation, pollution and nuclear weapons are closely related. The questionnaire was developed using Guttman's (1959) facet theory to differentiate three theoretical facets: the nature of the doomsday issue (overpopulation, pollution, or nuclear war), the type of response to the doomsday issue (seriousness of the threat, concern that action be taken to overcome the threat, or the effectiveness of any action taken), and the type of referent (oneself or humanity). Factor analysis of this questionnaire yielded seven factors underlying the belief statements, but the notion of a general factor of doomsday consciousness was only partially supported because beliefs about nuclear weapons were not found to be closely related to beliefs about overpopulation and pollution. In a replication of this study, however, Mayton (1986) found stronger evidence for a general factor of doomsday consciousness. This time factor analysis yielded five dimensions, with the first two reflecting all three doomsday issues (i.e., overpopulation, pollution, or nuclear war), indicating that general factor.



Kaiser and colleagues (F. G. Kaiser, Wölfing, & Fuhler, 1999) used attitude theory to develop EA dimensions. They argued that there are three main approaches for the study of EA: attitudes toward the environment, attitudes toward ecological behaviour, and the New Environmental Paradigm. A model was then proposed to unify these different EA approaches. In this model, the three EA approaches refer respectively to the dimensions of environmental knowledge, behavioural intentions, and environmental values. These dimensions are thus the knowledge, behavioural and affective attitude components (see Dunlap & Jones, 2002). Kaiser and colleagues developed attitude-related scales to measure these dimensions, and employed their unifying model to predict behaviour. This model predicted 75% of the respondents' self-reported ecological behaviour. In a subsequent study, this model was extended into the moral domain by including a dimension measuring feelings of personal responsibility toward the environment (F. G. Kaiser, Ranney, Hartig, & Bowler, 1999). This dimension explained an additional 5% of the variance of behavioural intention, and the overall expanded model predicted 76% (Study 1) to 96% (Study 2) of the respondents' self-reported ecological behaviour (for a similar approach, see also Harland, Staats, & Wilke, 1999).

Other research has used value-based orientation approaches to develop EA measures. For instance, Kellert (1989) developed a typology of basic human attitudes toward animals. In this typology, seven basic attitudes about animals were identified: utilitarian, naturalistic, scientific, humanistic, moralistic, dominionistic, and negativistic. This typology was later expanded to encompass human attitudes toward nature, and not only animals. Table 3 shows this expanded typology. As can be seen, many of Kellert's attitudinal domains overlap each other, so that a clear distinction between them is rather difficult. For instance, the utilitarian and dominionistic domains share very similar ideas. In line with this, Frost (2000) used Kellert's seven attitude domains to develop a measure of attitudes about forests, and factor analysis suggested that humanistic, scientific, and naturalistic attitudes cluster together, and the utilitarian and dominionistic attitudes also cluster together. Frost (2000), therefore, collapsed Kellert's seven domains into only four forest attitude domains.

Table 3

*Kellert's Typology of Human Values for Nature (Kellert, 1993, 1996)*

Value	Definition	Function
Utilitarian	Practical and material exploitation of nature	Physical sustenance/security
Naturalistic	Satisfaction from direct experience/contact with nature	Curiosity, outdoor skills, mental/physical development
Ecologicistic-Scientific	Systematic study of structure, function, and relationship in nature	Knowledge, understanding, observational skills
Aesthetic	Physical appeal and beauty of nature	Inspiration, harmony, peace, security
Symbolic	Use of nature for metaphorical expression, language, expressive thought	Communication, mental development
Humanistic	Strong affection, emotional attachment, "love" for nature	Group bonding, sharing, cooperation, companionship
Moralistic	Strong affinity, spiritual reverence, ethical concern for nature	Order and meaning in life, kinship and affiliational ties
Dominionistic	Mastery, physical control, dominance of nature	Mechanical skills, physical prowess, ability to subdue
Negativistic	Fear, aversion, alienation from nature	Security, protection, safety

Thompson and Barton's (1994) ecocentric and anthropocentric scales are also based on value orientations. They argued that EA are rooted in either a concern for all living things (*ecocentric* concern) or in a concern for humans (*anthropocentric* concern). Qualitative and quantitative studies have supported this ecocentric/anthropocentric distinction (Fulton, Manfredi, & Lipscomb, 1996; Kortenkamp & Moore, 2001; Pato, Ros, & Tamayo, 2005).

Following the value orientation approach, Stern and Dietz (1994) proposed a theory of the value basis of environmental concern. Expanding Schwartz's (1977) norm-activation model of altruism, they argued that environmental moral norms could be activated by social-altruistic values as well as by egoistic or by biospheric values, leading to a tripartite classification of value orientations towards environmental concern. *Altruistic* values predispose people to judge environmental issues on the basis of costs or benefits for a human group (e.g., community, ethnic group or all humanity). In contrast, people who apply *egoistic* values judge environmental issues on a personal basis. In the *biospheric* value orientation, people judge environmental issues on the basis of costs or benefits to ecosystems. Research showed that "three distinct value orientations, toward self, other human beings and other species and the biosphere, can be distinguished and that each can

independently influence intentions to act politically to preserve the environment” (Stern, Dietz, Kalof, & Guagnano, 1995, p. 1616). Thus, each kind of value-basis EA (egoistic, social-altruistic or biospheric) will induce different types of ascribed responsibility, personal norm and a consequent ecological behaviour.

Although distinct theoretically, these three clusters did not emerge empirically in initial research using Schwartz’s (1992) value items. Stern and associates (Stern, Dietz, & Guagnano, 1995; Stern, Dietz, Kalof, & Guagnano, 1995) found a two-factor structure for Schwartz’s (1992) value items, with egoistic value items forming the first factor, and biospheric and altruistic value items together comprising the second factor. However, this lack of empirical support could have been due to the use of general value items instead of specific attitude items.

Schultz (2001) thus used twelve more specific attitude items (i.e., assessing the importance of valued objects) of environmental concern to further test the tripartite model. These twelve valued objects, comprising the Environmental Motives Scale (EMS), represented *biospheric* (plants, marine life, birds, and animals), *egoistic* (me, my lifestyle, my health, and my future), and *altruistic* (people in my country, all people, children, and future generations) concerns. Using this more specific set of valued objects, Schultz (2001) confirmed the tripartite model proposed by Stern and Dietz. Other studies have also supported this model either using Schultz’s EMS (e.g., Milfont, Duckitt, & Cameron, 2006) or value items (e.g., De Groot & Steg, 2006).

Stern and Dietz’s value-basis theory has thus received empirical support but the pattern of relationship between the three environmental motive concerns and ecological behaviour is not yet clear. Research has suggested that biospheric concern seems to be consistently positively correlated with ecological behaviour (Schultz, 2001; Schultz, Shriver, Tabanico, & Khazian, 2004). However, the pattern of correlations found for both egoistic and altruistic concerns has not been as clear (Schmuck, 2003; Schultz, 2001; Schultz, Shriver, Tabanico, & Khazian, 2004). Egoistic concern has sometimes been found to be negatively correlated with ecological behaviour (Schmuck, 2003; Schultz, Shriver, Tabanico, & Khazian, 2004) and sometimes positively correlated (Schultz, 2001). Altruistic concern has been found to be positively correlated with ecological in same cases

(Schmuck, 2003; Schultz, 2001) and negatively correlated in others (Schultz, Shriver, Tabanico, & Khazian, 2004). These inconsistent findings were found across samples from different countries, including Brazil, Germany, India, New Zealand, Russia and USA (Schmuck, 2003; Schultz, 2001), and across different procedures. Schultz's (2001) correlations were calculated with average scores from raw data, while Schultz et al.'s (2004) correlations were based on mean corrected averages, controlling for response tendency. Schmuck (2003) presented results using both procedures, but again the results showed the same inconsistencies across procedures. These findings seem to indicate therefore that although the tripartite structure is stable, the pattern of association between the three factors and ecological behaviour varies across samples.

To summarise, several studies have suggested that EA are a multidimensional construct. These studies have proposed EA dimensions based on empirical findings, attitude theory or value-based orientations. The horizontal structure of EA therefore seems to comprise a number of dimensions. The vertical structure of EA is discussed next.

### Vertical Approach to the Issue of the Dimensionality of Environmental Attitudes

The vertical structure of EA refers to the hierarchical cognitive organization of the specific evaluating perceptions of or beliefs regarding the natural environment that underlie the overall EA (Heberlein, 1981). In other words, the vertical structure refers to the higher order or second-order factor(s) forming the hierarchical structure of EA.

1. One higher order factor. To date, only two studies have directly tested whether the hierarchical structure of EA comprises a single higher order factor (Carman, 1998; Xiao & Dunlap, 2007). Carman (1998) used data from the 1995 American National Election Study Pilot to test a higher order model of environmental policy support. In this model, the second-order environmental policy support factor was derived from three first-order factors: environmental economic concern (4 items), environmental regulation concern (5 items), and environmental quality assessment (4 items). The model had good fit to the data and the three first-order factors were good indicators of the second-order factor, suggesting therefore a unidimensional higher order structure for environmental

policy support. This higher order factor was positively predicted by attention to news on the environment, party identification and ideology, and negatively by age (however, neither a description of these variables nor a discussion of their association with environmental policy support is provided).

Although Carman's (1998) work is a pioneering contribution for the study of the vertical structure of EA, he focused only on environmental policy support. Xiao and Dunlap (2007) expanded Carman's (1998) findings by including a broader range of facets. They used data from national probability samples of citizens from the United States and Canada to test a higher order model of environmental concern. The second-order environmental concern factor was derived from eight first-order factors: perceived importance of environmental problems (3 items), willingness to pay for environmental protection (4 items), support for governmental policies and regulations (5 items), pro-environmental behaviours and activism (3 items), global environmental issues (7 items), national environmental issues (7 items), community environmental issues (7 items), and the NEP (8 items). Although the factor loadings of community and national environmental issues were relatively weak, the model had good fit to the data in both countries and all other first-order factors were good indicators of the higher order environmental concern factor. In both the United States and Canada, the higher order factor was predicted by age, educational attainment and gender, indicating that younger adults, the better educated and females are more environmentally concerned.

Carman's (1998) and Xiao and Dunlap's (2007) findings suggest a vertical, unidimensional higher order structure for EA. A single higher order structure can also be derived from some empirical studies by a re-analysis of their correlational data. For instance, Tognacci et al. (1972) did not perform factor analysis to test for a higher order factor for their proposed five-factors solution. However, the correlations between the five EA scales (i.e., conservation, pollution, power plant pollution, overpopulation, and individual population control) provided in their Table 1 can be used to perform second-order exploratory factor analyses. The intercorrelation matrix of these scales was subjected to Exploratory Factor Analyses (EFA) using the Principal Axis Factoring method (see

next chapter for more information on these procedures).<sup>2</sup> Table 4 provides the results from these analyses. Only one eigenvalue greater than one emerged, indicating that the five scales loaded on a single higher order factor and that they share a high degree of common variance. This suggests therefore a hierarchical structure of EA in which these scales represent five first-order factors that loaded on a single second-order factor. In fact, Tognacci and colleagues (1972) themselves pointed out the high intercorrelation between their scales.

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<sup>2</sup> These analyses were performed in the Statistical Package for the Social Sciences (SPSS) using the MATRIX DATA command syntax, with the FACTORS subcommand.

Table 4

*Higher Order Factor Analysis Results from Correlation Matrices of Published Studies*

Study	Higher Order Factor Loadings
Tognacci et al. (1972)	
Conservation scale	.85
Pollution scale	.91
Power plant pollution scale	.81
Overpopulation scale	.80
Individual population control scale	.72
KMO	.85
Eigenvalue	3.67
% variance explained	73.4
Maloney et al. (1975) – original scale / shortened scale	
Affect subscale	.79 / .83
Verbal commitment subscale	.99 / .92
Actual commitment subscale	.76 / .79
KMO	.68 / .62
Eigenvalue	2.42 / 2.16
% variance explained	80.8 / 72.1
Borden and Francis (1978)	
Affect subscale	.67
Verbal commitment subscale	.74
Actual commitment subscale	.52
KMO	.65
Eigenvalue	1.83
% variance explained	61.0
Van Liere and Dunlap (1981)	
Population scale	.42
Pollution scale	.76
Natural resources scale	.84
Environmental regulations scale	.81
Environmental spending scale	.67
Environmental behaviour scale	.34
KMO	.84
Eigenvalue	3.13
% variance explained	52.2
Blaikie (1992)	
Use/abuse of the natural environment subscale	.53
Precariousness of the natural environment subscale	.59
Conservation of the natural environment subscale	.63
Sacrifices for the environment subscale	.61
Confidence in science and technology subscale	.40
Problems of economic growth subscale	.51
Conservation of natural resources subscale	.53
KMO	.82
Eigenvalue	2.78
% variance explained	36.7

Note. Tognacci et al.:  $N = 141$ . Maloney et al. original and shortened:  $N = 127$ . Borden and Francis:  $N = 530$ . Van Liere and Dunlap:  $N = 806$ . Blaikie:  $N = 792$ . Factor loadings based on Principal Axis Factoring. The results for Maloney et al. shortened version are based on Principal Components because the communality of one subscale exceeded 1.0 when the Principal Axis Factoring was performed.

Several other studies can be re-analysed in the same way. Maloney and colleagues (Maloney & Ward, 1973; Maloney, Ward, & Braucht, 1975) did not perform factor analysis to test the proposed four-factor solution of their Ecology Scale, nor tested for a higher order solution. However, the correlations provided by Maloney et al. (1975, p. 790) between their verbal commitment, actual commitment and affect scales can be used to perform second-order exploratory factor analyses (the correlations for the knowledge scale were not provided). The correlation matrices of both the original and shortened versions of the subscales were thus subjected to an EFA. As reported in Table 4, only one eigenvalue greater than one emerged, indicating that the three subscales loaded in a single higher order factor in both the original and shortened versions of the scale. Similar results were also found for the Ecology Scale in re-analysis of data from Borden and Francis' (1978) study, with the three subscales loading in a single higher order factor (see Table 4). In fact, the subscales were summed in this study to obtain a general measure of EA.

Again, the study by Van Liere and Dunlap (1981) developing six scales for measuring EA (population scale, pollution scale, natural resources scale, environmental regulation scale, environmental spending scale, and environmental behaviour) provide intercorrelations that can be used to perform a second-order exploratory factor analysis. Once more, only one eigenvalue greater than one emerged, and the six scales did load on a single higher order factor (see Table 4).

In another study, Blaikie (1992) factor analysed 24 items from established scales and reported seven first-order factors descriptive of general ecological viewpoints (use/abuse of the natural environment, precariousness of the natural environment, conservation of the natural environment, confidence in science and technology, problems of economic growth, and conservation of natural resources). Although again Blaikie (1992) did not perform a factor analysis with the scale scores to test for vertical structures, the intercorrelations reported in his Table 3 between the seven scales can be used to perform a second-order exploratory factor analysis. Once again the results indicate a single higher order factor (see Table 4).

In a direct test of the dimensionality of EA, Guber (1996) used data from a national Gallup poll conducted in the U.S.A. in 1991. She did not test for a higher order model, but the three latent



factors found were highly correlated: pro-environmental behaviour correlated .80 and .73 with perceived seriousness of environmental problems and self-identification, respectively, while the latter two factors correlated .64. These high correlations indicate that a higher order factor would be obtained.

Two other studies have tested the horizontal structure of EA but fail to examine their vertical structure: Tarrant and Cordell (1997) used five EA scales (i.e., the NEP, Environmental Concern, Awareness of Consequences, Roper Organization, and Forest Values scales) and found that all were related to ecological behaviour, and Corraliza and Berenguer (1998) factor analysed a pool of 62 items and found seven EA factors (i.e., alarm, comfort, social comparison, concern, economy, saving, and locus of control). Although neither second-order factor analyses were performed nor correlations between the scales were reported, it seems likely that the EA scales used in these two studies measure the same underlying construct.

In summary, both Carman's (1998) and Xiao and Dunlap's (2007) findings and the re-analyses reported here suggest that a single higher order factor is likely for the hierarchical, vertical structure of EA. Moreover, there is some support in the literature for such a unidimensional higher order model. Pierce and Lovrich (1980) argued that beliefs about environmental issues "seem to fit together on a single dimension, thus suggesting some underlying general concept or fundamental orientation to which these beliefs are mutually connected" (p. 261). Similarly, Guber (1996) commented that "results suggest that not only can the standard environmental battery used by Gallup be reduced to relatively few latent factors, those factors are themselves strongly correlated across a diverse set of environmental issues" (p. 644). These researchers therefore also suggest a vertical structure of EA in which a number of evaluating perceptions of or beliefs regarding the natural environment comprise a single higher order dimension underlying those perceptions and beliefs. However, others disagree with this argument. For example, deHaven-Smith (1991, as cited by Dunlap & Jones, 2002, p. 512) suggested "that researchers should abandon survey designs and statistical techniques that presuppose the existence of a generalized concern for the environment" because people's perceptions of environmental problems are too dependent upon the particular

problem involved and the context in which the problem emerges. Furthermore, an important program of research has suggested a two factors higher order structure.

2. Two higher order factors. Bogner and his associates (e.g., Bogner, Brengelmann, & Wiseman, 2000; Bogner & Wiseman, 1997, 1999; Wiseman & Bogner, 2003) developed a program of research stimulated by Blaikie's (1992) study described earlier. Following Blaikie's approach, Bogner and Wiseman (1999) factor analysed a pool of 20 items and found five EA first-order factors, each having four items. They labelled these factors intent of support, care with resources, enjoyment of nature, human dominance, and altering nature.

In a further study, Bogner and Wiseman (2002) factor analysed the five first-order factors of their original study together with the three first-order factors from the NEP scale, that is, balance of nature, man (*sic.*) over nature and limits of growth, to investigate the second-order factor structure. Two factors emerged. The first factor was labelled Preservation and was formed by four first-order factors: intent of support, enjoyment of nature, limits of growth, and care with resources. The second factor was labelled Utilization and was formed by the other four first-order factors: man (*sic.*) over nature, altering nature, human dominance, and balance of nature. These two secondary factors were negatively correlated with each other ( $r = -.26$ ).

In a more recent paper, Wiseman and Bogner (2003) used these findings to propose a two-dimensional Model of Ecological Values (MEV), with two orthogonal dimensions, Preservation and Utilization. They described their model as follows: "Ecological Values are determined by one's position on two orthogonal dimensions, a biocentric dimension that reflects conservation and protection of the environment (Preservation); and an anthropocentric dimension that reflects the utilization of natural resources (Utilization)" (Wiseman & Bogner, 2003, p. 787). Preservation and Utilization reflect, therefore, a dilemma confronting people: how to balance the conservation of the natural environment with the need for some forms of exploitation of the environment. Hence, Wiseman and Bogner's (2003) model suggests that EA are a multidimensional construct organized in a hierarchical fashion with a two-dimensional higher order structure.

Although empirically based, this two-dimensional higher order model of EA has theoretical support. First, this model is supported by Kaiser and Scheuthle's (2003) argument that if "the evaluative component of people's attitudes consists of at least two distinguishable lines of values—utilitarian values as well as moral/altruistic ones—then it would be better to consider them independently" (p. 1041). Second, the proposition that EA seems to form two dimensions is also consistent with more general theories that propose that human-environment relations can be viewed in terms of two distinct beliefs. These beliefs have been articulated as Malthusian versus Cornucopian theories (Barbieri, 1997), cultures of survival versus cultures of progress (Berger, 1979; Witten-Hannah, 2000, 2004), NEP versus DSP (Corral-Verdugo & Armendáriz, 2000; Dunlap & Van Liere, 1978), harmony versus mastery values (1994a; Schwartz & Bardi, 1997) ecocentric versus anthropocentric concerns (Kortenkamp & Moore, 2001; S. C. G. Thompson & Barton, 1994), spiritual versus instrumental views of people-environment relations (Stokols, 1990), non-consumeristic versus consumeristic value orientation (Brown & Cameron, 2000), egalitarian versus individualism views of nature (Lima & Castro, 2005), and conflicting concepts of sustainability, that is, third concept versus first concept of environmental sustainability (Dobson, 1998).

Briefly, one side of each of these dyads of beliefs—Malthusian theory, culture of survival, NEP, harmony values, ecocentric concern, spiritual and egalitarian views of nature, non-consumeristic value orientation, and the third concept of environmental sustainability—prioritizes preserving nature and the diversity of natural species in its original natural state and protecting it from human use and alteration. The other side—Cornucopian theory, cultures of progress, DSP, mastery values, anthropocentric concern, instrumental and individualism views of nature, consumeristic value orientation, and the first concept of environmental sustainability—expresses the belief that it is right, appropriate and necessary for nature and all natural phenomena and species to be used and altered for human objectives. Again, these two sets of contrasting beliefs seem closely related to Wiseman and Bogner's (2003) second-order Preservation and Utilization factors, respectively.

Third, Preservation and Utilization are also related to specific attitude functions. As argued in Chapter Two, every EA seem to express all three main general attitude functions (i.e., object appraisal, knowledge and adjustive functions; social-adjustment and value-expressive functions; and externalization and ego-defensive functions). However, using the differentiation between symbolic and instrumental attitudes (i.e., those attitudes that serve the expression of deep-rooted values versus those that serve individual's self-interest and utilitarian concerns) (Ennis & Zanna, 2000; Prentice, 1987), Preservation and Utilization seem to express symbolic and instrumental functions, respectively. Psychological similarities between functions and structure of attitudes are not uncommon. As noted by Ennis and Zanna (2000) "it is not surprising to discover that attitude function is reflected in the thoughts and feelings that constitute the attitudinal structure" (p. 403). Therefore, the functionalistic view of EA proposed in the present research also seems to support the conceptualization of a two-dimensional higher order model of EA.

Finally, a two-dimensional model also seems consistent with the contemporary debate on sustainable development (Oskamp, 2000; Schmuck & Schultz, 2002; Schmuck & Vlek, 2003). This is a particular form of development that aims to guarantee environmental sustainability in which a potential complementarity between the preservation and utilization of natural resources is supported (Dobson, 1998; Lélé, 1991; Milfont, 2004). Thus, in this context environmental sustainability implies that humans need to use natural resources for human wellbeing, but also need to protect the environment at the same time. This, therefore, "reflects some of the dilemmas which people experience in trying to balance the need both to be aware of the delicate balance between humans and the rest of the natural world, and to conserve the natural environment, while at the same time recognizing that some forms of exploitation of the environment are needed if standards of living are to be maintained" (Blaikie, 1992, p. 161). Thus, the fundamental basis of the actual environmental conflicts "seems to concern whether natural resources should be developed or whether they should be preserved" (Pierce & Lovrich, 1980, p. 266)

The two-dimensional higher order model of EA has thus theoretical support. However, while Bogner and associates appear to have proposed an important new approach to the vertical

structure of EA, their research and theory are open to certain criticisms. First, they reported a significant correlations between their two higher order factors (Bogner & Wiseman, 2002, p. 229; Wiseman & Bogner, 2003, p. 789), but they presented their model as composed of two orthogonal dimensions, with this orthogonality treated as theoretically desirable (Wiseman & Bogner, 2003, p. 787). Second, their scale contains five unbalanced EA subscales, and may therefore be open to acquiescence bias. For example, all first-order factors that formed the Preservation second-order factor have only pro-trait items, while the Utilization second-order factor consisted of first-order factors having only con-trait items. Direction-of-wording effects might therefore be responsible for the relative independence between their two factors. A third criticism is related to this point. Although Wiseman and Bogner (2003) had correlated Preservation and Utilization with Eysenck's (1947) personality factors (see brief discussion below), they did not clearly demonstrate the discriminant validity of their two higher-order factors. Factors derived from factor analysis are purely empirical and can reflect various methodological artefacts, such as direction-of-wording effects. Hence, the ultimate test of whether such factors are theoretically and empirically meaningful is whether the factors do clearly predict important external variables differently, that is, the test of discriminant validity.

A fourth criticism of Bogner and associates' research and theory is that their five first-order factors were derived from 20 items, plus 12 items that formed three factors from the NEP scale. This raises the possibility that the eight first-order factors included in their analyses to obtain second-order factors might not adequately cover the full range of possible first-order EA factors. A more adequate sampling of first-order factors and a more extensive item set might reveal an even more complex second-order factor structure than was revealed by their analysis. And fifth, Bogner and his colleagues used only exploratory factor analysis to investigate the second-order structure. Factor solutions derived from this procedure might not provide good fitting factor solutions. Ideally such solutions should be checked by confirmatory factor analysis, which provides indices of goodness of fit that would indicate the adequacy of the factor solution.

In summary, this review of the dimensionality of EA suggests two main conclusions: (1) EA indeed seem to be a multidimensional construct. It is still not clear, however, how many dimensions form the horizontal structure of EA; (2) EA seem to be organized in a hierarchical fashion. It is still not clear how many dimensions form their vertical structure, that is, whether this hierarchical structure comprises a single higher order dimension (i.e., a generalized EA dimension) or two higher order dimensions, as suggested by Wiseman and Bogner (2003) and others. These are critical gaps that are addressed in the present research.

As well as understanding the dimensionality of EA, another important aspect is to understand their bases. That is, how are EA related to other relevant variables? This is the second main objective of this research, which is discussed next.

### ***THE NOMOLOGICAL NETWORK OF ENVIRONMENTAL ATTITUDES***

The second main objective of the present research is to investigate the nomological network (Cronbach & Meehl, 1955) of EA, that is, to test the relationship between EA and criterion variables. This has been the focus of both policy-based and theoretically based studies. Policy-based studies have investigated the role of demographic and political variables, and have been usually carried out by sociologists. In contrast, theoretical studies have been based on attitude theory, have investigated the role of psychological variables, and have usually been conducted by psychologists (Dunlap & Jones, 2002). In this research, given that demographic, political and psychological variables are investigated, both approaches are taken.

Testing the link between EA and criterion variables is important for understanding the basis of EA. For instance, as Tognacci and colleagues (1972) pointed out, if there is an universality of environmental concern “the degree of concern about particular environmental issues would be *unrelated* to such person attributes as socio-political ideology, age, level of formal education, and social class. On the other hand, if ecological concern is a more sectarian phenomenon, these variables may be instructive in defining some of the salient attributes of individuals who are apprehensive [about environmental issues]” (p. 75, emphasis in the original). It seems that

environmental concern is indeed a sectarian phenomenon because studies have indicated that only specific segments of the population hold pro-EA. This section gives an overview of these findings. The predictors of EA can be broadly organized into socio-demographic, psychological, and environmentally related variables, which are considered in turn.

### *Socio-Demographic Variables*

Research trying to understand the bases of EA initially focused on social-structural variables. This research, especially that from a sociological perspective, focused on the impact of variables such as age, education, residence, political ideology, and religiosity (Buttel, 1987; Cottrell, 2003; Guagnano & Markee, 1995; McFarlane & Hunt, 2006; Van Liere & Dunlap, 1980). Some consistent relationships between socio-demographic variables and EA were found, but these were weak in term of effect size (Fransson & Gärling, 1999). In other cases the findings have been inconsistent (Hines, Hungerford, & Tomera, 1987; Neuman, 1986; Wall, 1995). The main socio-demographic variables investigated are briefly reviewed below.

*Age.* Many studies have indicated that EA tend to be negatively related to age (Baldassare & Katz, 1992; Diekmann & Preisendörfer, 1998; Fransson & Gärling, 1999; Hines, Hungerford, & Tomera, 1987; McStay & Dunlap, 1983; Stern, Dietz, & Kalof, 1993; Theodori & Luloff, 2002; Van Liere & Dunlap, 1980), with younger persons being more environmentally concerned than older persons. This effect may be due to age differences in value priorities. Inglehart (1997) found that older persons tend to give higher priority to materialist than post-materialist values. However, other studies have given mixed results. For instance, cross-cultural findings indicate that age is positively related to concern for nature, rather than negatively (Schwartz, 2005). Mayer and Frantz (2004, Study 4) also found a positive correlation between age and EA, and Korfiatis et al. (2004) and Pato et al. (2005) a positive correlation between age and ecological behaviour.

*Gender.* Research examining the influence of gender on EA has also found mixed results. Some research has found that females tend to be more environmentally concerned than males (Baldassare & Katz, 1992; Diekmann & Preisendörfer, 1998; Eisler, Eisler, & Yoshida, 2003;

McStay & Dunlap, 1983; Stern, Dietz, & Kalof, 1993; Van Liere & Dunlap, 1980), but others have not found any significant relationship (Arcury, Scollay, & Johnson, 1987). However, more recent reviews and findings (e.g., Korfiatis, Hovardas, & Pantis, 2004; Theodori & Luloff, 2002; Vaske, Donnelly, Williams, & Jonker, 2001; e.g., Zelezny, Chua, & Aldrich, 2000) have concluded that females indeed tend to be more environmentally concerned than males. This may be a result of gender differences in values or personality traits (Borden & Francis, 1978; Dietz, Kalof, & Stern, 2002). Dietz, Kalof and Stern (2002) have argued, for instance, that gender differences in EA seem to be a result of gender differences in altruistic values. Consistent with this argument, recent findings have shown that gender influences value orientation, with females being more altruistic and biocentric orientated (Deng, Walker, & Swinnerton, 2006; McFarlane & Hunt, 2006). On the other hand, gender differences were not found in specific EA concerning forest management (McFarlane & Hunt, 2006).

*Level of education.* The findings for the relationship between education and EA have also been somewhat inconsistent. This may also be a result of differences in values priorities. Education has been found to be inconsistently and only weakly related to benevolence and universalism (Schwartz, 2005), which are values typically associated with EA (Schultz & Zelezny, 1999). Schwartz (2005) therefore suggested that although education may broaden one's intellectual horizons, it does not necessarily increase concern for nature. Research seems to show, however, that more educated persons are more environmentally concerned and attribute greater importance to biocentric orientations than less educated persons do (Fransson & Gärling, 1999; Hines, Hungerford, & Tomera, 1987; Olofsson & Öhman, 2006; Theodori & Luloff, 2002; Vaske, Donnelly, Williams, & Jonker, 2001). On the other hand, Korfiatis et al. (2004) found the inverse pattern for ecological behaviour.

*Political conservatism.* Research has related political orientation to EA (Buttel & Flinn, 1978; Dunlap, 1975; Kilbourne, Beckmann, & Thelen, 2002; Koenig, 1975). Many research findings indicate that EA is positively related to liberal political ideology (Diekmann &



Preisendörfer, 1998; Fransson & Gärling, 1999; Mayton, 1986; Olofsson & Öhman, 2006; Theodori & Luloff, 2002; Van Liere & Dunlap, 1980), but others do not (Baldassare & Katz, 1992).

*Religion, religiosity and Biblical literalism.* White (1967) argued that Christian religious traditions emphasize anthropocentric views of the environment, and a belief in human dominance over nature. Empirical studies have supported this. Persons from a Judeo-Christian tradition, and persons expressing high levels of religiosity and literal beliefs in the Bible, have been found to be less environmentally concerned (Gardner & Stern, 2002; Schultz, Zelezny, & Dalrymple, 2000). For example, Harvey and Belt (1995) found a relationship between church attendance and concern for population growth, with people who regularly attend church expressing lower concerns than those who either sometimes attend or never attend church.

*Residence.* There is some evidence suggesting that urban residents have higher EA scores than rural residents (Arcury & Christianson, 1990; Howell & Laska, 1992), but again the findings are mixed. In fact, Bunting and Cousins (1985) found the inverse: EA was stronger for children from rural areas than for urban children. A possible explanation for these mixed results is that EA seem more likely to be influenced by exposure to environmental problems than by place of residence (Arcury & Christianson, 1990; Fransson & Gärling, 1999). However, place of residence has been shown to have an important moderating role on the relationships between other socio-demographic variables and EA (Guagnano & Markee, 1995).

*Social class.* Research has indicated a positive association between income and EA (Fransson & Gärling, 1999; Theodori & Luloff, 2002; Van Liere & Dunlap, 1980). For instance, Vaske et al. (2001) grouped participants into three income categories, and found that participants in the lowest earnings category (i.e., <\$25,000) had lower EA scores than those in the other two categories (i.e., \$25,000–\$50,000, and >\$50,000). However, negative associations between income and ecological behaviour have also been found (Korfiatis, Hovardas, & Pantis, 2004).

To summarize, even though some mixed results have been reported, this review reveals that young individuals, the more highly educated, female individuals, people with liberal political ideologies, those with low levels of religiosity, people not following a Judeo-Christian tradition,

those with a less literal belief in the Bible, people living in urban areas, and those with higher incomes are more likely to maintain pro-EA.

### *Psychological Variables*

Research has also examined the relationship between EA and several psychological variables. The relationships between EA and political attitudes, locus of control, personality dimensions, social desirability, time perspective, and values are discussed below.

*Political attitudes (authoritarianism, democracy and social dominance orientation).* Research has shown a negative correlation between authoritarianism and EA (Iwata, 1977; Peterson, Doty, & Winter, 1993; Ray, 1980; Schultz & Stone, 1994; Zelezny & Pollitt, 1996), and a positive correlation between egalitarianism and EA (Lima & Castro, 2005). No previous research has investigated how EA relate to democratic attitudes or social dominance orientation. Based on the findings relating EA to authoritarianism, egalitarianism and social conservatism, however, associations of EA with democracy and social dominance would be expected. Egalitarianism is viewed as one of the two core democratic values, the other being individualism (Karstedt, 2006), so a positive relation between EA and democratic attitudes is likely. Social dominance is a general attitudinal orientation reflecting the “extent to which one desires that one’s ingroup dominate and be superior to outgroups” (Pratto, Sidanius, Stallworthm, & Malle, 1994, p. 742). Authoritarianism is positively related to social dominance orientation (Duckitt, 2001, 2006), and social conservatism, which is a conceptually similar measure of social dominance orientation, was found to be negatively related to EA measures (Hodgkinson & Innes, 2000), therefore a negative relation between EA and social dominance orientation is also likely.

*Locus of control.* Several studies have investigated the relationship between Rotter’s (1966) dimensions of internal versus external locus of control and both EA and ecological behaviour (Hines, Hungerford, & Tomera, 1987; Hwang, Kim, & Jeng, 2000; Pettus & Giles, 1987). Researchers have even developed specific scales to measure environmental locus of control (see Cleveland, Kalamas, & Laroche, 2005; Smith-Sebasto & Fortner, 1994, for reviews). Internal locus

of control refers to peoples' expectancies of control over the reinforcements and punishments they receive (i.e., control over events in the environment). External locus of control, in contrast, refers to peoples' expectancies that they have little control over reinforcements and punishments received (i.e., little control over events in the environment). Several findings have indicated that internal locus of control, rather than external locus of control, is associated with EA and ecological behaviour (Hines, Hungerford, & Tomera, 1987; Pettus & Giles, 1987). However, in one other study internal locus of control was not significantly related to either EA or ecological behaviour (Hamid & Cheng, 1995), and Grob (1995) found a negative relationship between perceived control and ecological behaviour.

*Personality dimensions.* Few studies have investigated the personality traits that may underlie EA. Borden and Francis (1978) examined the influence of four personality dimensions (value orientation, person orientation/extraversion, capacity for independence, and super-ego strength) on environmental concern. These four dimensions are respectively similar to the conscientiousness, extraversion, openness to experience, and agreeableness dimensions of the five-factor model of personality (McCrae & Allik, 2002; McCrae & John, 1992). Borden and Francis (1978) argue that the associations found demonstrate "the environmentally concerned individual to be more mature, responsible, outgoing, and conscientious than the person who cares little for problems of the environment" (Borden & Francis, 1978, p. 197). They also found that extraversion was positively related to environmental concern for female participants, but this relation was negative for male participants. In another study, Wiseman and Bogner (2003) related their higher order EA dimensions, Preservation and Utilization, to Eysenck's (1947) personality dimensions. They found that Preservation was positively related to neuroticism and Utilization was positively related to psychoticism.

*Social desirability.* Research has indicated a tendency to give socially desirable responses in respect to EA (F. G. Kaiser, Wölfing, & Fuhler, 1999; e.g., Schahn, 2002; Wiseman & Bogner, 2003). Wiseman and Bogner (2003) found, for instance, significant positive correlations between

their EA factors and Eysenck's (1947) fake good scale which measures social desirability tendencies. Schahn (2002) also reported a strong positive effect of social desirability on EA.

*Time perspective.* Several studies have shown that a future time perspective was positively related to people's self-reported environmental intentions and behaviour (Collins & Chambers, 2005; Ebreo & Vining, 2001; Joireman, Lasane, Bennett, Richards, & Solaimani, 2001; Joireman, Van Lange, & Van Vugt, 2004; Strathman, Gleicher, Boninger, & Edwards, 1994). There are also other time perspective dimensions that may be linked to environmental issues, such as these measured by the Zimbardo Time Perspective Inventory (Boyd & Zimbardo, 1997; Milfont, Andrade, Belo, & Pessoa, 2007; Milfont & Gouveia, 2006; Zimbardo & Boyd, 1999): past-negative, past-positive, present-hedonistic, and present-fatalistic. Corral-Verdugo and Pinheiro (2004) used this inventory to predict water conservation practices. They found that both the present-hedonistic and present-fatalistic time frames predicted water conservation negatively, while the future time frame predicted it positively. Neither the past-negative nor the past-positive time frames produced significant relationships with water conservation.

*Values.* As discussed previously, research has consistently found that self-transcendence values correlate positively with EA and self-enhancement values correlate negatively (e.g., Coelho, Gouveia, & Milfont, 2006; Schultz et al., 2005).

To sum up, this review reveals that people holding democratic attitudes, those with expectancies of control over environmental events, those who tend to behave in a social desirable manner, those who are conscientious and future-orientated, and those who hold self-transcendence values are more likely to express pro-EA.

### *Environmentally Related Variables*

There are also some variables that are conceptually similar to EA. Seven such environmentally related variables will be discussed here: ecological behaviour, economic growth and economic liberalism, environmental concern, environmental threat, environmental organization membership, inclusion with nature, and knowledge of environmental issues.

*Ecological behaviour.* Given that “conservation (ecological behavior)” is the psychological index term generally used (Gallagher, 2004), “ecological behaviour” is employed here to refer to actions contributing to environmental preservation and/or conservation (see Axelrod & Lehman, 1993; F. G. Kaiser & Fuhler, 2003; F. G. Kaiser, Ranney, Hartig, & Bowler, 1999). One of the major foci of psychological theory and research is to predict behaviour from attitudinal variables (Ajzen, 2001). Several studies have shown that EA have a positive effect on ecological behaviour (e.g., Diekmann & Preisendörfer, 1998; Hines, Hungerford, & Tomera, 1987; F. G. Kaiser, Wölfling, & Fuhler, 1999; Schultz, 2001; Theodori & Luloff, 2002). For example, Hines et al.’s (1987) meta-analysis reviewed findings about the relationship between EA and ecological behaviour. EA was the third most important variable associated with ecological behaviour, after verbal commitment and locus of control. However, the relationship between EA and ecological behaviour has typically yielded only moderate to weak effect sizes (e.g., Grob, 1995).

*Economic growth and economic liberalism.* Research has shown that EA are negatively related to attitudes toward both economic growth and economic liberalism (Axelrod, 1994; Buttel & Flinn, 1976; Dunlap & Van Liere, 1984; Kilbourne, Beckmann, & Thelen, 2002) and also beliefs about money (Hodgkinson & Innes, 2000). For instance, Buttel and Flinn (1976) found that two EA dimensions (i.e., awareness of environmental problems and support for environmental reform) were negatively related to a measure of attitudes towards economic growth, even when other variables (i.e., education, age, place of residence and laissez-faire liberalism) were controlled for. Similarly, Kilbourne et al. (2002) found that individuals less concerned about environmental problems were those with stronger beliefs in economic liberalism.

*Environmental concern.* As discussed above, Stern’s value-basis theory postulates three value orientations towards environmental concern, namely biospheric, egoistic, and altruistic (Stern & Dietz, 1994; Stern, Dietz, & Guagnano, 1995; Stern, Dietz, Kalof, & Guagnano, 1995). Research has suggested that biospheric concern seems to be consistently positively correlated with EA (De Groot & Steg, 2006; Schultz, 2001; Schultz, Shriver, Tabanico, & Khazian, 2004). As with ecological behaviour, however, the pattern of correlations between EA and both egoistic and

altruistic concerns has not been consistent. Egoistic concern has sometimes been significantly negatively correlated with EA (De Groot & Steg, 2006), sometimes non-significantly negatively correlated (Schultz, Shriver, Tabanico, & Khazian, 2004), and sometimes non-significantly positively correlated (Schultz, 2001). Altruistic concern has been significantly negatively correlated with EA in some cases (De Groot & Steg, 2006, Study 1; Schultz, Shriver, Tabanico, & Khazian, 2004), and non-significantly positively correlated in others (De Groot & Steg, 2006, Study 3).

*Environmental threat.* Several studies have shown the influence of environmental risk on both EA and ecological behaviour (Axelrod & Lehman, 1993; Baldassare & Katz, 1992; Blake, 2001; Bonaiuto, Breakwell, & Cano, 1996; Lima, 2004; Lima & Castro, 2005), but sometimes this relationship has been found to be not significant (Diekmann & Preisendörfer, 1998). Section three of this chapter has an extended discussion of the influence of perceived environmental threat on EA.

*Environmental organization membership.* Studies have shown that members of environmental organizations have more pro-EA (Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig, & Jones, 2000; Maloney & Ward, 1973; Mayer & Frantz, 2004, Study 3; Pahl, Harris, Todd, & Rutter, 2005, Study 2; Pato, Ros, & Tamayo, 2005; Weigel & Weigel, 1978).

*Inclusion with nature.* Schultz (2001, 2002b) has created a single-item scale to measure the perceived relationship between self and nature. As mentioned before, an intrinsic procedure was also developed to measure this construct (Schultz, Shriver, Tabanico, & Khazian, 2004), and a multi-item scale has also been developed recently (Mayer & Frantz, 2004). It has been found that both extrinsic and intrinsic connectedness with nature were positively correlated with EA and ecological behaviour (Mayer & Frantz, 2004; Schultz, 2001; Schultz, Shriver, Tabanico, & Khazian, 2004).

*Knowledge of environmental issues.* Studies have shown the importance of knowledge for EA and ecological behaviour (Diekmann & Preisendörfer, 1998; Hines, Hungerford, & Tomera, 1987; F. G. Kaiser & Fuhler, 2003; Lévy-Leboyer, Bonnes, Chase, & Ferreira-Marques, 1996; McFarlane & Hunt, 2006). Although some researchers have considered knowledge as the cognitive component of EA (Cottrell, 2003), most have considered knowledge as an independent variable

(Grob, 1995; Hwang, Kim, & Jeng, 2000; F. G. Kaiser, Ranney, Hartig, & Bowler, 1999). Tarrant, Bright and Cordell (1997), for instance, have looked at the moderating role of knowledge on the relationship between values and attitudes toward wildlife species protection. Overall, studies have indicated that higher environmental knowledge is related to higher EA. In a meta-analysis of recycling behaviour, knowledge was found to have the highest correlation with a score of propensity to recycle, which combined attitudes towards recycling, behavioural intentions and actual recycling (Hornik, Cherian, Madansky, & Narayana, 1995). However, the magnitude of these correlations was higher in studies using actual measures of recycling behaviour than in those using self-reports, and sometimes the relationship between knowledge and EA has been found to be not significant (Iwata, 1996).

To summarise, this review reveals that people who behave in a pro-environmental way, those who hold attitudes toward limits to economic growth, those who are worried about, and perceive threats from, environmental issues, those who are members of an environmental organization, and those who feel connected with nature and have knowledge about environmental problems are more likely to hold pro-EA.

### *Overview of the Nomological Network of Environmental Attitudes*

Research has related EA with several criterion variables providing indications of the social-structural and social-psychological bases of EA. Table 5 summarizes the relationship between EA and criterion variables. The findings suggest that the stronger relationships are between EA and other environmentally related variables (see, e.g., Hines, Hungerford, & Tomera, 1987). There seems to be two explanations for this. The first explanation is methodological and refers to the possibility of content overlap between the measures. The environmental constructs are so tied to each other that the scales almost become measures of the same construct. The other explanation for the high correlation between EA and other environmentally related variables is theoretical. This refers to Heberlein's (1981) argument that cognitive structures tend toward consistency (see also Thøgersen, 2004). Because of the consistency principle individuals having pro-EA would also show

other related outcomes, such as having higher environmental concern and performing more ecological behaviours. However, the causal direction of these relations is not clear. A much clearer causal model is that of value–attitude–behaviour, which will be discussed next.



Table 5  
*Summary of the Environmental Attitudes Nomological Network*

Variable	Direction of the Relationship		
	Positive (+)	Negative (-)	Non-significant results
<b>Socio-demographic variables</b>			
Age	(Korfiatis, Hovardas, & Pantis, 2004; Mayer & Frantz, 2004, Study 4)	(Hines, Hungerford, & Tomera, 1987)	(Mayer & Frantz, 2004, Study 1)
Being Judeo-Christian	—	(Schultz, Zelezny, & Dalrymple, 2000)	—
Biblical literalism	—	(Schultz, Zelezny, & Dalrymple, 2000)	—
Gender (being male)	—	(Zelezny, Chua, & Aldrich, 2000)	(Pahl, Harris, Todd, & Rutter, 2005)
Level of education	(Vaske, Donnelly, Williams, & Jonker, 2001)	(Korfiatis, Hovardas, & Pantis, 2004)	(Mayer & Frantz, 2004, Study 1)
Political conservatism	—	(Van Liere & Dunlap, 1980)	(Baldassare & Katz, 1992)
Religiosity	—	(Gardner & Stern, 2002)	—
Social class	(Van Liere & Dunlap, 1980)	(Korfiatis, Hovardas, & Pantis, 2004)	—
Urban residence	(Howell & Laska, 1992)	(Bunting & Cousins, 1985)	—
<b>Psychological variables</b>			
Altruistic values	(Stern, Dietz, Abel, Guagnano, & Kalof, 1999)	—	—
Authoritarianism	—	(Schultz & Stone, 1994)	—
Biospheric values	(Milfont & Gouveia, 2006)	—	—
Extroversion personality trait	(Borden & Francis, 1978)	—	—
Future time perspective	(Strathman, Gleicher, Boninger, & Edwards, 1994)	—	—
Locus of control	(Pettus & Giles, 1987)	(Grob, 1995)	(Hamid & Cheng, 1995)
Self-enhancement values	—	(Schultz & Zelezny, 1999)	—
Self-transcendence values	(Schultz & Zelezny, 1999)	—	—
Social desirability	(Wiseman & Bogner, 2003)	—	—
<b>Environmentally related variables</b>			
Ecological behaviour	(Hines, Hungerford, & Tomera, 1987)	—	—
Economic liberalism	—	(Kilbourne, Beckmann, & Thelen, 2002)	—
Economic growth	—	(Buttel & Flinn, 1976)	—
Environmental (biospheric) concern	(De Groot & Steg, 2006; Schultz, 2001)	—	—
Environmental (egoistic) concern	—	—	(Schultz, 2001; Schultz, Shriver, Tabanico, & Khazian, 2004)
Environmental (altruistic) concern	—	(Schultz, Shriver, Tabanico, & Khazian, 2004)	(De Groot & Steg, 2006)
Environmental threat	(Axelrod & Lehman, 1993)	—	(Diekmann & Preisendörfer, 1998)
Environmental organization membership	(Dunlap & Van Liere, 1978)	—	—
Inclusion with nature	(Schultz, 2000)	—	—
Knowledge	(F. G. Kaiser & Fuhler, 2003)	—	(Iwata, 1996)

Note. The associations for Korfiatis et al. (2004) were reported for ecological behaviour, but the same direction of the associations would also be expected for EA in this study.

### ***THE VALUE–ATTITUDE–BEHAVIOUR COGNITIVE HIERARCHY MODEL***

The third aim of this research is to test the value–attitude–behaviour cognitive hierarchy model proposed by Homer and Kahle (1988). According to this model, values influence behaviour both directly and indirectly through attitudes. This model therefore implies a hierarchy of cognitions in which the influence theoretically flows from more abstract cognitions (i.e., values) to mid-range cognitions (i.e., attitudes) to specific behaviours. Hence, this model can be visually depicted as a causal sequence: value → attitude → behaviour.

Homer and Kahle (1988) tested their proposed model in a very specific situation, that is, natural food shopping. Based on the hierarchical model, they proposed that value dimensions influence attitudes toward natural food, which in turn, influence shopping behaviours among natural food consumers. Their findings indicated that values had an influence on attitude toward natural food, and that attitude toward natural food had an influence on the purchase of natural food. More importantly, structural equation analysis revealed that values had no significant direct influence on shopping behaviours. This result shows that attitudes play a mediating role between values and behaviours, and thus supports the hierarchical model.

The value → attitude → behaviour cognitive hierarchy model has been applied in a variety of other areas, such as to explain consumer behaviours (Homer & Kahle, 1988) and career attitude (Shim, Warrington, & Goldsberry, 1999). This model has also been applied in several theoretical and empirical models looking at either the influence of values on EA and ecological behaviours, or the mediating role of EA (see, e.g., Fransson & Gärling, 1999; Fulton, Manfredi, & Lipscomb, 1996; Gärling, Fujii, Gärling, & Jakobsson, 2003; F. G. Kaiser & Scheuthle, 2003; Nordlund & Garvill, 2002; Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Stern, Dietz, & Guagnano, 1995). For instance, Homer and Kahle's (1988) model can be identified in Stern's (2000a; Stern, Dietz, & Guagnano, 1995) theoretical model of ecological behaviour. Stern's model also implies a hierarchical structure, with the major flow of causation from top to bottom (although an upward

flow of influence is also likely), and with the strongest causal effects between adjacent variables (see Figure 4).

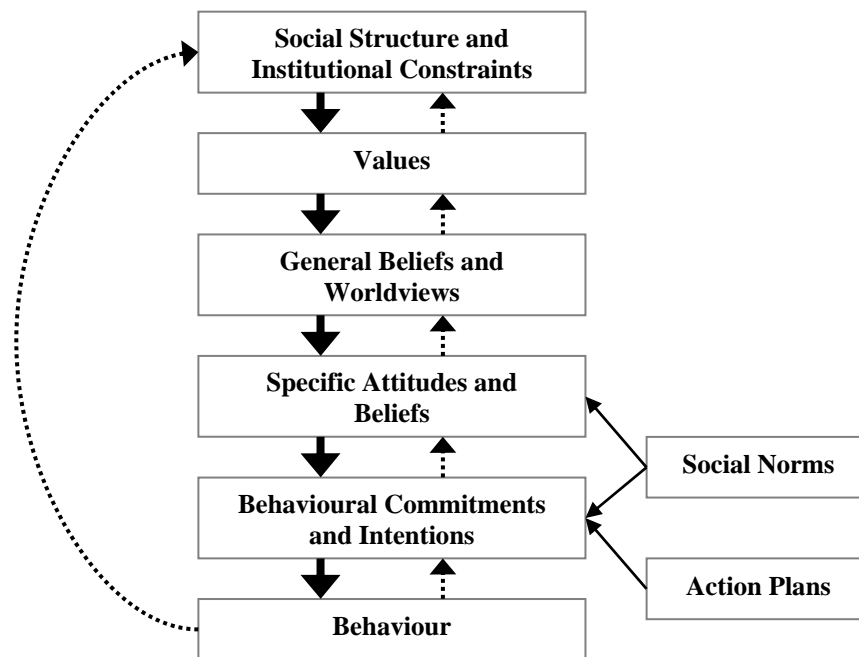


Figure 4

*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)*

According to Stern’s model, therefore, social structures (e.g., national laws, market and incentive structures) shape the development of individual’s values (e.g., egocentric, altruistic, or ecocentric values), which in turn guide the development of belief systems and worldviews. Belief systems and worldviews represent a general knowledge base from which new attitudes and beliefs about specific environmental issues are formed (e.g., attitudes about recycling, composting, and buying green products). These attitudes and beliefs influence behavioural commitments and intentions, which in turn influence ecological behaviour. This model has received empirical support (e.g., Dietz, Stern, & Guagnano, 1998), and, more recently, Cameron (2002) has conceptually expanded this model by including social norms influencing both attitudes and intentions, and action plans influencing intentions, as seen in Figure 4.

In a more explicit test of Homer and Kahle's (1988) model as applied to environmental issues, Vaske and Donnelly (1999) examined support for wildland preservation. They found that wildland preservation attitudes entirely mediate the relationship between biocentric/anthropocentric value orientations and wildland preservation voting intention. In another study, Vaske and colleagues (2001) expanded the hierarchical model by exploring the mediating role of value orientations on the relationship between normative beliefs and demographic variables (length of residency, gender, education, and income), that is, demographic variables → value orientations → normative beliefs → behaviour. They found that biocentric/anthropocentric value orientations fully mediate the influence of both income and education on normative belief, and partially mediate the influence of length of residence and gender on normative belief. An inspection of the normative items (e.g., "The amount of human use of national forests should be reduced", "National forests should be managed more for their natural health than for recreation") indicate that their normative belief scale could be seen as an EA measure. Hence, their expanded model can be depicted as: demographic variables → value orientations → EA → ecological behaviour.

Another expanded model was proposed by Tarrant, Bright and Cordell (1997). They examined the mediating role of general EA on the relationship between assigned value of the environment and specific attitudes toward wildlife species protection (i.e., assigned value → general attitude → specific attitude). They also tested the moderating role of knowledge of wildlife species protection on the relationship between assigned value and general EA. They tested these models across four wildlife constituent groups: (1) consumptive users (anglers and hunters), (2) non-consumptive users (birders), (3) non-users (non-hunters, non-anglers, and non-birders), and (4) combined consumptive and non-consumptive users (anglers, hunters and birders). The findings indicated that, in general, the mediating role of general EA was supported across all four users groups, and that the moderating role of knowledge was supported for consumptive and consumptive/non-consumptive users groups. However, this study used correlational rather than causal analysis, and the measure used to assess values (i.e., assigned value of the environment) was

not an appropriate measure of values as proposed in Homer and Kahle's (1988) model, which limits their findings.

A second explicit test of this model as applied to environmental issues was conducted by Grob (1995). In this study, a model in which values affect ecological behaviour directly and indirectly through three attitudinal components was proposed and tested. The three attitudinal aspects considered were the environmental awareness, perceived control and emotional components that correspond to the knowledge, behavioural and affective attitude components. Since this study used attitude theory to develop the dimensions, it is also an example of a theoretically-based study. Grob's (1995) model predicted 39% of the respondents' self-reported ecological behaviour. More importantly, his results supported Homer and Kahle's (1988) hierarchical value-attitude-behaviour causal sequence by showing that the three attitudinal components mediated the affect of values on ecological behaviour (but values also affected ecological behaviour directly).

In summary, Homer and Kahle (1988) suggested a causal influence among values, attitudes, and behaviours. Their model, with its theoretical premise of the hierarchical influence of values, attitudes and behaviours, has been applied to environmental issues and been found a useful approach to environmental research. Overall, research has shown that values predict EA, and that EA tend to fully mediate the relationship between values and self-reported ecological behaviour. Research has also expanded this model by including other variables, such as demographic variables, value orientations, and specific attitudes. It is also likely that this model might be influenced by real social situations. Therefore, in the present research an expanded model is proposed that includes perception of threat from environmental problems.

### *The Role of Social Situations: Perceived Environmental Threat*

In their review of survey polls on environmental protection, Gillroy and Shapiro (1986) concluded that environmental risks have not been well addressed in the literature. This seems to have changed during the last two decades with many studies examining the influence of environmental risk on both EA and ecological behaviour (see, e.g., Axelrod & Lehman, 1993; Baldassare & Katz, 1992; Blake, 2001; Bonaiuto, Breakwell, & Cano, 1996; Covitt, Gomez-

Schmidt, & Zint, 2005; Eisler, Eisler, & Yoshida, 2003; Harvey & Belt, 1995; Hine, Marks, Nachreiner, Gifford, & Health, 2007; Lima, 2004; Lima & Castro, 2005; Sundblad, Biel, & Gärling, 2007). Indeed, the study of perceived environmental risk is now a recurrent topic in environmental psychology (Sundstrom, Bell, Busby, & Asmus, 1996).

This interest in environmental risks seems to have increased specially after a study by Baldassare and Katz (1992) in which they hypothesised that perceived personal threat of environmental problems is a strong predictor of ecological behaviour. They examined the influence of perceived environmental threat on ecological behaviour by testing whether individuals who believe that environmental problems are a direct threat to their health and wellbeing would be more likely to engage in environmental practices (e.g., limiting the amount of driving to reduce air pollution, or conserving the water used). The results supported Baldassare and Katz's (1992) perceived environmental threat hypothesis. They found that perceived personal environmental threat was strongly related to ecological behaviour, and that ecological behaviour was better predicted by perceived environmental threat than by demographic and political variables.

In another study looking at the influence of threat on behaviour, Axelrod and Lehman (1993) combined three types of environmental threat perception—perceived likelihood of the threat occurring, the severity of the threat, and immediacy of the threat. This combined perceived environmental threat measure was correlated with an EA measure ( $r = .41, p < .001$ ) and an ecological behaviour measure ( $r = .36, p < .001$ ). Regression analyses also revealed that threat predicted ecological behaviour. Lévy-Leboyer et al. (1996) also found risk perception to be an important factor for predicting ecological behaviour in samples from four European countries (France, Italy, Portugal, and the UK). Stern and colleagues (2000b; Stern, Dietz, Abel, Guagnano, & Kalof, 1999) also mention the influence of threat on the activation of personal norms to perform ecological behaviours in their value-belief-norm theory of environmentalism.

However, some findings have challenged Baldassare and Katz's (1992) hypothesis. Axelrod and Lehman (1993) found that threat only predicted ecological behaviour for a student sample, and not for a community sample, and Harvey and Belt (1995) did not find support for their hypothesis

that threat would increase environmental and population concern. They found, however, that the threat manipulation moderated the relationship between environmental and population concerns, with lower correlation for the personally-framed threat condition than for the no-threat or socially-framed threat conditions. Nevertheless, research has generally supported Baldassare and Katz's (1992) hypothesis that perceived environmental threat predicts ecological behaviour.

A scale to measure perceived environmental threat, the Environmental Appraisal Inventory (Schmidt & Gifford, 1989), has also been developed. This inventory measures three dimensions of environmental appraisal (i.e., perceived environmental threats to self, threat to the environment, and perceived control over environmental hazards), and has been used in several studies (e.g., Fridgen, 1994; Lai, Brennan, Chan, & Tao, 2003; Walsh-Daneshmandi & MacLachlan, 2000). Environmental threat was found to correlate positively and significantly with EA in English and Irish samples (Pahl, Harris, Todd, & Rutter, 2005; Walsh-Daneshmandi & MacLachlan, 2000), but no significant correlations were found in a Chinese sample (Lai, Brennan, Chan, & Tao, 2003).

Therefore, studies have indicated that EA and ecological behaviour are related to perceptions of real social situations. Environmental problems that become markedly more threatening, or that are at least perceived to do so, seem to shift individuals' concerns and increase both EA and ecological behaviour. In the present research, Homer and Kahle's (1988) model is expanded by including perceived environmental threat. It is proposed that perceived environmental threat would influence ecological behaviour indirectly through attitudes. Accordingly, the expanded model suggests that the relationship between both values and perceived environmental and ecological behaviour is mediated by EA. Thus, the expanded model can be depicted as: value/threat → attitude → behaviour.

A somewhat similar model was recently proposed and tested by Oreg and Katz-Gerro (2006). They included several variables in their model: country-level values (i.e., harmony, and post-materialism), pro-EA (i.e., environmental concern, and perceived threat), perceived behavioural control, willingness to sacrifice for the environment, and behaviour (i.e., recycling, refraining from driving, and environmental citizenship). They also examined individuals'

perceptions of environmental threat of two kinds: specific threat under personal control (e.g., air pollution by cars) and general threat not under personal control (e.g., air pollution by industry). In their model, willingness to sacrifice mediates the influence of both attitude and perceived behavioural control on behaviour, and both environmental concern and willingness to sacrifice mediates the influence of values on behaviour. Results from structural equation modeling analysis supported this model.

There are, however, two main differences between Oreg and Katz-Gerro's (2006) model and the model proposed here. First, they considered values at a culture level of analysis rather than at an individual level as in the present research. Second, they considered threat as an attitudinal variable, and thus included both threat and EA measures at the same level of analysis. It seems more logical theoretically to consider threat and attitude as distinct constructs (see, e.g., Lai, Brennan, Chan, & Tao, 2003; Walsh-Daneshmandi & MacLachlan, 2000). This may explain Oreg and Katz-Gerro's (2006) inconsistent findings regarding the relationship between threat and willingness to sacrifice. They found that even though the relationship between both types of threat and willingness to sacrifice was significant in their overall sample, this relationship varied across the 38 countries investigated. Had Oreg and Katz-Gerro followed the model proposed in the present research, attitude and threat would be treated as distinct constructs, and the effect of threat on willingness to sacrifice would be examined through EA. Hence, environmental threat would influence willingness to sacrifice indirectly through attitudes. This might have produced more consistent findings across samples in their analyses.

In summary, the current research aims to assess the mediating role of attitude on the relationship between value and behaviour. It also aims to extend Homer and Kahle's (1988) model by incorporating perceived environmental threat in the model (i.e., value/threat → attitude → behaviour). This model therefore indicates that both values and threat influence attitudes and subsequently behaviour.



Section 1 provided a specific review of the literature on the dimensionality and nomological network of EA, and the value–attitude–behaviour cognitive hierarchy model. The overall research questions of this research will be summarised in the next section.

## ***SECTION 2. RESEARCH QUESTIONS***

As discussed previously, this research has three major objectives. The first objective is to investigate the cognitive structure of EA. That is, to investigate the structure underlying belief statements evaluating perceptions of or beliefs regarding the natural environment. This investigation is visually depicted in Figure 5. The determination of the cognitive structure of EA would be an important first step in fostering a psychology of EA that might help to reduce environmental problems. For instance, understanding the cognitive organization of EA is important for predicting ecological behaviour. Previous results have confirmed that EA do predict ecological behaviour, but this effect is only low to moderate in terms of effect size magnitude (Bamberg, 2003). One reason for this may be that the cognitive structure of EA has not yet been clarified adequately (Costarelli & Colloca, 2004; F. G. Kaiser, Wölfling, & Fuhler, 1999).

Understanding the cognitive organization of EA is also important for bringing greater clarity to the literature in the field (Heberlein, 1981). McCrae and John (1992), when discussing the questionnaire tradition of the five-factor model of personality, noted that “until recently, only a small minority of questionnaire researchers were concerned with the issue of consensus—most preferred to generate new scales rather than organize those already available” (p. 186). The same seems to be happening with research on EA, where only a few studies have tried to systematize research findings by building on previous studies, or to clarify previous findings through factor analyses of established measures. As discussed previously, although some important theoretical formulations have been proposed, there is no consensus about either the horizontal or the vertical structure of EA. The present research will address this gap in the literature.

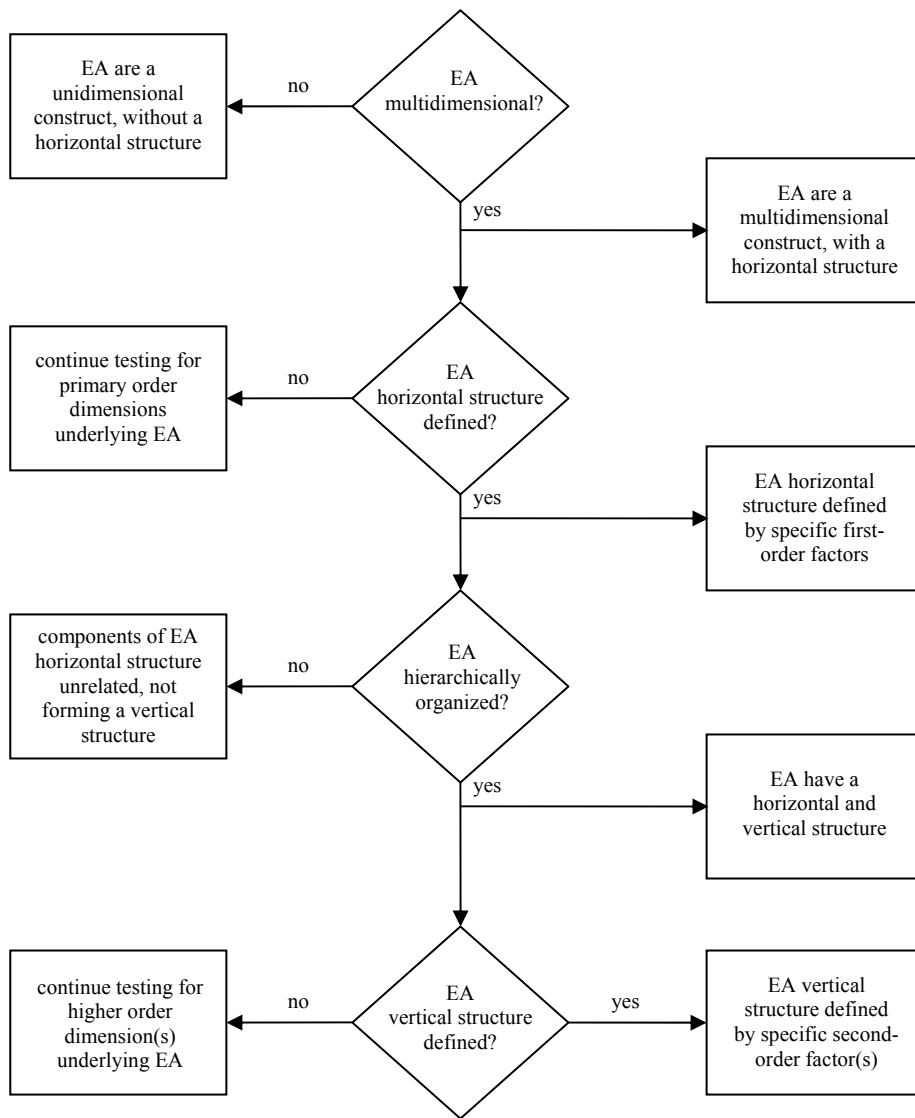


Figure 5

*Steps for Assessing the Dimensionality of Environmental Attitudes*

Of particular interest in investigating the structure of EA are the following questions. Are EA a multidimensional construct comprising several first-order factors that reflect the horizontal cognitive structure of EA? Are EA organized in a hierarchical fashion, reflecting their vertical cognitive structure (i.e., higher order, second-order structure)? Specifically, is there a general dimension of EA, a dimension that corresponds to a higher order factor reflecting a diverse set of EA primary factors, or are there instead two higher order factors that may be labelled Preservation and Utilization, as proposed by Wiseman and Bogner (2003)? Given that the understanding of the structure of EA is a prerequisite to accomplishing the other two objectives, the main research question of the thesis is thus to assess the cognitive structure of EA.

The second objective is to investigate the nomological network of EA. This investigation is visually depicted in Figure 6. Investigating how EA are related to a broad range of variables is important to understand the social-structural and social-psychological bases of EA (cf. Dietz, Stern, & Guagnano, 1998; Fransson & Gärling, 1999; cf. Van Liere & Dunlap, 1980). This investigation is also important to determine variations in EA across differing groups of society (cf. Dunlap & Jones, 2002). Furthermore, this can indicate whether there is a universality of concern for environmental issues, with people from diverse sectors of society all holding pro-EA, or whether these attitudes are held only by specific groups indicating a sectarian phenomenon (Tognacci, Weigel, Wideen, & Vernon, 1972). In investigating the nomological network of EA the following questions are of particular interest. How are socio-demographic (e.g., age, education), psychological (e.g., authoritarianism, values), and environmentally related variables (e.g., ecological behaviour, economic liberalism) associated with the higher order factor(s) of EA? Is there an indication of a sectarian phenomenon in which only specific groups of society hold pro-EA?

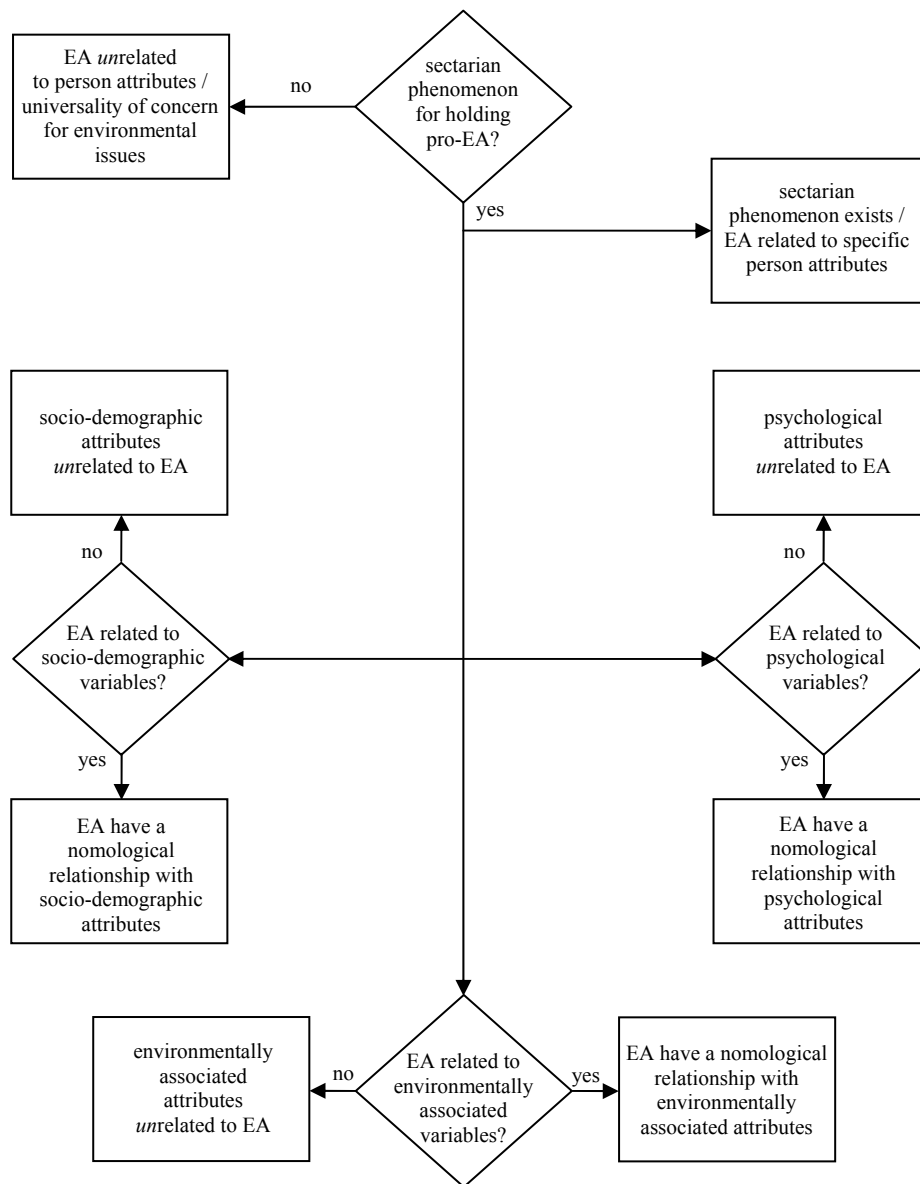


Figure 6

*Steps for Assessing the Nomological Network of Environmental Attitudes*

The third objective of this research is to examine the value–attitude–behaviour cognitive hierarchy model proposed by Homer and Kahle (1988) and tested by others (e.g., Tarrant, Bright, & Cordell, 1997; e.g., Vaske & Donnelly, 1999; Vaske, Donnelly, Williams, & Jonker, 2001). This model is important because it considers the two main variables related to EA: values and ecological behaviour (cf. F. G. Kaiser, Wölfing, & Fuhrer, 1999; Schultz & Zelezny, 1999). This model is also expanded in this research by including perceived environmental threat, which measures real

situations regarding environmental problems. The investigation of this third objective is visually depicted in Figure 7.

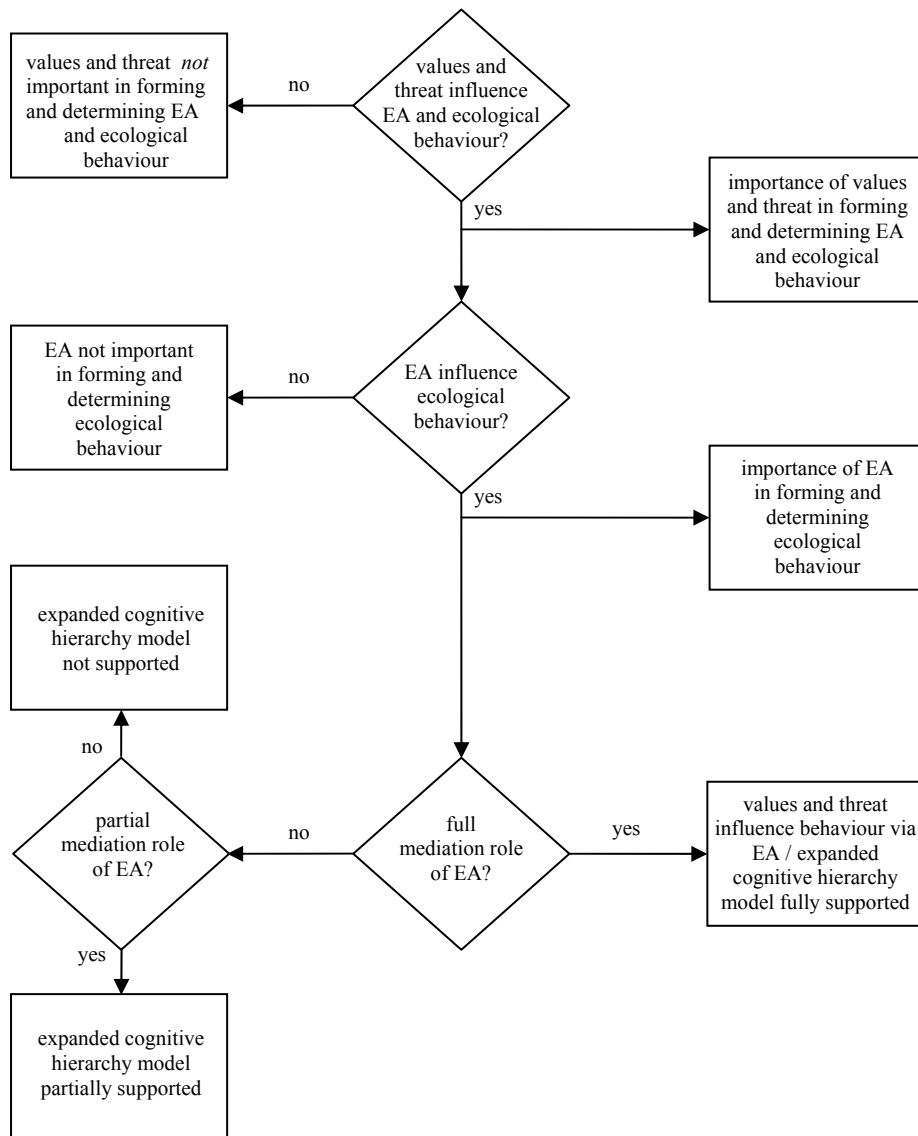


Figure 7

*Steps for Assessing the Value/Threat–Attitude–Behaviour Cognitive Hierarchical Model*

Of particular interest in examining this cognitive hierarchy model are the following questions. Can any support be found for Homer and Kahle’s (1988) proposition that attitudes mediate the influence of values on behaviour, or more specifically, do EA mediate the influence of values on ecological behaviour? Second, can any support be found for the expanded model

proposed here that EA also mediate the influence of perceived environmental threat on ecological behaviour?

## ***CONCLUSIONS***

This chapter reviewed the literature on EA research related to the three main areas addressed by the current research. The dimensionality of EA is still an issue in the literature. It seems clear that EA have both a horizontal and vertical structure, but the number of dimensions for each of these structures is unclear. On the other hand, several studies have shown that EA are linked to specific socio-demographic, psychological and environmentally related variables. This seems to indicate that concern for environmental issues is still a sectarian phenomenon, and that only certain individuals tend to hold pro-EA. Of fundamental importance in EA research is the investigation of their determinants and consequents. Studies have indicated that values seem to predict EA, and EA seem to predict ecological behaviour. This expresses a hierarchy of cognitive constructs. It is argued that real social situations might also influence this causal sequence of value–attitude–behaviour. In particular, perceptions of threat from environmental problems might contribute to the prediction of pro-EA. In the present research these research areas and their specific research questions are addressed in a series of empirical studies, which are reported in the next three chapters.

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## *Chapter Four*

# ***Study 1. Testing the dimensionality of environmental attitudes<sup>3</sup>***

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### ***INTRODUCTION AND OUTLINE OF STUDY 1***

Central to the present research is the issue of the dimensionality of EA. This chapter describes the first empirical study addressing this issue. This chapter also provides an overview of the methodological approach taken in this research. Study 1 had two objectives: (1) to investigate the multidimensionality and higher order structure of EA, and (2) test the validity of the EA higher order factor(s). Based on the theory and research discussed in the literature review, the following predictions about the structure and validity of the EA higher order or second-order factor(s) were formulated.

1. It was expected that EA would be a multidimensional construct, and organized in a hierarchical fashion, with several primary or first-order factors and either one or two second-order factor(s).
2. It was expected that if a vertical structure did emerge, a two-dimensional higher order structure would fit the data better than a structure with a single higher order factor.
3. It was expected that the factors of a two-dimensional higher order structure would correspond to Preservation and Utilization dimensions of EA.
4. It was expected that Preservation would predict self-reported ecological behaviour, whereas Utilization would predict economic attitudes.

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<sup>3</sup> Parts of this study were published in Milfont and Duckitt (2004b).

## ***METHOD***

### ***PARTICIPANTS***

An anonymous questionnaire was administered in 2003 to 455 introductory psychology students from the University of Auckland, New Zealand (319 females; 136 males), with ages ranging from 17 to 48 years ( $M = 20$ ,  $SD = 4.31$ ). Ethics approval for this study, as well as for all other studies reported in this research, was granted by the University of Auckland Human Subjects Ethics Committee (see Appendix A).

### ***INSTRUMENTS***

Participants completed a questionnaire with questions assessing demographic information (e.g., age, gender, ethnic affiliation), self-reports of behaviour, and items measuring EA. The two measures included to assess discriminant validity were the *Proenvironmental Behaviour Scale* and the *Economic Liberalism Scale*. The Proenvironmental Behaviour Scale consisted of 8 items previously used by Schultz and colleagues (Schultz & Zelezny, 1998; Schultz, Zelezny, & Dalrymple, 2000). Participants were asked to indicate how often they had engaged in each of the eight specific behaviours in the last year on a 5-point scale from 1 (*never*) to 5 (*very often*). The behaviours were (1) looked for ways to reuse things, (2) recycled newspaper, (3) recycled cans or bottles, (4) encouraged friends or family to recycle, (5) purchased products in reusable or recyclable containers, (6) picked up litter that was not their own, (7) composted food scraps, and (8) conserved gasoline by walking or bicycling. These are, therefore, private-sphere behaviours (Stern, 2000b). Schultz (2001) reported an alpha coefficient of .83 for the full scale (12 items). In this study, the alpha coefficient for the 8-item scale was .77, and the average score was 3.40 ( $SD = .73$ ). Ecological behaviour was the term employed to refer to this behavioural measure.

The Economic Liberalism Scale was a 3-item scale that had been developed to assess the economic dimension of the Dominant Social Paradigm (DSP) (Kilbourne, Beckmann, & Thelen, 2002). The items were “Individual behaviour should be determined by economic self-interest, not politics”, “The best measure of progress is economic”, and “If the economy continues to grow,



everyone benefits". Responses were on a 7-point Likert rating scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Kilbourne et al. (2002) reported an alpha coefficient of .61 for their polled sample ( $N = 742$ ), and an average score of 3.60 across seven countries. In this study, the alpha coefficient was .66, and the average score was 3.36 ( $SD = .90$ ).

The items used to measure EA were taken from a number of well-established measures of EA along with specially written items to balance direction-of-wording effects, with a total of 99 items. Responses were on a 7-point Likert rating scale (1 = *strongly disagree*; 7 = *strongly agree*). The measures used are listed below.

*New Ecological Paradigm (NEP) Scale* (Dunlap & Van Liere, 1978). As mentioned in Chapter Two, the NEP scale was developed to measure the overall relationship between humans and the environment, and has been the most widely used measure to investigate environmental concern (Dunlap & Jones, 2003; Stern, Dietz, & Guagnano, 1995). The revised NEP scale (Dunlap, Van Liere, Mertig, & Jones, 2000) contains 15 balanced items that were designed to tap each of the five hypothesized facets of an ecological worldview: (1) the reality of limits to growth, (2) antianthropocentrism, (3) the fragility of nature's balance, (4) rejection of exemptionalism, and (5) the possibility of an ecocrisis.

*Ecocentric and Anthropocentric Environmental Attitude Scales*. Thompson and Barton (1994) developed these scales to measure two motives/values that underlie support for environmental issues: Ecocentric (12 items) and Anthropocentric (12 items). While ecocentric motives imply the protection of nature because of its intrinsic values, anthropocentric motives imply that the environment should be protected for human wellbeing. All 24 items are pro-trait items.

*Ecological World View Scale*. This 24-item scale was developed by Blaikie (1992) from an analysis of items from existing scales. It contains seven unbalanced subscales that aim to measure levels of environment/ecological commitment. These subscales are (1) use/abuse of the natural environment, (2) precariousness of the natural environment, (3) conservation of the natural environment, (4) sacrifices for the environment, (5) confidence in science and technology, (6) problems of economic growth, and (7) conservation of natural resources. Three of the items

duplicated NEP items and were therefore discarded, and one item (“The remaining forests in the world should be conserved at all costs”) was unfortunately omitted during printing so that just 20 items of this scale were used.

*Environmental Perspective Scale (EPS).* This 20-item scale was developed by Bogner and his associates (Bogner & Wilhelm, 1996; Bogner & Wiseman, 1997, 1999) from factor analyses of a broader item pool. It contains five unbalanced EA subscales, with four items each. These subscales are (1) intent of support, (2) care with resources, (3) enjoyment of nature, (4) human dominance, and (5) altering nature. The first three subscales have only pro-trait items, while the last two have only con-trait items.

*Environmental Perspective Reversed Items Scale (EPS-R).* In order to reduce direction-of-wording effects, 20 further items were written to produce reversals of the 20 EPS items, thus producing new con-trait items for the three pro-trait only EPS subscales (intent of support, care with resources and enjoyment of nature), and new pro-trait items for the two con-trait only EPS subscales (human dominance and altering nature).<sup>4</sup>

## **DATA ANALYSES**

*Statistical Packages.* All data analyses were performed using SPSS or LISREL 8.71 (Jöreskog, Sörbom, Du Toit, & Du Toit, 2000), except as noted.

*Distributional Normality.* The distributional normality of the variables was investigated by examining indices of skewness and kurtosis. West, Finch, and Curran (1995) argued that only skewness values greater than 2.00 and kurtosis greater than 7.00 indicate distributions departing substantially from normality. These values were used as guidelines in the present research.

*Reliabilities.* Following Briggs and Cheek’s (1986) recommendations, both internal consistency and homogeneity were assessed. Internal consistency was assessed through Cronbach’s alpha coefficients, and homogeneity through mean inter-item correlations. According to Nunnally’s

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<sup>4</sup> Only reversed items for the EPS were included because this was the scale used by the study examining the vertical structure of EA (Wiseman & Bogner, 2003), and because it would not be possible to include reversed items for all unbalanced scales in the questionnaire.

(1978) rule of thumb, instruments used in basic research should have Cronbach's alpha coefficients of .70 or higher. However, lower values have also been viewed as adequate. Clark and Watson (1995) noted that "it is not uncommon for contemporary researchers to characterize reliabilities in the .60s and .70s as good or adequate" (p. 315). Indeed, it has been even argued that for samples larger than 100, Cronbach's alpha coefficients greater than .40 are acceptable for research purposes (Mueller, 1986). Regarding homogeneity, mean inter-item correlations ranging from .20 to .40 have been viewed as the optimal level (Briggs & Cheek, 1986). Nevertheless, for broad constructs values in the .15 to .20 range are desirable (Clark & Watson, 1995).

*Exploratory Factor Analysis.* Exploratory Factor Analysis (EFA) is a measurement model that looks for the underlying constructs that can best account for the observed relationships between the items of a given measure. EFAs were performed with Principal Axis Factoring (PAF) and subsequent oblique rotation (promax rotation with Kaiser normalization), following recent recommendations (Fabrigar, MacCallum, Wegener, & Strahan, 1999; Russell, 2002). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used to verify whether the data were likely to factor well. Values of KMO should be higher than .60 (Barbaranelli, 2003).

*Confirmatory Factor Analysis.* Confirmatory Factor Analysis (CFA) also treats the items of a given instrument as indicators of underlying constructs, but differs from EFA by testing a predicted measurement structure. Single-group and multi-group Confirmatory Factor Analysis (CFA) were performed using LISREL and maximum-likelihood (ML) estimation procedures, taking the observed covariance matrix as the input. ML estimates were used because they are robust, and provide good estimates even for non-normally distributed data (Chou & Bentler, 1995), and the covariance matrix is recommended for the analysis of structural equation modeling (SEM) models (Cudeck, 1989).

The issues of nomenclature, statistical identification, model evaluation, and missing values in CFAs were addressed as follows.

*Nomenclature.* SEM models dealing only with latent variables (i.e., factors) and their indicators (i.e., measured variables) are termed *measurement models*. SEM models dealing with the

relationship among latent variables are termed *structural models*. SEM models that include both measurement and structural models are termed *full latent variable models* (Byrne, 1998; Marsh & Hocevar, 1985). For instance, primary order or first-order CFA models are measurement models, higher order or second-order CFA models are structural models, and regression models looking at the causal relations among latent variables are full latent variable models.

*Statistical Identification.* In CFA, reference indicators are necessary to both identify the model and to set a metric for the latent variable(s) (Byrne, 1998; MacCallum, 1995). Statistical identification was addressed in all models tested in this research. For the measurement models (i.e., the first-order-factor models), identification was achieved by constraining one factor loading per each latent variable to 1.0. For the structural models (i.e., the second-order-factor models), identification was achieved by constraining to 1.0 both one factor loading per each latent variable and the variance of the second-order-factor(s). For the structural models testing measurement invariance, identification was achieved by constraining one factor loading to 1.0 for both the first-order and second-order factor(s).

*Model Evaluation.* LISREL provides several indices to assess how well an a priori hypothesized model fits the sample data. The likelihood ratio test (also called chi-square or  $\chi^2$  test) is an objective model fit index, and has been the traditionally used as a goodness-of-fit statistic in SEM. However, its sensitivity to sample size and its underlying assumption that the model fits the sample data perfectly has long been recognized as problematic (e.g., Bentler & Bonett, 1980; e.g., Browne & Cudeck, 1993). It has thus been recommended that this statistic should be used as a measure of fit rather than a test statistic (Jöreskog, 1993).

Several fit indices, or subjective model fit indices, have been developed to overcome limitations of the likelihood ratio test (for reviews, see Bentler & Bonett, 1980; Hu & Bentler, 1995; Kaplan, 2000; Mulaik et al., 1989). These fit indices may be categorized as either absolute or incremental fit indices. While the former measures how well an a priori model reproduces the sample data, the latter assesses improvement in fit by comparing a target model with a more constrained nested model (Hu & Bentler, 1999). Detailed consideration of these indices is beyond

the scope of this research but is covered at length elsewhere (Bollen, 1989; Hu & Bentler, 1995; Mulaik et al., 1989). Numerous fit indices consider different aspects of fit, and it has been recommended that researchers should report multiple fit indices in SEM studies (Hu & Bentler, 1995; B. Thompson, 2000). Accordingly, several absolute and incremental fit indices are used in the research reported in this thesis.

The absolute indices used to evaluate overall model fit were: the normed chi-square, or the chi-square to degrees of freedom ratio ( $\chi^2/df$ ) (Wheaton, Muthén, Alwin, & Summers, 1977), the root mean square error of approximation (RMSEA) (Steiger & Lind, 1980), a standardized version of Jöreskog and Sörbom's (1981) root mean square residual (SRMR), the comparative fit index (CFI) (Bentler, 1990), and the non-normed fit index (NNFI) (Bentler & Bonett, 1980). A  $\chi^2/df$  ratio of 3:1 or less indicates good fit (Carmines & McIver, 1981). RMSEA and SRMR values close to .06 and .08 respectively indicate acceptable fit (Hu & Bentler, 1999), and RMSEA values in the range of .08 to .10 and above .10 indicate mediocre and poor fit, respectively (Browne & Cudeck, 1993; MacCallum, Browne, & Sugawara, 1996). CFI and NNFI values close to .95 indicate acceptable fit (Hu & Bentler, 1999).

Furthermore, the difference in chi-square between two nested models (i.e.,  $\chi^2$  difference test), the expected cross-validation index (ECVI) (Browne & Cudeck, 1989), a consistent version of Akaike's (1987) information criterion (CAIC) (Bozdogan, 1987), and the target coefficient (T) (Marsh & Hocevar, 1985) were used as incremental fit indices to calculate improvements over competing models. Generally significant results for the  $\chi^2$  difference test reflect that the model with smaller  $\chi^2$  has a better fit. This test, however, has the same limitations as the likelihood ratio test so that with large samples very trivial differences give a significant test result. Therefore, the  $\chi^2$  difference test was used only as indicative of significant improvements. Lower ECVI and CAIC values, and higher T values reflect the model with the better fit (Garson, 2003; Marsh & Hocevar, 1985). In addition, 90% confidence intervals (90%CI) were also reported for both RMSEA and ECVI, following MacCallum et al.'s (1996) guidelines.

*Missing Values.* SEM procedures require complete data sets. Therefore, multiple imputation using the expectation maximization (EM) algorithm (Jöreskog & Sörbom, 1996) was used to replace isolated missing values. The percentage of missing values was less than 1% for all the data sets reported in this research.

## ***RESULTS AND DISCUSSION***

Given that the goal of this study was to test the horizontal and vertical structure of EA, EFAs and CFAs were used to investigate the factor structure of all the items from the six scales used. EFAs were performed first in order to determine the constructs underlying the set of EA items. Once a measurement structure was defined through EFAs, this structure was then statistically tested by performing CFAs. First-order factors were extracted from the items using EFA, followed by a second EFA of these factors to extract second-order factor(s) (Thurstone, 1947, p. 411). This would reveal the set of primary first order factors that best represented the variance in the 99 EA items, and how many higher order factors best represented the variance in these primary factors.

Exploratory PAF analyses were performed followed by oblique rotation (promax rotation with Kaiser normalization). As recommended (Fabrigar, MacCallum, Wegener, & Strahan, 1999; Reise, Waller, & Comrey, 2000; Russell, 2002; Zwick & Velicer, 1986), a number of procedures were used to determine the number of factors to extract. These were: The Kaiser's (1970) rule (or the eigenvalues-greater-than-one rule), Cattell's (1966) scree test from the Principal Component Analysis (PCA) and PAF eigenvalues, and parallel analysis based on PCA eigenvalues (Beauducel, 2001; Watkins, 2000). Two criteria were used to determine the factor structure: (a) items with a factor loading equal to, or greater than, .30 were defined as psychometrically meaningful and were thus retained, and (b) items with double loadings were excluded.

Twenty-four eigenvalues greater than one emerged. The eigenvalues-greater-than-one rule suggested a large number of factors, but the eigenvalue pattern suggested only six large factors. Scree plots from the PCA and PAF eigenvalues were ambiguous, indicating a substantial drop after the sixth eigenvalue and another smaller, but still substantial, drop after the tenth. The first ten

eigenvalues were 18.70, 5.50, 3.84, 3.62, 2.80, 2.40, 2.00, 1.90, 1.82, and 1.71. From the parallel analysis performed on the PCA eigenvalues, only the first ten eigenvalues (2.10, 2.02, 2.00, 1.91, 1.90, 1.83, 1.80, 1.80, 1.73 and 1.70) were higher than those that would be obtained from 100 replications of random data with the same number of items and the same sample size (Watkins, 2000). This suggested that ten factors should be extracted. This factor structure explained 38.6% of the total variance. Table 6 presents the labels and number of items for each of the ten primary factors.

Table 6

*Labels and Number of Items of the Ten Primary Factors Extracted*

Factor	Label	Number of items
I	<i>Enjoyment of Nature</i>	12
II	<i>External Control/Effective Commitment</i>	16
III	<i>Intent of Support</i>	8
IV	<i>Anthropocentric Concern</i>	6
V	<i>Rejection of Exemptionalism/Confidence in Science and Technology</i>	7
VI	<i>Ecocrisis/Limits to Growth/Nature's Balance</i>	7
VII	<i>Human Dominance/Altering Nature</i>	6
VIII	<i>Care with Resources</i>	6
IX	<i>Antianthropocentrism</i>	5
X	<i>Necessity of Development</i>	4

After rotation these factors accounted for 18.3%, 4.9%, 3.3%, 3.1%, 2.2%, 1.8%, 1.4%, 1.3%, 1.3%, and 1.1% of the total variance, respectively. (See Table B1 in Appendix B for the reliability, means, standard deviations, factor loadings, and communalities for the 77 items loading significantly on these ten factors.) A number of the factors had clear content similarities to factors reported in previous studies. These were:

- Factor I (Enjoyment of Nature) was a combination of Bogner and Wiseman's (1999) enjoyment of nature subscale with Thompson and Barton's (1994) ecocentric scale.

- Factor II (External Control/Effective Commitment) was similar to Blaikie's (1992) sacrifices for the environment subscale.
- Factor III (Intent of Support) combined Bogner and Wiseman's (1999) intent of support subscale, Iwata's (2001) approach to information on environmental problems factor, and Lounsbury and Tornatzky's (1977) environmental action dimension.
- Factor IV (Anthropocentric Concern) matched the anthropocentric concern factor proposed by Thompson and Barton (1994).
- Factor V (Rejection of Exemptionalism/Confidence in Science and Technology) had items from Blaikie's (1992) confidence in science and technology subscale and Dunlap et al.'s (2000) rejection of exemptionalism facet, and was also similar to Grob's (1995) perceived control third subcomponent.
- Factor VII (Human Dominance/Altering Nature) was a combination of Bogner and Wiseman's (1999) human dominance and altering nature subscales.
- Factor VIII (Care with Resources) matched Bogner and Wiseman's (1999) care with resources subscale.
- Factor IX (Antianthropocentrism) combined Albrecht et al.'s (1982) man over nature dimension, Blaikie's (1992) use/abuse of the natural environment subscale, Dunlap et al. (2000) antianthropocentrism facet, and Iwata's (2001) rejection of driving one's own car and La Trobe and Acott's (2000) humans and economy over nature factors.

The fit of the ten-correlated-first-order-factors model, which is a group-factor model (Rindskopf & Rose, 1988), was tested using CFA. The results indicated that this model had an acceptable fit for the data ( $\chi^2 = 6252.48$ ;  $df = 2804$ ;  $\chi^2/df = 2.23$ ; RMSEA = .052, 90%CI = .050-.054; SRMR = .062; CFI = .95; NNFI = .95), supporting the treatment of the ten latent variables identified by the EFA as ten unidimensional environmental attitude first-order factors.

The planned second EFA to establish the higher order structure was done using scale scores for each of the ten primary factors. The measure of sampling adequacy indicated acceptable fit



(KMO = .88). Two eigenvalues greater than one emerged (4.16, 1.17). These observed eigenvalues were greater than the first two eigenvalues (1.24, 1.16) expected for random data by parallel analysis based on PCA eigenvalues (10 variables, 455 subjects and 100 replications; Watkins, 2000). Furthermore, the scree plot from the unreduced correlation matrix indicated a substantial drop after the second eigenvalue. These results therefore suggest that two higher order factors can be extracted from the ten primary factors. As shown in Table 7, the first factor (Intent of Support, Enjoyment of Nature and Care with Resources) seems to represent Preservation, and the second factor (Necessity of Development, Anthropocentric Concern, Antianthropocentrism, Rejection of Exemptionalism/Confidence in Science and Technology, Ecocrisis/Limits to Growth/Nature's Balance and Human Dominance/Altering Nature) seems to represent Utilization. One primary factor (External Control/Effective Commitment) loaded on both these two higher order factors.

Table 7

*Means, Standard Deviations, Factor Loadings, and Communalities of Exploratory Factor Analysis of the Environmental Attitudes Primary Factors (Study 1)*

Primary Factors	<i>M</i>	<i>SD</i>	Higher Order Factor Loadings		<i>h</i> <sup>2</sup>
Factor III - Intent of Support	4.39	1.11	<b>.94</b>	-.15	.71
Factor I - Enjoyment of Nature	4.96	1.02	<b>.73</b>	-.03	.51
Factor VIII - Care with Resources	4.93	1.00	<b>.65</b>	-.04	.39
Factor II – External Control/Effective Commitment	5.39	.70	<b>.40</b>	<b>.40</b>	.53
Factor X - Necessity of Development	3.58	.88	.02	<b>-.69</b>	.46
Factor IV- Anthropocentric Concern	3.91	1.00	.22	<b>-.62</b>	.25
Factor IX -Antianthropocentrism	5.25	1.03	.21	<b>.50</b>	.44
Factor V - Rejection of Exemptionalism/Confidence in Science and Technology	4.21	.88	.06	<b>.48</b>	.27
Factor VI - Ecocrisis/Limits to Growth/Nature's Balance	4.84	.83	.24	<b>.41</b>	.36
Factor VII - Human Dominance/Altering Nature	4.03	.85	-.29	<b>-.33</b>	.32

Note. *N* = 455. *h*<sup>2</sup> = communalities. Factor loadings based on Principal Axis Factoring and Promax Rotation with Kaiser Normalization (rotation converged in 3 iterations). Loadings above .30 are given in bold face.

To test the hierarchical structure that best represents the variance in the primary factors, four further models were tested through CFAs.

- Model 1 tested the ten-corrected-first-order-factor model.
- Model 2 had a one-second-order-factor model on which all ten primary factors loaded.
- Model 3 tested a two-uncorrelated-second-order-factors model, implying an orthogonal solution.
- Model 4 tested a two-correlated-second-order-factors model.

To keep the models to a reasonable size, composite measures from individual items were created through an item parcelling strategy. This also has the advantage of providing more reliable indicators than individual items and requiring the estimation of fewer parameters (Hull, Tedlie, & Lehn, 1995; Landis, Beal, & Tesluk, 2000; Marsh, Antil, & Cunningham, 1989; Rindskopf & Rose, 1988). Mulaik and colleagues (Mulaik & James, 1995; Mulaik & Millsap, 2000) have suggested the use of at least four manifest indicators for each latent variable. However, many researchers have recommended and used three manifest indicators for each latent variable (see, e.g., Byrne, 1998; Duckitt, 2001; MacCallum, 1995). This latter approach was followed.

Three manifest indicators, consisting of item parcels, were thus used for each primary factor. A procedure similar to that used by Brooke, Russell and Price (1988) was employed in order to develop the indicators. Each of the ten primary factors were forced into a one-factor solution using EFA, and the items with the highest and lowest loadings were successively combined until all items from a given primary factor scale had been assigned to one of its three parcels. Thus, the items with the highest and the lowest loadings were aggregated to form the first new indicator, the items with the next highest and the next lowest loadings were aggregated to the second new indicator, and so on. This strategy of balancing high- and low-loading items across parcels is known as the single factor method (Landis, Beal, & Tesluk, 2000). Pro- and con-trait items were equally represented in each parcel whenever possible, so as to have balanced indicators. Table 8 shows the results for these model tests. Model 1, the ten-correlated-first-order-factor model, had good fit to the data, again supporting treating the ten latent variables as unidimensional environmental attitude first-order

factors. The fit indices also demonstrated that Model 2, the one-second-order-factor model, had a better fit to the data and was also better fitting [ $\chi^2(1) = 15.86, p < 0.001$ ] than the two-uncorrelated-second-order-factors model (Model 3). However, the two-correlated-second-order-factors model (Model 4) was an improvement [ $\chi^2(2) = 113.21, p < 0.001$ ] over the unidimensional model, and clearly had better overall fit indices when compared to the other second-order models (Model 2 and 3).

Table 8

*Fit Indices for Alternative Models (Study 1)*

Model	$\chi^2$	<i>df</i>	$\chi^2/df$	RMSEA (90%CI)	SRMR	CFI	NNFI	ECVI (90%CI)	CAIC	T
Model 1	701.17	360	1.95	.046 (.041-.051)	.043	.98	.97	2.01 (1.85-2.18)	1448.80	NA
Model 2	922.94	395	2.34	.054 (.050-.059)	.061	.97	.97	2.34 (2.15-2.54)	1421.36	.759
Model 3	938.80	394	2.38	.055 (.051-.060)	.15	.96	.96	2.38 (2.19-2.59)	1444.34	.747
Model 4	809.73	393	2.06	.048 (.044-.053)	.052	.97	.97	2.10 (1.93-2.29)	1322.39	.866

Note.  $N = 455$ . Models: 1 = ten-correlated-first-order-factor; 2 = one-second-order-factor; 3 = two-uncorrelated-second-order-factors; 4 = two-correlated-second-order-factors.  $\chi^2/df$  = the ratio of chi-square to degrees of freedom; RMSEA = root mean square error of approximation; 90%CI = 90 percent confidence interval; SRMR = standardized root mean square residual; CFI = comparative fit index; ECVI = expected cross-validation index; CAIC = consistent Akaike information criterion; T = target coefficient. NA = not applicable.

A full latent variable model was also tested to verify the relations among the two higher order factors (i.e., Utilization and Preservation), and the two measures used to test discriminant validity (i.e., self-reported ecological behaviour and economic liberalism). The fit indices indicated good overall fit for the full model:  $\chi^2 = 1735.39$ ;  $df = 763$ ;  $\chi^2/df = 2.27$ ; RMSEA = .053, 90%CI = .050-.056; SRMR = .061; CFI = .96, NNFI = .96. Figure 8 displays the standardized coefficients for this model. To simplify, the manifest indicators and paths from manifest to latent variables were omitted (the weakest path was .39 from the third parcel of Factor X).

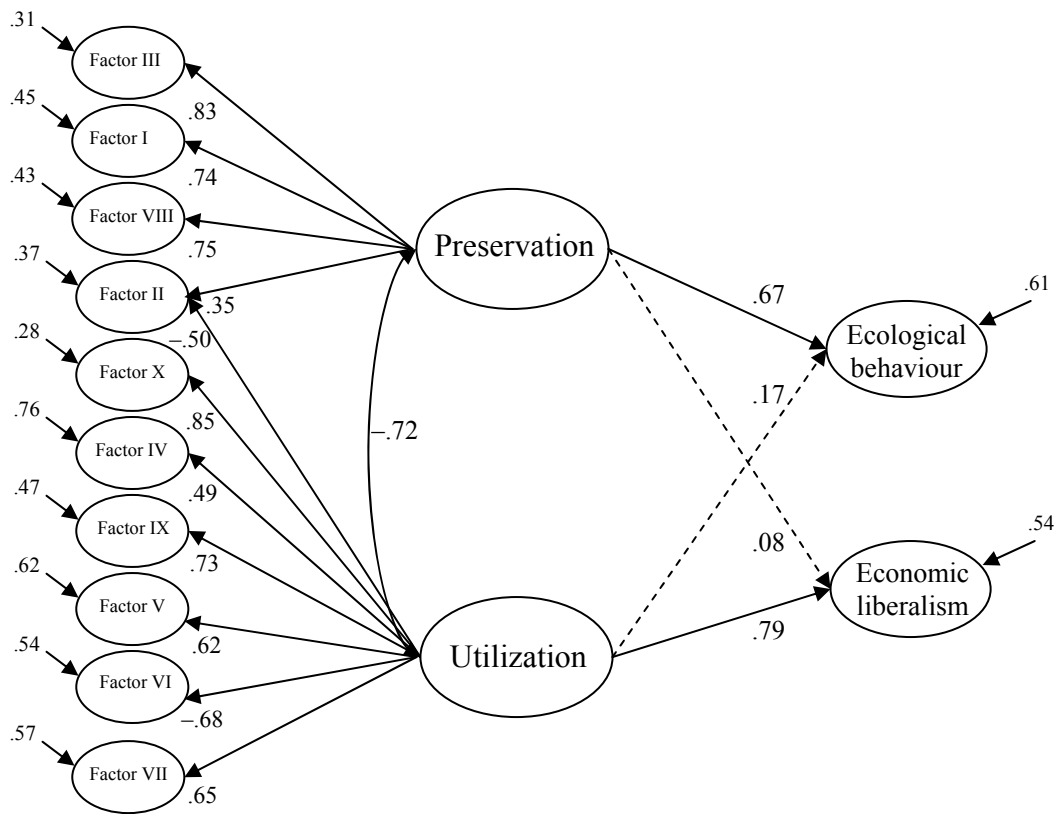


Figure 8

*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)*

Note.  $N = 455$ . To simplify, manifest variables and the paths from latent to manifest variables are not shown (the weakest path was  $.47$ ). Dotted arrows represent non-significant causal paths ( $t < 1.96, p > 0.05$ ). All other coefficients from normal arrows are significant at the 5% level ( $t > 1.96, p < 0.05$ ). Arrows without origin indicate proportions of error and unexplained variances. Factors labels: Factor III = Intent of Support, Factor I = Enjoyment of Nature, Factor VIII = Care with Resources, Factor II = External Control/Effective Commitment, Factor X = Necessity of Development, Factor IV = Anthropocentric Concern, Factor IX = Antianthropocentrism, Factor V = Rejection of Exemptionalism/Confidence in Science and Technology, Factor VI = Ecocrisis/Limits to Growth/Nature's Balance, Factor VII = Human Dominance/Altering Nature.

As can be seen from Figure 8, the path from Preservation to self-reported ecological behaviour was powerful and significant, but the path from Preservation to economic liberalism was not significant. Conversely, the path from Utilization to economic liberalism was powerful and significant, but the path from Utilization to ecological behaviour was not significant. The model accounted for 39% of the variance in ecological behaviour and 46% of the variance in economic liberalism. However, Preservation and Utilization were highly correlated ( $\Phi = -.72$ ), and this correlation was only slightly reduced (to  $-.71$ ) if Factor II, which loaded on both Preservation and Utilization, was excluded from the analysis.<sup>5</sup>

## ***SUMMARY AND CONCLUSIONS FROM STUDY 1***

Study 1 sought to investigate the dimensionality and higher order structure of EA, and to test the validity of the higher order dimensions obtained. Results from both EFAs and CFAs revealed that EA are a multidimensional construct, and are organized in a hierarchical fashion. The findings indicated that ten first-order factors loaded on one of two correlated second-order factors (i.e., Preservation and Utilization), providing empirical evidence for a two-dimensional model of EA as proposed by Wiseman and Bogner (2003) and others. However, Preservation and Utilization were strongly correlated, and not orthogonal as proposed by Wiseman and Bogner (2003). Finally, discriminant validity for these two higher order dimensions was demonstrated by showing that self-reported ecological behaviour was predicted by Preservation, and not by Utilization, while attitudes toward economic liberalism were predicted by Utilization, and not by Preservation.

Study 1 relied on a data-driven approach, and the factors obtained inevitably reflect the items included in the factor analyses. However, this study went beyond previous research in using an extensive set of EA items from well established and well used measures, and using EFA to explore factor structures inductively, followed by CFA to test the adequacy of different factor

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<sup>5</sup> As Model 2 also showed good fit for the data, a full latent variable model was also tested combining the first-order factors to form only one higher order factor (i.e., Model 2). This model had good fit indices ( $\chi^2 = 1922.43$ ;  $df = 767$ ;  $\chi^2/df = 2.51$ ; RMSEA = .058, 90%CI = .054-.061; SRMR = .070; CFI = .96, NNFI = .95), and accounted for 29% of the variance in ecological behaviour and 30% of the variance in economic liberalism. The second-order factor predicted ecological behaviour positively ( $\beta = .54, p < .001$ ) and economic liberalism negatively ( $\beta = -.54, p < .001$ ).

solutions. By drawing on a broader range of items than used previously, and by including specially written items to balance existing measures, it minimized direction-of-wording effects with the factors emerging including both pro- and con-trait items. Furthermore, although purely empirically based, the findings are consistent with a number of theories. These theories have argued that people-environment relations can be viewed in terms of two distinct beliefs that are very similar to the Preservation and Utilization dimensions found here (Corral-Verdugo & Armendáriz, 2000; Dobson, 1998; Dunlap & Jones, 2002; Dunlap & Van Liere, 1978; Kortenkamp & Moore, 2001; S. C. G. Thompson & Barton, 1994; Witten-Hannah, 2000, 2004).

These strengths of this study are qualified by some important weaknesses, however. First, the item pool of 99 items from well-established measures of EA did not include items tapping overpopulation. The world's population has doubled between 1960 and 2000 (Millennium Ecosystem Assessment, 2005), and population growth has been posed as a central issue in the environmental problems literature (Bandura, 2002; Van Liere & Dunlap, 1981). Research has shown, for example, that human population numbers have increased almost exponentially in the last 300 years, impacting considerably the environment (Goldewijk, 2005). In addition, items comprising one of the first-order factors (Factor II, External control/effective commitment) seemed unusually heterogeneous and some items loaded very weakly on the factor (see Table B1 in Appendix B). This suggests the possibility that this first-order factor should be divided into two factors. Third, the items that loaded on the ten first-order factors did not form completely balanced scales, and so were not adequately controlled for acquiescence response bias. Finally, tests of the discriminant validity of the two higher order EA dimensions were based on only two criterion variables, that is, ecological behaviour and economic liberalism. There may have been some degree of content overlap for these two criterion variables with Preservation and Utilization respectively that could have influenced the apparently strong discriminant validity of these two higher order dimensions. A second study was therefore designed to address these problems by using a more theory-driven approach to develop a new comprehensive and fully balanced EA inventory, and to assess the hierarchical structure of EA more systematically and rigorously.

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*Chapter Five*

***Study 2. Development and validation of  
the Environmental Attitudes Inventory  
(EAI)***

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***INTRODUCTION AND OUTLINE OF STUDY 2***

In Study 1, the dimensionality and nomological network of EA were initially addressed. Study 2 expands the first study by systematically investigating these two topics of the psychology of EA. Study 2 had three specific research objectives: (1) to develop a psychometrically sound, multi-dimensional inventory to assess EA, (2) to investigate the construct validity and reliability of this inventory across samples, and (3) to investigate the relationship between this measure and external variables. In order to do this, three studies were conducted during 2004. Study 2a comprised the EA inventory construction study conducted in New Zealand. Study 2b was a Web-based study conducted in Brazil to test the structure of the inventory in another sample. Finally, Study 2c was another Web-based study conducted with a worldwide sample to test the stability of the inventory over time and to develop its short-form version.

***STUDY 2A<sup>6</sup>***

The aim of Study 2a was to develop a reliable and valid measure of EA dimensions, the Environmental Attitudes Inventory (EAI). The first stage in developing the EAI was to identify critical dimensions of EA that would comprise their horizontal structure. The identification of dimensions came primarily from the 10 first-order factors found in Study 1 as well as environmental issues literature. As discussed in the last chapter, one first-order factor identified in Study 1 (i.e., Factor II, External control/effective commitment) had items that were heterogeneous in meaning and seemed to comprise two distinct item sub-sets, which might constitute different

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<sup>6</sup> Parts of this study were published in Milfont and Duckitt (2006).

factors. In order to test this, these two sub-sets were expanded into two balanced scales to see if they would emerge as distinct dimensions. These two dimensions were labelled “Support for Interventionist Conservation Policies” and “Ecocentric Concern”. In addition, the items used in Study 1 did not include items assessing overpopulation. As population growth is a central issue in environmental problems (Bandura, 2002; Millennium Ecosystem Assessment, 2005; Van Liere & Dunlap, 1981), “Support for Population Growth Policies” was tentatively identified as a possible additional dimension. In this way, twelve EA dimensions were identified and construct definitions of these dimensions written. Table 9 presents the scale names, construct definitions, and content similarities with prior EA measures. This corresponds to the content of EA dimensions. As can be seen, all twelve scales relate clearly to prior research, indicating that the EAI scales seem to adequately cover the full range of possible first-order EA factors. It also indicates that the domain of beliefs covered by the EAI scales capture well the horizontal structure of EA.



Table 9

*Content of Environmental Attitudes: The Environmental Attitudes Inventory Scales, their Construct Definition and Content Similarities with Prior Environmental Attitudes Studies*

Scale Label	Construct Definition	Content similarities with prior EA measures, factors, or dimensions
Scale 1. <i>Enjoyment of Nature</i>	Belief that enjoying time in nature is pleasant and preferred to spending time in urban areas, versus belief that enjoying time in nature is dull, boring and not enjoyable, and not preferred over spending time in urban areas.	<ul style="list-style-type: none"> <li>- McKechnie's (1977) stimulus seeking scale</li> <li>- Bunting and Cousins' (1985) pastoralism, and urbanism dimensions</li> <li>- Thompson and Barton's (1994) ecocentric scale</li> <li>- Kellert's (1996) naturalistic, aesthetic, and humanistic dimensions</li> <li>- Bogner and Wiseman's (1999) enjoyment of nature subscale</li> <li>- Mayer and Frantz's (2004) connectedness to nature scale</li> </ul>
Scale 2. <i>Support for Interventionist Conservation Policies</i>	Support for conservation policies regulating industry and the use of raw materials, and subsidising and supporting alternative eco-friendly energy sources and practices, versus opposition to such measures and policies.	<ul style="list-style-type: none"> <li>- Buttel and Flinn's (1976) support for environmental reform dimensions</li> <li>- Van Liere and Dunlap's (1981) natural resources, and environmental regulations scales</li> <li>- Pettus and Giles' (1987) rights and restrictions for environmental quality factor</li> <li>- Blaikie's (1992) sacrifices for the environment, and conservation of natural resources subscales</li> <li>- Klineberg, McKeever, and Rothenbach's (1998) economic costs or government regulations items</li> </ul>
Scale 3. <i>Environmental Movement Activism</i>	Personal readiness to actively support or get involved in organized action for environmental protection, versus disinterest in or refusal to support or get involved in organized action for environmental protection.	<ul style="list-style-type: none"> <li>- Maloney and Ward's (1973) verbal commitment subscale</li> <li>- Lounsbury and Tornatzky's (1977) environmental action dimension</li> <li>- Bogner and Wiseman's (1999) intent of support subscale</li> <li>- Iwata's (2001) approach to information on environmental problems factor</li> </ul>
Scale 4. <i>Conservation Motivated by Anthropocentric Concern</i>	Support for conservation policies and protection of the environment motivated by anthropocentric concern for human welfare and gratification, versus support for such policies motivated by concern for nature and the environment as having value in themselves.	<ul style="list-style-type: none"> <li>- Thompson and Barton's (1994) anthropocentric scale</li> <li>- Kellert's (1996) symbolic dimension</li> <li>- Johansson's (2005) human wellbeing and recreation factor</li> </ul>

Table 9 (continued)

*Content of Environmental Attitudes: The Environmental Attitudes Inventory Scales, their Construct Definition and Content Similarities with Prior Environmental Attitudes Measures*

Scale Label	Construct Definition	Content similarities with prior EA measures, factors, or dimensions
Scale 5. <i>Confidence in Science and Technology</i>	Belief that human ingenuity, especially science and technology, can and will solve all environmental current problems and avert or repair future damage or harm to the environment, versus belief that human ingenuity, especially science and technology, cannot solve all environmental problems.	<ul style="list-style-type: none"> <li>- Dunlap and Van Liere's (1984) faith in science and technology factor</li> <li>- Kuhn and Jackson's (1989) negative consequences of growth and technology, and quality of life dimensions</li> <li>- Blaikie's (1992) confidence in science and technology subscale</li> <li>- Grob's (1995) belief in technology and science subcomponent</li> <li>- Dunlap, Van Liere, Mertig and Jones' (2000) rejection of exemptionalism facet</li> </ul>
Scale 6. <i>Environmental Fragility</i>	Belief that the environment is fragile and easily damaged by human activity, and that serious damage from human activity is occurring and could soon have catastrophic consequences for both nature and humans, versus belief that nature and the environment are robust and not easily damaged in any irreparable manner, and that no damage from human activity that is serious or irreparable is occurring or is likely.	<ul style="list-style-type: none"> <li>- Kuhn and Jackson's (1989) limits to the biosphere dimension</li> <li>- Corraliza and Berenguer's (1998) alarm factor</li> <li>- Klineberg et al.'s (1998) ecological worldview items</li> <li>- Dunlap et al.'s (2000) the reality of limits to growth, the fragility of nature's balance, and the possibility of an ecocrisis facets</li> </ul>
Scale 7. <i>Altering Nature</i>	Belief that humans should and do have the right to change or alter nature and remake the environment as they wish to satisfy human goals and objectives, versus belief that nature and the natural environment should be preserved in its original and pristine state and should not be altered in any way by human activity or intervention.	<ul style="list-style-type: none"> <li>- McKechnie's (1977) environmental adaptation scale</li> <li>- Bunting and Cousins' (1985) environmental adaptation dimension</li> <li>- Kellert's (1996) dominionistic dimension</li> <li>- Bogner and Wiseman's (1999) human dominance, and altering nature subscales</li> <li>- Vaske et al.'s (2001) normative belief scale</li> </ul>
Scale 8. <i>Personal Conservation Behaviour</i>	Taking care to conserve resources and protect the environment in personal everyday behaviour, versus lack of interest in or desire to take care of resources and conserve in one's everyday behaviour.	<ul style="list-style-type: none"> <li>- Tognacci et al.'s (1972) conservation scale</li> <li>- Maloney and Ward's (1973) actual commitment subscale</li> <li>- Corraliza and Berenguer's (1998) comfort factor</li> <li>- Bogner and Wiseman's (1999) care with resources subscale</li> </ul>

Table 9 (continued)

*Content of Environmental Attitudes: The Environmental Attitudes Inventory Scales, their Construct Definition and Content Similarities with Prior Environmental Attitudes Measures*

Scale Label	Construct Definition	Content similarities with prior EA measures, factors, or dimensions
Scale 9. <i>Human Dominance Over Nature</i>	Belief that nature exists primarily for human use, versus belief that humans and nature have the same rights.	<ul style="list-style-type: none"> <li>- Albrecht, Bultena, Hoiberg and Nowa's (1982) man over nature dimension</li> <li>- Kuhn and Jackson's (1989) relationship between mankind (<i>sic</i>) and nature dimension</li> <li>- Blaikie's (1992) use/abuse of the natural environment subscale</li> <li>- Klineberg et al.'s (1998) ecological worldview scale</li> <li>- Dunlap et al.'s (2000) antianthropocentrism facet</li> <li>- La Trobe and Acott's (2000) humans and economy over nature factor</li> <li>- Iwata's (2001) rejection of driving one's own car factor</li> <li>- Johansson's (2005) respect for nature factor</li> </ul>
Scale 10. <i>Human Utilization of Nature</i>	Belief that economic growth and development should have priority rather than environmental protection, versus belief that environmental protection should have priority rather than economic growth and development.	<ul style="list-style-type: none"> <li>- Buttel and Flinn's (1976) support for economic growth scale</li> <li>- Weigel and Weigel's (1978) environmental concern scale items</li> <li>- Guagnano and Markee's (1995) economic tradeoff factor</li> <li>- Corraliza and Berenguer's (1998) locus of control factor</li> <li>- Klineberg et al.'s (1998) economic costs or government regulations items</li> </ul>
Scale 11. <i>Ecocentric Concern</i>	A nostalgic concern and sense of emotional loss over environmental damage and loss, versus absence of any concern or regret over environmental damage.	<ul style="list-style-type: none"> <li>- Maloney and Ward's (1973) affect subscale</li> <li>- Thompson and Barton's (1994) ecocentric scale</li> <li>- Kellert's (1996) moralistic dimension</li> <li>- Corraliza and Berenguer's (1998) concern factor</li> <li>- Dunlap et al.'s (2000) rejection of exemptionalism facet</li> </ul>
Scale 12. <i>Support for Population Growth Policies</i>	Support for policies regulating the population growth and concern about overpopulation, versus lack of any support for such policies and concern.	<ul style="list-style-type: none"> <li>- Tognacci et al.'s (1972) overpopulation scale</li> <li>- Braithwaite and Law's (1977) overpopulation facet</li> <li>- Van Liere and Dunlap's (1981) population scale</li> <li>- Mayton's (1986) effectiveness of personal actions on overpopulation component</li> </ul>

EAI therefore assesses broad evaluating perceptions of (e.g., enjoyment of nature) or beliefs (e.g., human dominance over nature) regarding the natural environment, including factors affecting its quality (e.g., overpopulation). It was hypothesized that this inventory would capture both the vertical and horizontal structure of EA by measuring twelve specific facets, or primary factors, that define the two-dimensional higher order structure of EA (i.e., Preservation and Utilization). Following Byrne (1995, p. 141), the EAI structural model can be expressed formally as follows.

The EAI structural model hypothesizes that:

- a) responses to EAI could be explained by twelve first-order factors, and two second-order factors (i.e., Preservation and Utilization);
- b) seven first-order factors (i.e., Scales 1, 2, 3, 6, 8, 11, and 12) would comprise the Preservation second-order factor, and five first-order factors (i.e., Scales 4, 5, 7, 9, and 10) would comprise the Utilization second-order factor;
- c) each EAI item would have nonzero loading on the first-order factor it was designed to measure and zero loadings on the other eleven first-order factors;
- d) error terms associated with each item would be uncorrelated; and
- e) covariation among the twelve first-order factors would be explained fully by their regression onto the two second-order factors.

The second stage in developing the EAI was to generate an item pool to cover all twelve expected scales adequately. An initial item pool of 200 items was derived from Study 1 plus other specially written items. Content validation of this item pool was then performed in the third stage of EAI development. A group of four social psychologists (2 lecturers and 2 graduate students) were asked to evaluate the content validity of the items. Each member of the research team was asked to rate:

- a) the clarity of each item (on a 5-point scale anchored by *not clear* and *very clear*);
- b) how well the items fitted the correspondent factor label and definition; and
- c) how well the conceptual domain of each factor was adequately represented by the set of items (both on a 5-point scale anchored by *not well* and *very well*).

Seven items were rated as problematic by the judges in the content validation stage and were excluded. The remaining set of 193 content-validated items was then used to cover the EAI twelve dimensions (see Table C1 in Appendix C for this complete set of items). Confirmatory factor analysis and correlation and regression analyses were performed to evaluate the validity and reliability of this proposed measure.

Predictions about the structure of EAI, and its discriminant and convergent validity were also formulated. These predictions are based on the theory and research presented in the literature review and findings from Study 1. Note, however, that only the pattern of relationships between the two higher order factors with the criterion variables was examined in this research. The relationships between the twelve first-order factors and criterion variables remain to be addressed in future research. The predictions were as follows:

1. It was expected that there would be two distinct, although correlated, higher order EA dimensions, which would correspond to Preservation and Utilization second-order factors. Preservation would consist of seven primary factors, being Scales 1, 2, 3, 6, 8, 11, and 12. Utilization would consist of five primary factors, being Scales 4, 5, 7, 9, and 10.
2. It was expected that Preservation, but not Utilization, would be correlated with ecological behaviour, being female and younger, inclusion with nature, attitudes toward sustainability and democracy, self-transcendence values, and biospheric and altruistic environmental concern because theory and research suggest that conservation attitudes are associated with these constructs.
3. It was expected that Utilization, but not Preservation, would be correlated with economic liberalism, religiosity, Biblical literalism, political conservatism, social dominance orientation, authoritarian attitudes, self-enhancement values, and egoistic environmental concern because theory and research suggest that utilitarian attitudes are associated to all these constructs.

## ***METHOD***

### ***PARTICIPANTS***

An anonymous questionnaire was administered in 2004 to students enrolled in introductory psychology classes at the University of Auckland, New Zealand. More than 95% of the students in the classes voluntarily agreed to participate. A total of 314 (215 female and 99 male) students completed the questionnaire. Their ages ranged from 16 to 51 ( $M = 20.00$ ,  $SD = 4.48$ ).

### ***INSTRUMENTS***

In order to be able to include more criterion variable measures, two questionnaire versions were created, with the EAI included in both versions, but with different criterion measures in each. Version A was administered to 150 students, and Version B was administered to 164 students. The responses to all measures were given on a 7-point Likert rating scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), except as noted. The following measures, along with questions assessing demographic information (e.g., age, gender, ethnic affiliation), were included in both versions of the questionnaire.

*Ecological Behaviour.* This was the same 8-item scale used in Study 1. Participants were asked to indicate how often they had engaged in each of eight specific behaviours in the last year on a 5-point scale from 1 (*never*) to 5 (*very often*).

*Economic Liberalism Scale.* This was the same 3-item scale used in Study 1 to assess people's attitudes toward economic liberalism.

*Environmental Attitudes Inventory (EAI).* This consisted of the 193 balanced items described above to assess the twelve EA primary dimensions that had been identified.

*Shortened Social Desirability Scale.* To investigate the relationship between the EAI scales and social desirability, a set of 10 balanced items measuring impression management were selected from Paulhus' (1991) Balanced Inventory of Desirable Responding (BIDR) scale (e.g., "I never swear" and "I sometimes tell lies if I have to"). Participants rated each item on a 7-point scale anchored by *not true* and *very true*.

*Single Self-Report Items.* Single self-report items were used to measure religiosity (on a 8-point scale anchored by *not religious at all* and *very religious*), Biblical literalism (Schultz, Zelezny, & Dalrymple, 2000), political conservatism (on a 7-point scale anchored by *extremely liberal* and *extremely conservative*), self-perceived family economic status (on a 9-point scale anchored by *lower income* and *upper income*), and connectedness with nature (Schultz, 2001).

Version A of the questionnaire also included the following measures:

*Attitude towards Democracy Scale.* A set of 6 balanced items were selected from Watts and Feldman's (2001) democratic orientations scale to measure preference for democracy (e.g., "No matter what people believe, they are entitled to the same democratic rights and legal protection as anyone else", and "Society should have the right to protect itself against certain groups by repressing them and denying them normal, democratic freedoms", reverse scored).

*Shortened Social Dominance Orientation (SDO) Scale.* This scale assesses "the extent to which one desires that one's in-group dominate and be superior to out-groups" (Pratto, Sidanius, Stallworth, & Malle, 1994, p. 742). Six items were randomly sampled from the original SDO scale so as to have equal number of pro- (e.g., "It's OK if some groups have more of a chance in life than others") and con-trait (e.g., "All groups should be given an equal chance in life") items.

*Shortened Right-wing Authoritarianism (RWA) Scale.* Altemeyer (1981) defined authoritarianism as the covariation of conventionalism, authoritarian submission and authoritarian aggression. Six items were randomly sampled from the original RWA scale (Altemeyer, 1981) so as to have an equal number of pro- (e.g., "Obedience and respect for authority are the most important virtues children should learn") and con-trait (e.g., "We should treat protestors and radicals with open arms and open minds, since new ideas are the lifeblood of progressive change") items.

Version B of the questionnaire included the following measures:

*Environmental Motives Scale (EMS).* As described before, this 12-item scale measures three areas of concern about environmental problems caused by human behaviours (Schultz, 2000, 2001). These categories are *egoistic* (me, my lifestyle, my health, and my future), *altruistic* (people in my country, all people, children, and future generations), and *biospheric* (plants, marine life, birds, and

animals). Participants indicated their environmental concern on a 7-point scale from 1 (*not important*) to 7 (*supreme importance*). To control for individual differences in response style, centered environmental concern scores were created by subtracting the mean score (i.e., the average of all 12 items) from each of the three environmental concern clusters (Schultz, 2001).

*Value Priorities.* A brief inventory containing four 3-item scales (Stern, Guagnano, & Dietz, 1998) was used to measure Schwartz's (1994a) four major value clusters of self-transcendence, self-enhancement, openness to change, and conservatism. "Conservatism" was used following the recommendations by Stern et al. (1995), see also Schultz and Zelezny (1999) and Schultz et al. (2005), because of the double meaning of Schwartz's (1994a) term "conservation" in the context of environmental research. Because the self-transcendence cluster is weighted toward environmental content, Stern et al. (1998) created the *biospheric* and *altruistic* clusters. The former includes the self-transcendence's environmental items, and the latter includes self-transcendence's non-environmental items. Thus, a total of six value clusters were examined in this study: self-transcendence (protecting the environment, a world at peace, and social justice), self-enhancement (authority, influential, and wealth), openness to change (a varied life, an exciting life, and curious), conservatism (honouring parents and elders, family security, and self-discipline), biospheric (protecting the environment, unity with nature, and respecting the earth), and altruistic (a world at peace, social justice, and equality). The participants rated each value on Schwartz's (1994) 9-point importance scale "as a guiding principle in my life", from -1 (*opposed to my values*) to 0 (*not important*) to 7 (*of supreme importance*). To control for individual differences in response style, centered value scores were calculated by subtracting the mean value score (i.e., the average of all 15 value items) from each of the six value clusters (Schwartz, 2005).



## ***RESULTS AND DISCUSSION***

### ***DESCRIPTIVE STATISTICS AND RELIABILITIES***

Preliminary analyses were then performed to select the best 120 EAI items from the 193 items included in the questionnaire. The items were selected on the basis of specific psychometric criteria: corrected item–total correlation higher than .30, inter-item correlations within scales higher than the correlations between scales, unifactorial structure in an EFA, and internal consistency. Five pro- and five con-trait items were chosen for each scale. In this way, each one of the twelve EAI scales comprised a set of 10 balanced items to control for acquiescence (Krosnick, 1999). The subsequent analyses were then performed using this select set of 120 items (see Table 10).

Table 10

*The Environmental Attitudes Inventory (EAI), Its Items Reliabilities based on Study 2a, and the Selected Items for its Short-Form Version*

<b>Scale</b>	<b>Corrected Item-Total Correlation</b>
<b>1. Enjoyment of Nature</b>	
I am NOT the kind of person who loves spending time in wild, untamed wilderness areas.(R)	.48
I really like going on trips into the countryside, for example to forests or fields.*	.62
I find it very boring being out in wilderness areas.(R)*	.66
Sometimes when I am unhappy, I find comfort in nature.	.55
Being out in nature is a great stress reducer for me.*	.67
I would rather spend my weekend in the city than in wilderness areas.(R)	.49
I enjoy spending time in natural settings just for the sake of being out in nature.	.59
I have a sense of well-being in the silence of nature.*	.63
I find it more interesting in a shopping mall than out in the forest looking at trees and birds.(R)*	.54
I think spending time in nature is boring.(R)*	.68
<b>2. Support for Interventionist Conservation Policies</b>	
Industry should be required to use recycled materials even when this costs more than making the same products from new raw materials.	.50
Governments should control the rate at which raw materials are used to ensure that they last as long as possible.*	.64
Controls should be placed on industry to protect the environment from pollution, even if it means things will cost more.*	.66
People in developed societies are going to have to adopt a more conserving life-style in the future.*	.63
The government should give generous financial support to research related to the development of alternative energy sources, such as solar energy.	.54
I don't think people in developed societies are going to have to adopt a more conserving life-style in the future.(R)*	.63
Industries should be able to use raw materials rather than recycled ones if this leads to lower prices and costs, even if it means the raw materials will eventually be used up.(R)*	.58
It is wrong for governments to try and compel business and industry to put conservation before producing goods in the most efficient and cost effective manner.(R)	.51
I am completely opposed to measures that would force industry to use recycled materials if this would make products more expensive.(R)	.58
I am opposed to governments controlling and regulating the way raw materials are used in order to try and make them last longer.(R)*	.59
<b>3. Intent of Support / Environmental Movement Activism</b>	
If I ever get extra income I will donate some money to an environmental organisation.	.65
I would like to join and actively participate in an environmentalist group.*	.67
I don't think I would help to raise funds for environmental protection.(R)*	.63
I would NOT get involved in an environmentalist organization.(R)*	.72
Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort.*	.68
I would not want to donate money to support an environmentalist cause.(R)*	.66
I would NOT go out of my way to help recycling campaigns.(R)	.61
I often try to persuade others that the environment is important.	.57
I would like to support an environmental organization.*	.70
I would never try to persuade others that environmental protection is important.(R)	.50

Table 10 (continued)

<b>4. Conservation Motivated by Anthropocentrism Concern</b>	
One of the best things about recycling is that it saves money.	.39
The worst thing about the loss of the rain forest is that it will restrict the development of new medicines.	.37
One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy water sports.*	.47
Nature is important because of what it can contribute to the pleasure and welfare of humans.*	.48
The thing that concerns me most about deforestation is that there will not be enough lumber for future generations.*	.40
We should protect the environment for the well being of plants and animals rather than for the welfare of humans.(R)	.32
Human happiness and human reproduction are less important than a healthy planet.(R)	.32
Conservation is important even if it lowers peoples' standard of living.(R)*	.47
We need to keep rivers and lakes clean in order to protect the environment, and NOT as places for people to enjoy water sports.(R)*	.41
We should protect the environment even if it means peoples' welfare will suffer.(R)*	.39
<b>5. Confidence in Science and Technology</b>	
Most environmental problems can be solved by applying more and better technology.	.50
Science and technology will eventually solve our problems with pollution, overpopulation, and diminishing resources.*	.58
Science and technology do as much environmental harm as good.(R)	.31
Modern science will NOT be able to solve our environmental problems.(R)*	.57
We cannot keep counting on science and technology to solve our environmental problems.(R)*	.57
Humans will eventually learn how to solve all environmental problems.*	.51
The belief that advances in science and technology can solve our environmental problems is completely wrong and misguided.(R)*	.57
Humans will eventually learn enough about how nature works to be able to control it.	.46
Science and technology cannot solve the grave threats to our environment.(R)	.54
Modern science will solve our environmental problems.*	.70
<b>6. Environmental Fragility</b>	
If things continue on their present course, we will soon experience a major ecological catastrophe.*	.57
The earth is like a spaceship with very limited room and resources.	.50
The balance of nature is very delicate and easily upset.	.54
When humans interfere with nature it often produces disastrous consequences.*	.54
Humans are severely abusing the environment.*	.58
The idea that we will experience a major ecological catastrophe if things continue on their present course is misguided nonsense.(R)	.62
I cannot see any real environmental problems being created by rapid economic growth. It only creates benefits.(R)	.58
The idea that the balance of nature is terribly delicate and easily upset is much too pessimistic.(R)*	.67
I do not believe that the environment has been severely abused by humans.(R)*	.64
People who say that the unrelenting exploitation of nature has driven us to the brink of ecological collapse are wrong.(R)*	.66
<b>7. Total Preservation of Nature</b>	
Grass and weeds growing between paving stones may be untidy but are natural and should be left alone.(R)	.38
The idea that natural areas should be maintained exactly as they are is silly, wasteful, and wrong.	.29
I'd prefer a garden that is wild and natural to a well groomed and ordered one.(R)*	.52
Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us.(R)*	.49
Turning new unused land over to cultivation and agricultural development should be stopped.(R)*	.42
I'd much prefer a garden that is well groomed and ordered to a wild and natural one.*	.49
When nature is uncomfortable and inconvenient for humans we have every right to change and remake it to suit ourselves.*	.42
Turning new unused land over to cultivation and agricultural development is positive and should be supported.	.37
Grass and weeds growing between pavement stones really looks untidy.*	.42
I oppose any removal of wilderness areas no matter how economically beneficial their development may be.(R)	.31

Table 10 (continued)

<b>8. Personal Conservation Behaviour</b>	
I could not be bothered to save water or other natural resources.(R)*	.56
I make sure that during the winter the heating system in my room is not switched on too high.	.46
In my daily life I'm just not interested in trying to conserve water and/or power.(R)*	.66
Whenever possible, I take a short shower in order to conserve water.	.41
I always switch the light off when I don't need it on any more.*	.50
I drive whenever it suits me, even if it does pollute the atmosphere.(R)	.36
In my daily life I try to find ways to conserve water or power.*	.56
I am NOT the kind of person who makes efforts to conserve natural resources.(R)*	.59
Whenever possible, I try to save natural resources.*	.50
Even if public transportation was more efficient than it is, I would prefer to drive my car.(R)	.30
<b>9. Human Dominance over Nature</b>	
Humans were meant to rule over the rest of nature.*	.65
Human beings were created or evolved to dominate the rest of nature.*	.70
Plants and animals have as much right as humans to exist.(R)*	.58
Plants and animals exist primarily to be used by humans.*	.63
Humans are as much a part of the ecosystem as other animals.(R)	.41
Humans are no more important in nature than other living things.(R)	.51
Nature exists primarily for human use.	.61
Nature in all its forms and manifestations should be controlled by humans.	.60
I DO NOT believe humans were created or evolved to dominate the rest of nature.(R)*	.68
Humans are no more important than any other species.(R)*	.58
<b>10. Human Utilization of Nature</b>	
It is all right for humans to use nature as a resource for economic purposes.	.54
Protecting peoples' jobs is more important than protecting the environment.*	.63
Humans do NOT have the right to damage the environment just to get greater economic growth.(R)*	.56
People have been giving far too little attention to how human progress has been damaging the environment.(R)	.54
Protecting the environment is more important than protecting economic growth.(R)*	.67
We should no longer use nature as a resource for economic purposes.(R)	.48
Protecting the environment is more important than protecting peoples' jobs.(R)*	.62
In order to protect the environment, we need economic growth.	.48
The question of the environment is secondary to economic growth.*	.59
The benefits of modern consumer products are more important than the pollution that results from their production and use.*	.58
<b>11. Ecocentric Concern</b>	
The idea that nature is valuable for its own sake is naïve and wrong.(R)*	.63
It makes me sad to see natural environments destroyed.	.53
Nature is valuable for its own sake.*	.61
One of the worst things about overpopulation is that many natural areas are getting destroyed.	.53
I do not believe protecting the environment is an important issue.(R)*	.65
Despite our special abilities humans are still subject to the laws of nature.*	.55
It makes me sad to see forests cleared for agriculture.*	.67
It does NOT make me sad to see natural environments destroyed.(R)*	.68
I do not believe nature is valuable for its own sake.(R)	.62
I don't get upset at the idea of forests being cleared for agriculture.(R)	.61
<b>12. Support for Control of Population Growth Policies</b>	
We should strive for the goal of "zero population growth".	.44
The idea that we should control the population growth is wrong.(R)	.44
Families should be encouraged to limit themselves to two children or less.*	.71
A married couple should have as many children as they wish, as long as they can adequately provide for them. (R)*	.60
Our government should educate people concerning the importance of having two children or less.*	.69
We should never put limits on the number of children a couple can have.(R)*	.67
People who say overpopulation is a problem are completely incorrect.(R)	.33
The world would be better off if the population stopped growing.	.51
We would be better off if we dramatically reduced the number of people on the Earth.*	.51
The government has no right to require married couples to limit the number of children they can have.(R)*	.60

Note.  $N = 314$ . R = reversed coded items. \* The six balanced items selected for a short-form version of the Environmental Attitudes Inventory (EAI-S).

Table 11 presents the alpha coefficients, mean inter-item correlations, item means, standard deviations, skewness, and kurtosis for the twelve EAI scales. Overall, the alpha coefficients were highly satisfactory, ranging from .72 to .89 ( $M = .84$ ). The mean inter-item correlations ranged from .22 to .46 ( $M = .36$ ). These results indicated substantial internal consistency and homogeneity of all EAI scales. The scales also had acceptable (i.e.,  $< 1.00$ ) levels of skewness and kurtosis, suggesting no serious deviation from normality.

Table 12 presents the descriptive statistics and reliabilities of all other scales. Some scales had reliabilities below the optimum level of .70 for the alpha coefficients and .20 for the mean inter-item correlations (Briggs & Cheek, 1986; Nunnally, 1978). However, all measures had either Cronbach's alphas higher than .60 or mean inter-item correlations higher than .15, indicating acceptable internal consistency and homogeneity. The attitude toward democracy scale, and the altruistic concern scale showed some deviation from normality (i.e.,  $> 1.00$ ), but the skewness and kurtosis values were within acceptable values (West, Finch, & Curran, 1995).

Table 11

*Descriptive Scale Statistics for the EAI Scales (Study 2a)*

Scale	$\alpha$	Mean inter-item correlation	$M$	$SD$	Skewness	Kurtosis
1. Enjoyment of nature	.87	.41	4.88	1.01	-.56	.36
2. Conservation policies	.87	.40	5.39	.89	-.10	-.73
3. Environmental activism	.89	.46	4.56	1.06	-.34	.61
4. Anthropocentric concern	.74	.22	3.81	.82	-.33	.34
5. Confidence in science	.84	.34	3.73	.83	-.06	.75
6. Environmental fragility	.87	.40	5.05	.89	.04	-.51
7. Altering nature	.72	.24	4.10	.77	-.07	.59
8. Personal conservation	.80	.30	4.67	.91	-.58	.75
9. Dominance over nature	.87	.41	3.13	1.04	-.13	-.58
10. Utilization of nature	.86	.38	3.44	.80	-.73	.79
11. Ecocentric concern	.88	.43	5.40	.88	-.27	-.09
12. Population growth	.85	.36	3.87	1.00	.36	.90

Note.  $N = 314$ . All scales comprised 10 items. Scale means were item means, based on 1-7 response ratings.

Table 12

*Descriptive Scale Statistics for the Criterion Scales (Study 2a)*

Scale	No. of items	$\alpha$	Mean inter-item correlation	$M$	$SD$	Skewness	Kurtosis
Attitude towards democracy <sup>b</sup>	6	.78	.38	4.61	1.02	-.19	2.09
Altruistic concern <sup>c</sup>	4	.88	.66	5.66	1.18	-1.29	1.78
Altruistic values <sup>c</sup>	3	.63	.36	5.30	1.23	-.70	.15
Biospheric concern <sup>c</sup>	4	.90	.70	5.39	1.08	-.54	.06
Biospheric values <sup>c</sup>	3	.87	.69	4.42	1.46	-.40	-.21
Conservatism values <sup>c</sup>	3	.59	.33	5.11	1.20	-.77	.85
Ecological behaviour <sup>a</sup>	8	.69	.22	3.30	.67	-.32	-.06
Economic liberalism <sup>a</sup>	3	.65	.38	3.32	1.02	-.19	-.23
Egoistic concern <sup>c</sup>	4	.89	.68	5.49	1.25	-.93	.91
Limits to economic growth <sup>a</sup>	2	.40	.25	4.51	.94	-.24	.88
Openness to change <sup>c</sup>	3	.74	.49	4.65	1.32	-.36	-.47
Right-wing authoritarianism <sup>b</sup>	6	.60	.20	3.48	.82	-.72	.81
Self-enhancement values <sup>c</sup>	3	.66	.40	3.57	1.38	-.06	.06
Self-transcendence values <sup>c</sup>	3	.77	.52	5.04	1.32	-.65	-.56
Social desirability <sup>a</sup>	10	.67	.17	3.34	.89	.04	-.41
Social dominance orientation <sup>b</sup>	6	.71	.31	2.97	.94	-.34	-.41
Sustainability <sup>a</sup>	2	.76	.61	4.63	1.55	-.33	-.55

<sup>a</sup>  $N = 314$ . <sup>b</sup>  $n = 142$ . <sup>c</sup>  $n = 156$ .

### ***INTERCORRELATIONS AND SOCIAL DESIRABILITY***

Table 13 presents the intercorrelations of the EAI scales and their correlations with the social desirability scale. The scale intercorrelations were not too powerful. None were higher than .60, and only 8 out of 66 were higher than .50. These results indicate considerable independence between the EAI scales. Moreover, all correlations between the seven Preservation scales (Scales 1, 2, 3, 6, 8, 11, and 12) and all correlations between the five Utilization scales (Scales 4, 5, 7, 9, and 10) were positive, and only three intercorrelations did not reach significance. Only three Preservation scales (Scales 1, 3 and 8) had significant and very weak ( $r < .30$ ) correlations with social desirability. Given that these scales seem to share behavioural contents (i.e., enjoyment of nature, environmental activism, and personal conservation), it may indicate that the influence of social desirability are restricted to behavioural aspects within the environmental domain. Nevertheless, the correlations suggest that Preservation scales were relatively free from the effects of social desirability, while Utilization scales were completely free from desirability effects.

Table 13

*Intercorrelations of the EAI scales (Study 2a)*

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Enjoyment of nature	—												
2. Conservation policies	.37***	—											
3. Environmental activism	.44***	.40***	—										
4. Anthropocentric concern	-.21***	-.35***	-.31***	—									
5. Confidence in Science	-.05	-.27***	-.12*	.28***	—								
6. Environmental fragility	.30***	.58***	.48***	-.33***	-.28***	—							
7. Altering nature	.31***	.34***	.38***	-.35***	-.24***	.38***	—						
8. Personal conservation	.38***	.30***	.41***	-.20**	-.08	.35***	.33***	—					
9. Dominance over nature	-.30***	-.37***	-.40***	.41***	.25***	-.42***	-.37***	-.37***	—				
10. Utilization of nature	-.28***	-.44***	-.52***	.46***	.30***	-.50***	-.45***	-.32***	.56***	—			
11. Ecocentric concern	.41***	.53***	.51***	-.35***	-.26***	.60***	.38***	.39***	-.54***	-.57***	—		
12. Population growth	.14*	.27***	.23***	-.27***	-.04	.40***	.29***	.19**	-.23***	-.39***	.33***	—	
13. Social desirability	.16**	-.03	.20***	-.11	.04	.03	-.04	.27***	-.02	-.02	.09	.03	—

Note.  $N = 314$ .\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . Two-tailed.



### ***TESTING THE ENVIRONMENTAL ATTITUDES INVENTORY (EAI) STRUCTURAL MODEL***

In order to test the EAI structural model, the EAI measurement model (i.e., a twelve-correlated-first-order-factor model) was first tested. Three manifest indicators, consisting of item parcels, were used for each one of the twelve scales. As in Study 1, the single factor method (Brooke, Russell, & Price, 1988; Landis, Beal, & Tesluk, 2000) was employed to create the indicators, with pro- and con-trait items equally represented in each parcel so as to have balanced indicators. The model was then examined using CFA. The fit indices for the EAI measurement model indicated very good fit ( $\chi^2 = 810.97$ ;  $df = 528$ ;  $\chi^2/df = 1.54$ ; RMSEA = .041, 90%CI = .036-.047; SRMR = .048; CFI = .98; NNFI = .98). All parameters from the manifested indicators to their respective latent variable were significant ( $t > 1.96$ ,  $p < .05$ ), and all loadings were high (the weakest standardised path was .65 from the first parcel of Scale 07). Only the correlations between Scale 5 and Scales 1, 8 and 12 were non-significant. Overall, these results are consistent with the EAI scales representing unidimensional environmental attitude first-order factors.

The EAI structural model was then assessed using the same item parcels. Three models were estimated to test the higher order factorial structure of EA: a one-second-order-factor model (Model 1), a two-uncorrelated-second-order-factors model (Model 2), and a two-correlated-second-order-factors model (Model 3). The fit indices for these models are reported in Table 14. The two-correlated-second-order-factors model (Model 3) was statistically better fitting [ $\chi^2(1) = 51.02$ ,  $p < .001$ ] and had better overall fit indices than the single second-order factor structure, although the single factor model also had good fit (Model 1). All parameters from the first-order to the second-order factors were significant ( $t > 1.96$ ,  $p < .05$ ), and all loadings were high (the weakest standardised path was .39 from Utilization to Scale 05). The two higher order latent factors were highly correlated ( $\Phi = -.87$ ).

Table 14

*Fit Indices for Alternative Models (Study 2a)*

Model	$\chi^2$	<i>df</i>	$\chi^2/df$	RMSEA (CI90%)	SRMR	CFI	NNFI	ECVI (CI90%)	CAIC	T
Model 1	997.88	582	1.71	.048 (.043-.053)	.064	.98	.98	3.72 (3.46-4.02)	1564.83	.813
Model 2	1082.26	582	1.86	.052 (.048-.057)	.18	.97	.97	3.99 (3.71-4.30)	1649.21	.749
Model 3	946.86	581	1.63	.045 (.040-.050)	.061	.98	.98	3.57 (3.31-3.85)	1520.56	.856

Note. *N* = 314. Models: 1 = one-second-order-factor; 2 = two-uncorrelated-second-order-factors; 3 = two-correlated-second-order-factors. All  $\chi^2$  statistics are significant at  $p < .001$ .  $\chi^2/df$  = the ratio of chi-square to degrees of freedom; RMSEA = root mean square error of approximation; CI90% = 90 percent confidence interval; SRMR = standardized root mean square residual; CFI = comparative fit index; NNFI = non-normed fit index; ECVI = expected cross-validation index; CAIC = consistent Akaike information criterion; T = target coefficient.

### ***TESTING THE CONVERGENT AND DISCRIMINANT VALIDITY OF THE EAI STRUCTURAL MODEL***

The convergent and discriminant validity of the EAI model was assessed by the relationship between the two higher order dimensions and both ecological behaviour and economic liberalism. The full latent variable model had good overall fit for the data ( $\chi^2 = 1613.94$ ;  $df = 1017$ ;  $\chi^2/df = 1.59$ ; RMSEA = .043, 90%CI = .039-.047; SRMR = .064; CFI = .97; NNFI = .97). This model is shown in Figure 9. In line with findings from Study 1, the path from Preservation to ecological behaviour was powerful and significant, but the path from Preservation to economic liberalism was not significant. On the other hand, the path from Utilization to economic liberalism was powerful and significant, but the path from Utilization to ecological behaviour was not significant. The model accounted for 48% of the variance in ecological behaviour and 50% of the variance in economic liberalism.

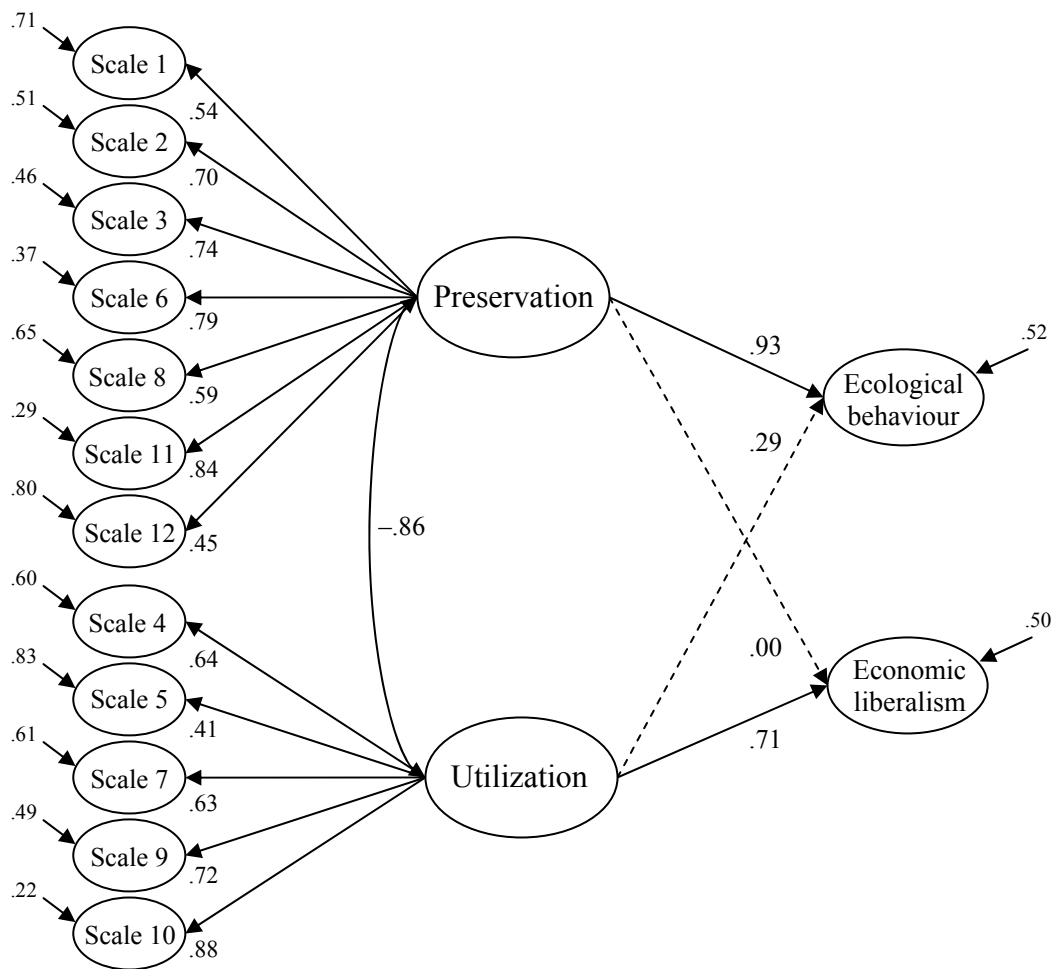


Figure 9

*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)*

Note.  $N = 314$ . To simplify, manifest variables and the paths from latent to manifest variables are not shown. Dotted arrows represent non-significant causal paths ( $t < 1.96$ ,  $p > 0.05$ ). All other coefficients from normal arrows are significant. Arrows without origin indicate the error terms. Scale labels: Scale 1 = Enjoyment of Nature, Scale 2 = Support for Interventionist Conservation Policies, Scale 3 = Environmental Movement Activism, Scale 4 = Conservation Motivated by Anthropocentric Concern, Scale 5 = Confidence in Science and Technology, Scale 6 = Environmental Fragility, Scale 7 = Altering Nature, Scale 8 = Personal Conservation Behaviour, Scale 9 = Human Dominance Over Nature, Scale 10 = Human Utilization of Nature, Scale 11 = Ecocentric Concern, and Scale 12 = Support for Population Growth Policies.

To assess the relationships between the two higher order factors with other criterion variables, mean scores for the 70 Preservation items and the 50 Utilization items were calculated. A unidimensional EA item mean score was also calculated and labelled “Generalized Environmental Attitudes” (GEA). This was done by reversing the 50 Utilization items and then aggregating all 120 EAI items. The Preservation, Utilization, and GEA scores are thus multiple-topic, multiple-expression scores (Dunlap & Jones, 2002). Preservation ( $M = 4.83$ ,  $SD = .65$ ), Utilization ( $M = 3.64$ ,  $SD = .60$ ), and GEA ( $M = 4.63$ ,  $SD = .58$ ) had adequate reliabilities:  $\alpha = .95$ ,  $.91$  and  $.96$ , and mean inter-item correlations =  $.20$ ,  $.17$  and  $.17$ , respectively. These slightly low homogeneity coefficients indicate the expected multidimensionality of Preservation, Utilization and GEA. Preservation and Utilization were strongly correlated ( $r = -.66$ ,  $p < .001$ ). In view of this high correlation, it remains to be shown whether Preservation and Utilization do show discriminant validity.

To test which theoretical model (either unidimensional or two-dimensional) provided the most empirically useful approach to the vertical structure of EA and their predictive power, the correlations of Preservation, Utilization, and GEA with criterion variables were computed. To be able to directly compare the correlations and for convenience of interpretation, Utilization was reverse scored so that this variable had the same score direction as Preservation and GEA. Table 15 presents these correlations. The number of respondents included in each analysis varied because there were two versions of the questionnaire. Correlations differed significantly for only two of the 24 criterion variables. Preservation was positively related to age, while Utilization was negatively related to this variable. Moreover, the correlation of Preservation with ecological behaviour was significantly higher than for Utilization. This difference, however, seems to be a result of content overlap because Preservation includes items covering behavioural intention. Furthermore, an inspection of the correlations indicated that Preservation and Utilization had very similar relationships with virtually all criterion variables. These findings did not therefore support a clear distinction between Preservation and Utilization. More importantly, these correlational findings did

not indicate any distinction between the unidimensional and two-dimensional models. The two-dimensional model did not have any more predictive power than the unidimensional model.

Table 15

*Correlations between the Higher Order Factors of the EAI and Criterion Measures (Study 2a)*

Measures	Preservation	Utilization	GEA
<i>Socio-demographic variables</i>			
Age <sup>a</sup>	<b>.13*</b>	<b>-.06</b>	.06
Biblical literalism <sup>a</sup>	-.09	-.15**	-.12*
Gender (being male) <sup>a</sup>	-.15**	-.09	-.14*
Political conservatism <sup>a</sup>	-.12*	-.14*	-.14*
Religiosity <sup>a</sup>	-.10	-.21***	-.16**
Self-perceived family economic status <sup>a</sup>	-.05	-.08	-.07
<i>Psychological variables</i>			
Altruistic values <sup>c</sup>	.21**	.20*	.22**
Attitude towards democracy <sup>b</sup>	.42***	.33***	.42***
Biospheric values <sup>c</sup>	.58***	.53***	.61***
Conservatism values <sup>c</sup>	-.24**	-.25**	-.26**
Openness to change values <sup>c</sup>	.02	-.02	.01
Self-enhancement values <sup>c</sup>	-.50***	-.41***	-.51***
Self-transcendence values <sup>c</sup>	.34***	.24**	.33***
Social desirability <sup>a</sup>	.16**	.04	.12*
Social dominance orientation <sup>b</sup>	-.21**	-.27**	-.26**
Right-wing authoritarianism <sup>b</sup>	-.17*	-.25**	-.22**
<i>Environmentally related variables</i>			
Altruistic concern <sup>c</sup>	-.00	-.10	-.04
Biospheric concern <sup>c</sup>	.39***	.47***	.46***
Ecological behaviour <sup>a</sup>	<b>.54***</b>	<b>.38***</b>	.52***
Economic liberalism <sup>a</sup>	-.42***	-.50***	-.50***
Egoistic concern <sup>c</sup>	-.42***	-.42***	-.46***
Inclusion with nature <sup>a</sup>	.39***	.32***	.39***
Limits to economic growth <sup>a</sup>	.25***	.21***	.26***
Sustainability <sup>a</sup>	.23***	.13*	.21***

Note. Utilization was reverse scored to have the same score direction as Preservation and GEA. Correlations in bold refer to those significantly different at .05. The value clusters and the environmental concern variables are centered scores to control for individual differences in response style. GEA = Generalized Environmental Attitudes (i.e., Preservation and Utilization combined).

<sup>a</sup>  $N = 314$ . <sup>b</sup>  $n = 142$ . <sup>c</sup>  $n = 156$ .

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . Two-tailed.

Simple correlations, however, may not show the full picture. To test further if Preservation and Utilization could account for significant non-overlapping variance in the validity criteria, multiple regression analyses were performed and compared with the regressions on the combined GEA. Each validity criterion was simultaneously regressed on both Preservation and Utilization. Again, Utilization was reverse scored so that this variable had the same score direction as Preservation and GEA. The adjusted  $R^2$  are also reported to try and evaluate if Preservation and Utilization scores account for notably more variance on predicted variables than just GEA. If the adjusted  $R^2$  for Preservation and Utilization is higher than the adjusted  $R^2$  for GEA alone in predicting a criterion variable, it would provide evidence for the validity of having two separate Preservation/Utilization scores. In order to obtain adjusted  $R^2$  for Preservation and Utilization, two hierarchical regression analyses were performed. One entered Preservation first as predictor of each validity criterion and then Utilization; the second entered Utilization first and then Preservation. The results are reported in Table 16.

For all regressions reported the tolerance coefficients were higher than .20, and the variance-inflation factor coefficients were lower than 4.0, indicating the absence of multivariate multicollinearity (Garson, 2003). As expected, Preservation accounted for significant non-overlapping variance in being female, inclusion with nature, social desirability, ecological behaviour, sustainability, limits to economic growth, attitudes toward democracy, and self-transcendence values. Utilization, on the other hand, accounted for significant non-overlapping variance in religiosity, Biblical literalism, social dominance orientation, and right-wing authoritarianism. However, Preservation and Utilization scores do not seem to account for markedly more variance on the predicted variables than just GEA, as indicated by the adjusted  $R^2$ s. Thus, again there is no clear evidence for the discriminant validity of Preservation and Utilization.

Table 16

*Beta Coefficients of the Simultaneous Multiple Regressions of the Validity Criteria on the Higher Order Factors of the EAI (Study 2a)*

Measures	Preservation		Utilization		$R^2_{Adjusted}$	GEA	
	$\beta$	$R^2_{Adjusted}$	$\beta$	$R^2_{Adjusted}$		$\beta$	$R^2_{Adjusted}$
<i>Socio-demographic variables</i>							
Age <sup>a</sup>	.30***	.02	-.26**	.00	.05	.06	.00
Biblical literalism <sup>a</sup>	.01	.01	-.15*	.02	.02	-.12*	.01
Gender (being male) <sup>a</sup>	-.16*	.02	.01	.01	.02	-.14*	.02
Political conservatism <sup>a</sup>	-.04	.01	-.12	.02	.02	-.14*	.02
Religiosity <sup>a</sup>	.07	.01	-.26**	.04	.04	-.16	.02
Self-perceived family economic status <sup>a</sup>	.01	-.00	-.09	.00	.00	-.07	.00
<i>Psychological variables</i>							
Altruistic values <sup>c</sup>	.13	.04	.11	.03	.04	.22**	.04
Attitude towards democracy <sup>b</sup>	.36***	.17	.09	.10	.17	.42***	.17
Biospheric values <sup>c</sup>	.41***	.34	.26**	.28	.37	.61***	.37
Conservatism values <sup>c</sup>	-.13	.05	-.16	.05	.06	-.26**	.06
Openness to change values <sup>c</sup>	.07	-.01	-.07	-.01	-.01	.01	-.01
Self-enhancement values <sup>c</sup>	-.42***	.25	-.13	.16	.25	-.51***	.25
Self-transcendence values <sup>c</sup>	.33**	.11	.03	.05	.11	.33***	.11
Social desirability <sup>a</sup>	.24**	.02	-.12	-.00	.03	.12*	.01
Social dominance orientation <sup>b</sup>	-.07	.04	-.23*	.07	.06	-.26**	.06
Right-wing authoritarianism <sup>b</sup>	.00	.02	-.26*	.06	.05	-.22**	.04
<i>Environmentally related variables</i>							
Altruistic concern <sup>c</sup>	.11	-.01	-.17	.00	.00	-.04	-.00
Biospheric concern <sup>c</sup>	.15	.15	.37***	.21	.22	.46***	.21
Ecological behaviour <sup>a</sup>	.51***	.29	.04	.14	.29	.52***	.27
Economic liberalism <sup>a</sup>	-.17*	.18	-.39***	.25	.26	-.50***	.24
Egoistic concern <sup>c</sup>	-.25**	.17	-.25**	.17	.20	-.46***	.20
Inclusion with nature <sup>a</sup>	.32***	.15	.10	.10	.15	.39***	.15
Limits to economic growth <sup>a</sup>	.20**	.06	.08	.04	.06	.26***	.06
Sustainability <sup>a</sup>	.25**	.05	-.04	.01	.05	.21***	.04

Note. Utilization was reverse scored to have the same score direction as Preservation and GEA. The value clusters and the environmental concern variables are centered scores to control for individual differences in response style. GEA = Generalized Environmental Attitudes (i.e., Preservation and Utilization combined).

<sup>a</sup>  $N = 314$ . <sup>b</sup>  $n = 142$ . <sup>c</sup>  $n = 156$ .

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . Two-tailed.

## ***SUMMARY AND CONCLUSIONS FROM STUDY 2A***

This study set out to develop the EAI and test the convergent and discriminant validity of its higher order factors. There were three main findings. First, the results showed good psychometric properties for the EAI, and indicated that the EAI scales are relatively free from effects of social desirability. Second, CFA results supported the two-factors higher order structure of EA by showing that this model provided the best fit to the data and was statistically better fitting than competing models. However, the one-second-order-factor model was virtually as good as the two-correlated-second-order-factors model. Finally, some support for the discriminant validity of Preservation and Utilization was found. For instance, while Preservation was related to inclusion with nature, being female, and self-transcendence values, Utilization was related to religiosity, Biblical liberalism and right-wing authoritarianism. However, Preservation and Utilization were highly correlated and their distinction was not completely supported.

Therefore, the findings from both Study 1 and Study 2a provided evidence for the multidimensionality of EA. Both studies also showed evidence for a two-dimensional structure of EA. Hence, both studies provided evidence for the horizontal and vertical structure of EA as well as their nomological network. However, both studies were limited to New Zealand samples, the higher order structure of EA was still unclear, and the discriminant validity of Preservation and Utilization was not clearly established. These issues will be addressed in the next studies.



## ***STUDY 2B***

One step toward establishing the validity and reliability of the EAI is to replicate the findings of Study 2a in another cultural context. The primary goal of Study 2b was therefore to provide an initial assessment of the cross-cultural validity of the horizontal and vertical structure of EA. In particular, this second study aimed to examine the robustness of the factor structure and the psychometric properties of EAI in a different social context. It also set out to assess whether Preservation, but not Utilization, would be associated with general environmental concern, as a further test of their discriminant validity.

## ***METHOD***

### ***PARTICIPANTS, PROCEDURE AND INSTRUMENTS***

A Web-based study was created and administered in Brazil through the SurveyMonkey technology ([www.surveymonkey.com](http://www.surveymonkey.com)) in 2005. The study was advertised to lecturers of postgraduate programs, to friends of the author, and to the Latin-American Environmental Psychology Network (REPALA) email list. The survey link was accessed by 414 people, and 409 agreed to participate in the study, but only 229 (153 female and 76 male) completed the survey. Most of the participants (53.1%) became aware of the survey through an electronic message. Their ages ranged from 19 to 64 ( $M = 32.28$ ,  $SD = 9.50$ ), and more than half of all Brazilian states were represented (18 out of 27 states). Most of the respondents (81.7%) had completed an undergraduate or graduate degree. The survey included the Brazilian-Portuguese version of the EAI, and a single self-report item to measure general environmental concern (rated on a 7-point scale anchored by *not at all concerned* and *extremely concerned*). It should be noted that the use of Web-based methods in psychological research is growing (Reips, 2006), and this methodology has already been used in environmental research (e.g., De Groot & Steg, 2006; Rideout, Hushen, McGinty, Perkins, & Tate, 2005). Moreover, research has shown no significant differences in the psychometric properties of

psychological measures completed online, compared to paper-based versions (Riva, Teruzzi, & Anolli, 2003).

### ***PRODUCING THE BRAZILIAN-PORTUGUESE VERSION OF THE EAI***

The English version of the EAI was adapted into Brazilian-Portuguese using a bilingual committee approach (van de Vijver & Leung, 1997). First, the EAI items were translated by an independent translator, and the two versions were compared by the author. This first translated version was then administered to two bilingual Brazilian residents in New Zealand for their comments. After modifications, a revised version was subjected to content validation by ten undergraduate psychology students in Brazil. Translation accuracy checks were completed with subsequent correction when necessary (for details, see Milfont, Pessoa, Belo, Gouveia, & Andrade, 2005).

## ***RESULTS AND DISCUSSION***

### ***DESCRIPTIVE STATISTICS AND RELIABILITIES***

Table 17 presents the descriptive statistics and reliabilities for the twelve EAI scales. Overall, the reliabilities of all EAI scales were lower in Study 2b than in Study 2a. The equality of the internal reliabilities (Cronbach's alpha) of the twelve scales in both studies was tested using a procedure described by van de Vijver and Leung (1997, Box 4.1). This procedure allows the statistical test of possible significant differences between alphas. All but four scales (Scales 1, 7, 9, and 12) had a significantly lower reliability in Study 2a. However, all scales still revealed adequate reliability in the Brazil sample, with alpha coefficients ranging from .63 to .87 ( $M = .76$ ), and mean inter-item correlations ranging from .15 to .40 ( $M = .27$ ). The scales had also acceptable levels of skewness and kurtosis, suggesting no serious deviation from normality.

Table 17

*Descriptive Scale Statistics for EAI Scales (Study 2b)*

Scale	$\alpha$	Mean inter-item correlation	$M$	$SD$	Skewness	Kurtosis
1. Enjoyment of nature	.87	.40	5.78	.97	-1.21	1.74
2. Conservation policies	.63	.15	6.18	.62	-.55	-.28
3. Environmental activism	.86	.36	5.34	.99	-.60	.42
4. Anthropocentric concern	.63	.15	3.59	.79	-.11	.08
5. Confidence in Science	.80	.28	4.17	.97	-.34	.08
6. Environmental fragility	.77	.28	5.82	.76	-.73	.32
7. Altering nature	.74	.22	3.68	.88	-.10	-.05
8. Personal conservation	.71	.23	5.48	.85	-.36	.10
9. Dominance over nature	.86	.39	2.39	1.04	.82	.59
10. Utilization of nature	.67	.17	3.01	.72	-.13	.27
11. Ecocentric concern	.76	.26	6.21	.63	-1.34	3.30
12. Population growth	.86	.37	4.41	1.17	.09	-.06

Note.  $N = 229$ . All scales comprised 10 items.

***TESTING EAI STRUCTURAL MODEL***

As in Study 2a, item parcels were used, and the EAI measurement model was tested first. The fit indices demonstrated that the twelve EAI scales could also be treated as unidimensional EA first-order factors in this sample ( $\chi^2 = 655.09$ ;  $df = 528$ ;  $\chi^2/df = 1.24$ ; RMSEA = .032, CI90% = .023-.040; SRMR = .051; CFI = .98; NNFI = .98). All parameters from the manifest indicators to their respective latent variable were significant ( $t > 1.96$ ,  $p < .05$ ), and all loadings were high (the weakest standardised path was .52 from the first Scale 04 parcel). All correlations between the first-order factors were also significant. The EAI structural model was then tested. The CFA results indicated that the two-correlated-second-order-factors structure that had best fit in Study 2a also showed adequate fit for the data in Study 2b (see Table 18). All parameters were significant ( $t > 1.96$ ,  $p < .05$ ), and all loadings were high (the weakest standardised path was .23 from Preservation to Scale 12). The two higher order factors were highly correlated ( $\Phi = -.83$ ). As before, however, the two-correlated-second-order-factors model (Model 3) was statistically better fitting [ $\chi^2(1) =$

18.78,  $p < .001$ ], and had better overall fit indices than the one-second-order-factor model (Model 1).

Table 18

*Fit Indices for Alternative Models (Study 2b)*

Model	$\chi^2$	$df$	$\chi^2/df$	RMSEA (CI90%)	SRMR	CFI	NNFI	ECVI (CI90%)	CAIC	T
Model 1	859.50	582	1.48	.046 (.039-.052)	.068	.97	.97	4.51 (4.18-4.87)	1399.93	.762
Model 2	898.00	582	1.54	.049 (.042-.055)	.14	.96	.95	4.68 (4.34-5.05)	1438.43	.729
Model 3	840.72	581	1.45	.044 (.038-.051)	.067	.97	.97	4.43 (4.11-4.79)	1387.59	.779

Note.  $N = 229$ . Models: 1 = one-second-order-factor; 2 = two-uncorrelated-second-order-factors; 3 = two-correlated-second-order-factors. All  $\chi^2$  statistics are significant at  $p < .001$ .  $\chi^2/df$  = the ratio of chi-square to degrees of freedom; RMSEA = root mean square error of approximation; CI90% = 90 percent confidence interval; SRMR = standardized root mean square residual; CFI = comparative fit index; NNFI = non-normed fit index; ECVI = expected cross-validation index; CAIC = consistent Akaike information criterion; T = target coefficient.

### ***TESTING THE DISCRIMINANT VALIDITY OF THE EAI STRUCTURAL MODEL***

The Preservation ( $M = 5.60$ ,  $SD = .55$ ), Utilization ( $M = 3.37$ ,  $SD = .57$ ), and GEA ( $M = 5.20$ ,  $SD = .49$ ) scores were again created, and had adequate reliabilities:  $\alpha = .91$ ,  $.86$  and  $.93$ , and mean inter-item correlation =  $.14$ ,  $.11$  and  $.11$ , respectively. Preservation and Utilization were strongly correlated ( $r = -.57$ ,  $p < .001$ ). The correlations between Preservation, Utilization, and GEA with the general environmental concern were assessed. All three scores had significant correlations with the general environmental concern measure: Preservation ( $r = .50$ ,  $p < .001$ ), Utilization ( $r = .33$ ,  $p < .001$ ), and GEA ( $r = .48$ ,  $p < .001$ ). The correlation between general environmental concern and Preservation was significantly higher ( $p < .05$ ) than for Utilization. Multiple regressions were performed and supported this result: only the Beta from Preservation was significant ( $R^2_{\text{Adjusted}} = .25$  for the model). This indicated that Preservation ( $\beta = .46$ ,  $p < .001$ ;  $R^2_{\text{Adjusted}} = .25$ ) explained variance in general environmental concern over and above Utilization ( $\beta = .07$ ,  $ns$ ;  $R^2_{\text{Adjusted}} = .11$ ). However, as general environmental concern is distinctly more similar to

Preservation than to Utilization, this finding may be a result of content overlap. Moreover, the Beta for GEA was also significant ( $\beta = .48, p < .001; R^2_{\text{Adjusted}} = .23$ ).

## ***SUMMARY AND CONCLUSIONS FROM STUDY 2B***

Study 2b aimed to test the horizontal and the two-dimensional vertical structure of EA and the psychometric properties of the EAI in a different cultural context. This study replicated most of the findings of Study 2a and provided initial support for both the cross-cultural validity of the horizontal and vertical approach to the structure of EA and the EAI. However, the higher order structure of EA is still unclear.

## ***STUDY 2C***

Study 2c was also a Web-based study, conducted with a worldwide sample to further examine the dimensionality of EA and their nomological network. Specifically, the aims of Study 2c were fivefold:

1. Develop and test a short-form version of the EAI.
2. Replicate the analysis of the horizontal and vertical structure of EA across a number of cultural contexts (i.e., a worldwide sample).
3. Examine the test-retest reliability of the EAI scales.
4. Expand the nomological network of EA by investigating the discriminant validity of Preservation and Utilization with a diverse set of criterion variables. It was expected that Preservation would be correlated primarily with self-transcendence and altruistic values, the components of norm activation, agreeableness, emotional stability, and future because theory and research suggest that conservation attitudes are associated with all these constructs. On the other hand, it was expected that Utilization would be correlated primarily with being Judeo-Christian, religiosity, Biblical literalism, political conservatism and present-hedonistic because theory and research suggest that utilitarian attitudes are associated with all these variables.

5. Investigate the psychological meaning of Preservation and Utilization. It was expected that the psychological meanings of Preservation and Utilization would be distinct.

## ***METHOD***

### ***PARTICIPANTS AND PROCEDURE***

This Web-based study was conducted in 2005 and aimed to recruit a worldwide sample. The study was advertised on both the “Psychological Research on the Net” and “Web Survey List” websites. The study was also advertised to members of the Environmental Psychology mailing list (i.e., ENVPSI) and the participants of the “5th Doctoral Students Conference of the Association of Pacific Rim Universities”. Most of the participants (71.2%) became aware of the survey through an electronic message. The survey link was accessed by 659 people and 648 agreed to participate in the study. However, only 468 (244 female and 224 male) completed the survey. The participants’ ages ranged from 18 to 69 ( $M = 34.04$ ,  $SD = 12.89$ ). There were participants from 59 countries and from all six inhabited continents: Africa ( $n = 9$ ), Asia ( $n = 35$ ), Australia and Oceania ( $n = 216$ ), Europe ( $n = 107$ ), North America ( $n = 80$ ), and South America ( $n = 21$ ). (See Table C2 in Appendix C for the complete list of countries.) Most of the respondents were from New Zealand (40.2%), followed by participants from the United States of America (13.2%). Most of the respondents (88.7%) had completed an undergraduate or graduate degree.

The participants were also asked to provide their names and email addresses if they were interested in participating in another study. Contact details were provided by 141 participants. A test-retest internet study link was then emailed to them. This study link was accessed by 97 participants who also agreed to participate in the test-retest study, and 80 participants (54 female and 26 male) completed the survey. The test-retest participants’ ages ranged from 18 to 61 ( $M = 33.68$ ,  $SD = 10.85$ ). Again, most of the test-retest participants were from New Zealand (37.5%) and from the United States of America (21.3%).

## ***INSTRUMENTS***

Six balanced items from each scale were selected to form the short-form of the EAI. The items were selected based on their high factor loadings in both Study 2a and 2b. This short-form will be referred to hereafter as EAI-S. The questionnaire included the EAI-S, all single self-reported items (except the connectedness with nature measure), the ecological behaviour and value priorities scales used in Study 2a, plus the following measures.

*Big Five Mini-Markers.* A set of 20 balanced items were selected from Saucier's (1994) scale to measure the Five-Factor Model personality dimensions (i.e., agreeableness, conscientiousness, emotional stability, extraversion, and intellect). The 4 items with the highest factor loading were selected for each dimension. The respondents rated each of the 20 items on a 5-point scale, anchored by *extremely inaccurate* and *extremely accurate*.

*Components of Norm Activation.* The two components of Schwartz's (1977) norm activation, that is, awareness of consequences (AC) and ascription of responsibility (AR), were measured at a local and global level (Schultz et al., 2005). Participants were asked to rate the seriousness of six environmental problems (deforestation, water pollution, air pollution, land pollution, overpopulation, and global warming) in their community (AC local), and also the seriousness of these six environmental problems worldwide (AC global). Single items asked the participants to rate the extent to which they felt responsible for environmental problems in their community (AR local), and for environmental problems worldwide (AR global). A 4-point scale was used, anchored by *not at all* and *extremely* for the AC scales, and *not at all responsible* and *extremely responsible* for the AR scales. The participants showed significantly ( $p < .001$ ,  $d = 1.82$ ) higher awareness of consequences for the global ( $M = 3.59$ ,  $SD = .44$ ) than the local ( $M = 2.59$ ,  $SD = .64$ ) level—as would be expected by the “environmental hyperopia” effect (Uzzell, 2000)—while showing significantly ( $p < .001$ ,  $d = .21$ ) higher ascription of responsibility for the local ( $M = 2.73$ ,  $SD = .82$ ) than the global ( $M = 2.56$ ,  $SD = .81$ ) level.

*Natural Semantic Network.* Data on the psychological meaning of the EA higher order factors were also obtained from the test-retest participants using the natural semantic network

technique (Cortez, Milfont, & Belo, 2001; Figueroa, Gonzáles, & Solís, 1976; Milfont, Cortez, & Belo, 2003; Reyes-Lagunes, 1993). Participants were asked to list the first five words (pronouns, nouns, adjectives, verbs or adverbs, but not propositions, conjunctions or articles) that came to their mind associated with two stimulus phrase words: “environmental preservation” and “environmental utilization”. In this technique, the words listed are treated as a semantic network generated through a process of memory reconstruction, providing a set of concepts/definers for the stimulus words. The order of the five definers listed indicates their hierarchical order of importance in relation to the stimulus word. So, the first definer listed expresses the closest meaning to the stimulus word, the second definer a less important meaning to the stimulus word, and so on. The semantic network is then evaluated according to five criteria: (1) *network size* indicates the network richness, or the number of definers used to describe the stimuli words; (2) *semantic weight* is a quantitative measure of the hierarchical order of importance of the definers listed. This is measured by assigning 5 for the first definer listed, 4 for the second definer, and so on, and then multiplying these values by the number of times the definer appeared; (3) *network core* represents the set of definers with higher semantic weights, as indicated when the semantic weights curve starts to show an asymptotic pattern; (4) *affective load* indicates the positive or negative aspects of the definers listed; and (5) *network density* indicates the semantic distance between definers of the core of the network. It is measured by assigning 100% for the definer with higher semantic weight and then calculating the relative percentage of the remaining definers.

*Time Perspective.* A set of 15 items were selected from the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999) to measure five time frames: past-negative, past-positive, present-hedonistic, present-fatalistic, and future. The 3 items with the higher factor loading were selected for each dimension. The respondents rated each of the 15 items on a 5-point scale, anchored by *very untrue* and *very true*.



## ***RESULTS AND DISCUSSION***

### ***DESCRIPTIVE STATISTICS AND RELIABILITIES***

Table 19 presents the descriptive statistics and reliabilities for the twelve EAI-S. Overall, the alpha coefficients and mean inter-item correlations for the EAI-S scales were highly satisfactory, with an average of .82 and .47, respectively. Only Scale 4 had low, but still acceptable, reliabilities. The scales had also acceptable levels of skewness and kurtosis, suggesting no serious deviation from normality.

Table 19

*Descriptive Scale Statistics for the Short-Form of the Environmental Attitudes Inventory (EAI-S)  
Scales (Study 2c)*

Scale	$\alpha$	Mean inter-item correlation	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	Test-retest reliability <sup>a</sup>
1. Enjoyment of nature	.87	.52	6.11	.97	-1.67	3.60	.79
2. Conservation policies	.77	.37	6.02	.94	-1.20	2.02	.88
3. Environmental activism	.92	.67	5.17	1.30	-.66	.06	.89
4. Anthropocentric concern	.53	.16	3.51	.86	-.34	-.05	.62
5. Confidence in Science	.88	.54	3.63	1.27	.14	-.48	.73
6. Environmental fragility	.82	.43	5.46	1.03	-.68	.51	.84
7. Altering nature	.75	.34	3.55	1.01	-.04	-.36	.89
8. Personal conservation	.87	.54	5.82	.96	-1.15	2.02	.90
9. Dominance over nature	.89	.59	2.54	1.37	1.00	.61	.89
10. Utilization of nature	.84	.46	2.67	1.05	.56	.78	.84
11. Ecocentric concern	.81	.42	6.13	.83	-1.59	4.93	.82
12. Population growth	.88	.55	4.12	1.46	-.04	-.55	.85

Note. *N* = 468. All scales comprised 6 items.

<sup>a</sup> Data based on an eight weeks interval (*n* = 80).

Table 20 presents the descriptive scale statistics for the criterion variables. It can be seen that two scales (emotional stability, and present-fatalistic) exhibit lower (< .60) alphas, and another two (global awareness of consequences and intellect) had moderate levels (> 1.0) of skewness and kurtosis. Overall, however, all scales exhibited high levels of homogeneity and did not present serious violations of normality.

Table 20

*Descriptive Scale Statistics for the Criterion Scales (Study 2c)*

Scale	No. of items	$\alpha$	Mean inter-item correlation	$M$	$SD$	Skewness	Kurtosis
Altruistic values	3	.80	.57	5.65	1.15	-.95	.66
Agreeableness	4	.82	.53	5.59	.92	-.86	.83
Biospheric values	3	.91	.77	5.34	1.26	-.58	-.10
Conservatism values	3	.64	.38	5.15	1.04	-.48	.17
Conscientiousness	4	.89	.66	5.10	1.27	-.64	-.06
Ecological behaviour	8	.79	.34	3.72	.76	-.74	.57
Emotional stability	4	.57	.25	4.61	1.01	.11	-.44
Extraversion	4	.85	.59	4.22	1.28	-.15	-.67
Future	3	.69	.43	3.49	.86	-.56	.12
Global awareness of consequences	6	.80	.42	3.59	.44	-1.63	4.48
Intellect	4	.81	.51	5.60	.97	-1.00	1.77
Local awareness of consequences	6	.79	.40	2.59	.64	.04	-.39
Openness to change values	3	.79	.56	5.35	1.11	-.62	-.06
Past-negative	3	.88	.72	2.85	1.13	.18	-.80
Past-positive	3	.72	.48	3.54	.83	-.45	.14
Present-Fatalistic	3	.52	.28	2.07	.74	.60	.07
Present-Hedonistic	3	.86	.67	3.15	1.01	-.36	-.44
Self-enhancement values	3	.62	.35	3.69	1.06	.22	-.37

Note.  $N = 468$ .

### ***TESTING THE STRUCTURAL MODEL OF THE SHORT-FORM OF THE ENVIRONMENTAL ATTITUDES INVENTORY (EAI-S)***

Instead of using item parcels as in the previous studies, both the EAI-S measurement model and the structural model were tested in this study using the full set of items (i.e., 6 items for each of the twelve EAI first-order factors). This was done because the EAI-S comprised a smaller number of items, reducing the CFA models. The EAI-S measurement model had adequate fit to the data ( $\chi^2 = 6539.08$ ;  $df = 2418$ ;  $\chi^2/df = 2.70$ ; RMSEA = .060, CI90% = .059-.062; SRMR = .065; CFI = .96; NNFI = .96), demonstrating that the twelve six-item scales can be treated as unidimensional EA first-order factors. Two items from Scale 4 (item 2, "Nature is important because of what it can

contribute to the pleasure and welfare of humans”, and item 3, “The thing that concerns me most about deforestation is that there will not be enough lumber for future generations”) were not significant ( $t < 1.96, p > .05$ ). However, these items were retained for the subsequent analysis. All other parameters were significant. The EAI-S structural model was then tested. The two-correlated-second-order-factors structure had adequate fit for the data (see Table 21). All parameters were significant (except for those two items from Scale 4), and all loadings were high (the weakest standardised path was .47 from Utilization to Scale 5). The two-correlated-second-order-factors model was statistically better fitting [ $\chi^2(1) = 6.52, p < .05$ ] than the one-second-order-factor model, but the overall fit indices for both models were virtually identical, and the two higher order factors were extremely highly correlated ( $\phi = -.96$ ).

Table 21  
*Fit Indices for Alternative Models (Study 2c)*

Model	$\chi^2$	df	$\chi^2/df$	RMSEA (CI90%)	SRMR	CFI	NNFI	ECVI (CI90%)	CAIC	T
Model 1	6862.12	2472	2.78	.062 (.060-.063)	.070	.96	.96	15.36 (14.84-15.90)	7977.28	.953
Model 2	7214.68	2472	2.92	.064 (.062-.066)	.17	.95	.95	16.12 (15.58-16.67)	8329.84	.906
Model 3	6855.60	2471	2.77	.062 (.060-.063)	.070	.96	.96	15.35 (14.83-15.89)	7977.91	.954

Note.  $N = 468$ . Models: 1 = one-second-order-factor; 2 = two-uncorrelated-second-order-factors; 3 = two-correlated-second-order-factors. All  $\chi^2$  statistics are significant at  $p < .001$ .  $\chi^2/df$  = the ratio of chi-square to degrees of freedom; RMSEA = root mean square error of approximation; CI90% = 90 percent confidence interval; SRMR = standardized root mean square residual; CFI = comparative fit index; NNFI = non-normed fit index; ECVI = expected cross-validation index; CAIC = consistent Akaike information criterion; T = target coefficient.

### ***TESTING THE CONVERGENT AND DISCRIMINANT VALIDITY OF THE EAI-S STRUCTURAL MODEL***

Preservation ( $M = 5.60, SD = .76$ ), Utilization ( $M = 3.20, SD = .81$ ), and GEA ( $M = 5.26, SD = .73$ ) had adequate reliabilities ( $\alpha = .94, .91$  and  $.96$ , and mean inter-item correlation =  $.28, .25$  and  $.24$ , respectively), and Preservation and Utilization were strongly correlated ( $r = -.75, p < .001$ ).

Table 22 presents the correlations between these three scores with external variables. To be able to

compare significant differences in the magnitude of the correlations, Utilization was reverse scored so that this variable had the same score direction as Preservation and GEA. There were only two significant differences between correlations for Preservation and Utilization. The correlations of Preservation with ecological behaviour and self-transcendence were higher than for Utilization. These differences, however, seems to be a result of content overlap because both ecological behaviour and self-transcendence share similar ideas with Preservation. Once again, therefore, a distinction between Preservation and Utilization was not supported by the correlational findings.

Table 22

*Correlations between the Higher Order Factors of the EAI-S and Criterion Measures (Study 2c)*

Measures	Preservation	Utilization	GEA
<i>Socio-demographic variables</i>			
Age	.12**	.09	.11*
Being Judeo-Christian	-.20***	-.27***	-.24***
Biblical literalism	-.20***	-.28***	-.25***
Gender (being male)	-.11*	-.15**	-.14**
Level of education	.13**	.08	.12*
Political conservatism	-.40***	-.42***	-.43***
Religiosity	-.12*	-.22***	-.17***
Self-perceived family economic status	.10*	.06	.09
<i>Psychological variables</i>			
Agreeableness personality trait	.29***	.24***	.29***
Altruistic values	.28***	.26***	.29***
Biospheric values	.64***	.58***	.65***
Conservatism values	-.27***	-.27***	-.28***
Conscientiousness personality trait	.15**	.13**	.15**
Emotional stability personality trait	.16**	.08	.13**
Extraversion personality trait	.12**	.11*	.13**
Future time orientation	.03	-.02	.01
Intellect personality trait	.21***	.15**	.19***
Openness to change values	-.03	.04	.01
Past-negative time orientation	-.08	-.12*	-.10*
Past-positive time orientation	.15**	.07	.12**
Present-hedonistic time orientation	.10*	.01	.07
Present-fatalistic time orientation	-.04	-.01	-.03
Self-enhancement values	-.55***	-.52***	-.57***
Self-transcendence values	<b>.49***</b>	<b>.40***</b>	<b>.48***</b>
<i>Environmentally related variables</i>			
Ascription of responsibility (global)	.49***	.43***	.49***
Ascription of responsibility (local)	.42***	.33***	.40***
Awareness of consequences (global)	.44***	.41***	.46***
Awareness of consequences (local)	.32***	.28***	.32***
Ecological behaviour	<b>.57***</b>	<b>.39***</b>	<b>.52***</b>

Note.  $N = 468$ . Utilization was reverse scored to have the same score direction as Preservation and GEA. The value clusters are centered scores to control for individual differences in response style. Correlations in bold refer to those significantly different at .09 (self-transcendence values) and at .05 (ecological behaviour). GEA = Generalized Environmental Attitudes (i.e., Preservation and Utilization combined).

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . Two-tailed.

Each validity criterion was then simultaneously regressed on both Preservation and Utilization. For all regressions reported the tolerance coefficients were higher than .20 and the variance-inflation factor coefficients were lower than 4.0, indicating the absence of multivariate multicollinearity. As can be seen in Table 23, the multiple regression results revealed some distinctions between Preservation and Utilization. Preservation accounted for significant non-overlapping variance in ecological behaviour, self-transcendence and altruistic values, awareness of consequences for local environmental problems, ascription of responsibility for global problems, all personality dimensions but extraversion, and past-positive time orientation. Conversely, Utilization accounted for significant non-overlapping variance in being male and Judeo-Christian, religiosity, and Biblical literalism. Again, however, Preservation and Utilization scores do not seem to account for markedly more variance in the predicted variables than just GEA, as indicated by the adjusted  $R^2$ s.

Table 23

*Beta Coefficients of the Simultaneous Multiple Regressions of the Validity Criteria on the Higher Order Factors of the EAI-S (Study 2c)*

Measures	Preservation		Utilization		$R^2_{Adjusted}$	GEA	
	$\beta$	$R^2_{Adjusted}$	$\beta$	$R^2_{Adjusted}$		$\beta$	$R^2_{Adjusted}$
<i>Socio-demographic variables</i>							
Age	.13	.01	-.01	.01	.01	.11*	.01
Being Judeo-Christian	.03	.04	-.29***	.08	.08	-.24***	.06
Biblical literalism	.04	.04	-.31***	.08	.08	-.25***	.06
Gender (being male)	-.00	.01	-.15*	.02	.02	-.14**	.02
Level of education	.16*	.02	-.04	.01	.02	.12*	.01
Political conservatism	-.19**	.16	-.27***	.17	.19	-.43***	.19
Religiosity	.11	.01	-.30***	.05	.05	-.17***	.03
Self-perceived economic status	.12	.01	-.03	.00	.01	.09	.01
<i>Psychological variables</i>							
Agreeableness	.25***	.08	.05	.06	.08	.29***	.08
Altruistic values	.20**	.08	.11	.07	.08	.29***	.08
Biospheric values	.48***	.41	.22***	.33	.43	.65***	.42
Conservatism values	-.14*	.07	-.16*	.07	.08	-.28***	.09
Conscientiousness	.14*	.02	.02	.01	.02	.15**	.02
Emotional stability	.22**	.02	-.09	.01	.02	.12**	.02
Extraversion	.10	.01	.04	.01	.01	.13**	.01
Future	.11	-.00	-.11	-.00	.00	.01	-.00
Intellect	.22**	.04	-.02	.02	.04	.19***	.04
Openness to change values	-.13**	-.01	.13	-.01	.00	.00	-.00
Past-negative	.02	.00	-.13	.01	.01	-.10*	.01
Past-positive	.22**	.02	-.10	.00	.02	.12**	.01
Present-fatalistic	-.06	-.00	.03	-.00	-.00	-.03	-.00
Present-hedonistic	.22**	.01	-.15*	-.00	.02	.07	.00
Self-enhancement values	-.36***	.30	-.26***	.27	.33	-.57***	.33
Self-transcendence values	.44***	.24	.07	.16	.24	.48***	.23
<i>Environ. related variables</i>							
AC-global	.31***	.19	.18**	.17	.21	.46***	.21
AC-local	.25***	.10	.09	.08	.10	.32***	.10
AR-global	.37***	.24	.15*	.18	.24	.49***	.24
AR-local	.38***	.17	.04	.11	.17	.40***	.16
Ecological behaviour	.62***	.32	-.08	.15	.32	.52***	.27

Note.  $N = 468$ . Utilization was reverse scored to have the same score direction as Preservation and GEA. The value clusters are centered scores to control for individual differences in response style. GEA = Generalized Environmental Attitudes (i.e., Preservation and Utilization combined). AC-local = Seriousness of local environmental problems. AC-global = Seriousness of global environmental problems. AR-local = Ascription of responsibility for local problems. AR-global = Ascription of responsibility for global problems.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . Two-tailed.

### ***TEST-RETEST RELIABILITY OF THE EAI-S***

The last column of Table 19 presents the test-retest coefficients, which ranged from .62 to .90. The test-retest coefficients for Preservation, Utilization and GEA were also computed, and were .95, .92, and .96, respectively. The results indicated the stability of all EAI-S scales as well as the higher order EA factors across an interval of 8 weeks. Thus, people's EA exhibited considerable stability over this period.

The test-retest study was also used to examine the stability of the relations between the higher order factors of EA and the value clusters in Time 1 and Time 2. The results are reported in Table 24. For all regressions reported, the tolerance coefficients were higher than .20 and the variance-inflation factor coefficients were lower than 4.0. These results indicate the absence of multivariate multicollinearity. As would be expected, some variations in the pattern of associations between Time 1 and Time 2 were found. These variations may be related to both the small sample size ( $n = 80$ ) and the time interval. However, when analysing these results, less attention should be paid to the specific numbers involved and more to the similarities in trends. Taking this into account, it can be seen that the associations between GEA and the value clusters were virtually identical at Time 1 and Time 2, but the associations for Preservation and Utilization varied more across time.



Table 24

*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)*

Measures	Preservation		Utilization		$R^2_{\text{Adjusted}}$	GEA	
	$\beta$	$R^2_{\text{Adjusted}}$	$\beta$	$R^2_{\text{Adjusted}}$		$\beta$	$R^2_{\text{Adjusted}}$
<i>Time 1</i>							
Altruistic	.05	.08	.30	.11	.10	.34**	.10
Biospheric	.37*	.46	.39**	.47	.50	.72***	.51
Conservatism	-.28	.04	.06	.02	.03	-.22	.04
Openness to change	.26	.00	-.45*	.04	.05	-.18	.02
Self-enhancement	-.37*	.35	-.28	.33	.37	-.62***	.38
Self-transcendence	.28	.26	-.29	.26	.28	.55***	.29
<i>Time 2</i>							
Altruistic	-.13	.03	.42*	.09	.08	.27*	.06
Biospheric	.40**	.50	.39**	.50	.54	.74***	.55
Conservatism	-.13	.03	-.10	.03	.03	-.22*	.04
Openness to change	.13	-.00	-.28	.02	.01	-.14	.01
Self-enhancement	-.28	.31	-.36*	.33	.35	-.60***	.35
Self-transcendence	.22	.23	.33	.25	.26	.53***	.27

Note.  $N = 80$ . The value clusters are centered scores to control for individual differences in response style. GEA = Generalized Environmental Attitudes (i.e., Preservation and Utilization combined).

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . Two-tailed.

## ***QUALITATIVE EVALUATION OF THE HIGHER ORDER ENVIRONMENTAL ATTITUDES DIMENSIONS***

The test-retest study was also used to access the psychological meaning of Preservation and Utilization through the natural semantic network technique, which was described above. Five criteria were analysed: network size, semantic weight, network core, affective load, and network density. The network size was first assessed. Up to 400 definers could be expected for each stimulus word, as there were 80 participants and 5 possible listed words. Some definers were excluded (e.g., missing cases, ‘don’t know’ and ‘have no idea’) and others were combined (e.g., ‘sustainable’ and ‘sustainability’, ‘preserve’ and ‘preservation’, ‘forest’ and ‘forests’). There were 195 definers for ‘environment utilization’ and 217 for ‘environment preservation’ (see Tables C3 and C4 in Appendix C for the complete list of definers). For both stimulus words the semantic weights curve started to show an asymptotic pattern when the semantic weight of the definers was smaller than 6. Forty definers comprised the network core for ‘environmental utilization’, while 44 comprised the network core for ‘environmental preservation’. Table 25 presents the semantic weight, network density, and affective load for the ten definers with higher semantic weight for both stimulus words.

The results indicated that although ‘environmental preservation’ had more definers and a bigger network core, this stimulus word showed a higher network density than ‘environmental utilization’. That is, although more concepts were generated for ‘environmental preservation’, the strength of association between the concepts and this stimulus word was higher than for ‘environmental utilization’. The results indicated, therefore, that participants had a richer and more coherent psychological meaning for ‘environmental preservation’ than they did for ‘environmental utilization’. Furthermore, participants associated ‘environmental preservation’ mainly with positive aspects, while they associated ‘environmental utilization’ with both positive and negative aspects. Interestingly, ‘forests’ were associated with both stimulus words, and ‘sustainability’ had the second highest semantic weight for ‘environmental utilization’.

Table 25

*Ten Main Definers of the Higher Order Environmental Attitudes Dimensions for the Test-Retest Sample (Study 2c)*

Stimulus words							
'Environmental Preservation'				'Environmental Utilization'			
Definers	SW(NTD)	ND	AL	Definers	SW(NTD)	ND	AL
Conservation	68(19)	100%	+	Exploitation	57(13)	100%	-
Recycling	50(15)	73.5%	+	Sustainability	47(12)	82.5%	+
Protecting	43(13)	63.2%	+	Use	28(8)	49.1%	-
Forests	28(7)	41.2%	+	Pollution	25(7)	43.9%	-
Future	26(9)	38.2%	+	Water	22(6)	38.6%	+
Saving	25(7)	36.8%	+	Farming	20(6)	35.1%	+
Trees	23(6)	33.8%	+	Forests	18(5)	31.6%	+
Necessary	22(5)	32.4%	+	Cautions	16(4)	28.1%	-
Difficult	20(5)	29.4%	-	Abuse	15(4)	26.3%	-
Reserves	18(5)	26.5%	+	Humans	15(4)	26.3%	-

Note.  $N = 80$ . SW = semantic weight; NTD = number of times the definer was listed; ND = network density; AL = affective load.

## ***SUMMARY AND CONCLUSIONS FROM STUDY 2C***

Study 2c accomplished four main objectives: (1) offered additional support for the horizontal and vertical structure model of EA, (2) demonstrated the psychometric properties of the short-form of the EAI, (3) expanded the EA nomological network by offering some indication of convergent and discriminant validity of Preservation and Utilization, and (4) reported qualitative data regarding the psychological meaning of these two EA higher order dimensions.

Once again the results indicated considerable overlap between Preservation and Utilization. First, the one-second-order-factor model was virtually as good as the two-correlated-second-order-factors model. Second, Preservation and Utilization were very highly correlated (.75). Finally, Preservation and Utilization showed a very similar pattern of relationship with almost all criterion variables. This consistent pattern of results raises the question whether Preservation and Utilization

are empirically distinct or opposite ends of a single dimension. This question will be discussed in more detail below.

## ***GENERAL SUMMARY AND CONCLUSIONS FROM STUDY 2***

Study 2 tested the dimensionality and nomological network of EA in three independent studies and in a more systematic way. It did so using the fully balanced Environmental Attitudes Inventory (EAI), therefore extending the findings from Study 1 that were based on only ten primary factors using ad hoc item sets not adequately balanced to control for direction-of-wording effects. The EAI was developed to investigate the horizontal and vertical structure of EA. Overall, the twelve EAI scales were shown to have high internal consistency and homogeneity, to be unidimensional scales, to have high test-retest reliability, and to be largely free from social desirability. The results of the three empirical investigations of Study 2 supported the validity and reliability of both the complete EAI (with 10 items per scale) and its short-form (i.e., EAI-S, with only 6 items per scale). It seems, therefore, that EA can be measured through twelve primary factors, and that these factors may form, in turn, a hierarchical structure. A crucial issue is whether this hierarchical structure comprises one or two higher order dimensions.

The confirmatory factor analyses suggested that two content factors (i.e., Preservation and Utilization) provided a better empirical fit for both the EAI and the EAI-S items than did a single content factor (i.e., Generalized Environmental Attitudes). This distinction was somewhat supported by Preservation and Utilization predicting some external variables differently. For instance, Preservation was consistently related to ecological behaviour but not to economic liberalism, whereas Utilization was consistently related to economic liberalism but not to ecological behaviour. Moreover, Preservation was related to being female, inclusion with nature, sustainability, limits to economic growth, attitudes toward democracy, self-transcendence and altruistic values, general environmental concern, awareness of consequences for local environmental problems, ascription of responsibility for global problems, agreeableness, conscientiousness, emotional stability, intellect,

and past-positive time orientation. On the contrary, Utilization was related to religiosity, Biblical literalism, being Judeo-Christian, social dominance orientation, and right-wing authoritarianism.

These distinctions between Preservation and Utilization are qualified by some important findings that threaten the independence of these two factors. First, even though the two-correlated-second-order-factors model provided the best fit to the data and was statistically better fitting than a one-factor second-order model across all three studies, the differences were marginal: the one-second-order-factor model was virtually as good as the two-correlated-second-order-factors model. Thus, given the similarity of the fit indices, a case could be made for accepting either model because the two-correlated-second-order-factors model fits the data slightly better and the one-second-order-factor model is more parsimonious. Second, Preservation and Utilization were highly and inversely correlated in all three studies, with an average intercorrelation of  $-.66$  and  $-.87$  for the observed and latent variables, respectively. Third, as a result of being so highly negatively correlated, these two factors showed a similar pattern of association with several criterion variables. Fourth, the qualitative data also indicated similarity between the psychological meanings of Preservation and Utilization. For instance, 'environmental utilization' was associated with both positive (e.g., sustainability) and negative (e.g., exploitation) aspects, and the definer 'forests' was associated with both 'environmental preservation' and 'environmental utilization'. Finally, the pattern of relationships between the unidimensional factor score (i.e., GEA) and the criterion variables was much more consistent across studies and over time than the relationships between Preservation and Utilization and the criterion variables.

Thus, even though the idea that EA are rooted in two higher order sets of environmental values is theoretically meaningful and even though some findings seem to suggest that they constitute factorially distinct higher order dimensions that correlate differently with specific external variables, independence between Preservation and Utilization has not been clearly established. In other words, these higher order factors are so strongly related that they seem more to express a unidimensional, bipolar construct, where Preservation and Utilization are its end-points, rather than a two-dimensional construct.

In summary, there is some evidence for discriminant validity of Preservation and Utilization. However, given the very powerful correlation between these latent factors, which suggests virtual unidimensionality, it seems debatable whether Preservation and Utilization can be seen as truly meaningful. As mentioned previously, some differential effects may also result from content overlap between a criterion variable and either Preservation or Utilization which may result in a non-significant effect for the other. For instance, the possibility of content overlap between Preservation and ecological behaviour and between Utilization and economic liberalism may explain the non-significant Betas for Preservation and economic liberalism and for Utilization and ecological behaviour. The cases where both Preservation and Utilization are significantly related to the same criterion variable (either in the same direction or in different directions) seem to provide somewhat stronger evidence that these factors have some differential effects. It does seem clear, however, that the current study may not have assembled enough evidence to come to definitive conclusions about the higher order dimensionality of EA, and that a clear conclusion must await more research in new and different samples. It is possible that there may well be samples or situations in which the two-correlated-second-order-factors model might be found to be clearly superior to the one-second-order-factor model.

Since more parsimonious models are preferred over less parsimonious ones, and since the one-second-order-factor model is the simplest explanation for the structure of EA, it must be concluded that this model should be adopted, at least in the meantime. Given that the two higher order dimensions are highly plausible and worthy of further scrutiny, further research should continue testing the two-correlated-second-order-factors model until enough evidence has been accumulated to decide the issue more conclusively. This approach will therefore be adopted in the next study.

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## *Chapter Six*

# ***Study 3. Testing the measurement invariance of the EAI-S and the value/threat-attitude-behaviour model<sup>7</sup>***

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### ***INTRODUCTION AND OUTLINE OF STUDY 3***

Both Study 1 and Study 2 examined the dimensionality and nomological network of EA. These studies provided support for the multidimensionality of EA, expanded the nomological relationship between EA and socio-demographic, psychological and environmentally related variables, and also demonstrated the validity and reliability of the EAI and EAI-S. The vertical structure of EA is still, however, not completely clear. First, the two proposed higher order dimensions, Preservation and Utilization, were strongly correlated but some discriminant validity was demonstrated. Second, although the findings have indicated that the two-correlated-second-order-factors model seems to represent the data well, the fit indices were very similar for both the one-second-order-factor and two-correlated-second-order-factors models. Therefore, adopting the most parsimonious model, Study 3 will focus on the one-second-order-factor model, although results will also be reported testing the discriminant validity of Preservation and Utilization since it seems premature to entirely discard the two-correlated-second-order-factors model model.

The objective of Study 3 was therefore to test the one-second-order-factor model in a more systematic way. This study also examined the third topic addressed in this research, that is, the value/threat-attitude-behaviour model. A cross-cultural study was conducted in Brazil, New Zealand, and South Africa with five specific research objectives, to test: (1) the validity and reliability of the EAI-S in three further samples, (2) the measurement invariance of the EAI-S across these three samples, (3) the competing hierarchical models of EA, (4) the value-attitude-

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<sup>7</sup> Parts of this study were presented at the 18th International Congress of the International Association for Cross-Cultural Psychology (Milfont, Duckitt, & Wagner, 2006).

behaviour cognitive hierarchy model, and (5) the contribution of perceived environmental threat to this model (i.e., value/threat → EA → ecological behaviour model).

Brief information regarding the countries in this study seems in order. General information is based on the Center for International Business Education and Research's web-portal at Michigan State University (globalEDGE, 2006), while information regarding psychological and socioeconomic-political indicators related to environmental issues are based on the World Values Survey (World Values Survey, 2006), the Environmental Sustainability Index (ESI) (Environmental Sustainability Index, 2005), and the Environmental Performance Index (EPI) (Environmental Performance Index, 2006). Table 26 summarises relevant statistics.

**Brazil.** This country was colonized by the Portuguese in the 16th century. Six major groups make up the Brazilian population: native peoples (mainly from Tupi and Garani language groups), Portuguese, Africans, other Europeans, Middle Eastern, and Asian immigrant groups. Brazil is the only Portuguese-speaking nation in the Americas, and its primary religion is Roman Catholic. As can be seen in Table 26, Brazil has the highest total area, population, and population growth rate of the three countries. Moreover, this country has the highest environmental support in almost all environmental related indicators (except for environmental protection and Environmental Performance Index).

**New Zealand.** This country was colonized by the British in the late 19th century, after the United Kingdom established British sovereignty through the Treaty of Waitangi signed in 1840 with Māori chiefs, the native peoples. Four major ethnic groups constitute New Zealand society: European or Pakeha (mainly of British origin), Māori, Pacific Islanders, and Asians. The major language is English, but Te Reo Māori is also an official language, and the primary religion is Anglican. As can be seen in Table 26, New Zealand has the highest gross domestic product (GDP) of the three countries, and also the highest Environmental Performance Index.

**South Africa.** The first Europeans in South Africa were the Portuguese, but the Dutch started the first settlements in the 17th century, and the British intensified their settlements in the 18th century. The major languages are Zulu, Xhosa, Sotho, Afrikaans and English, and the primary



religions are Christian and indigenous beliefs. The ethnic groups are African peoples (mainly from Khoisan and Bantu language groups), Afrikaners (mainly originating from Dutch, French and German settlers), British, and Indian/Asian. As can be seen in Table 26, South Africa has a higher GDP than Brazil, and a higher degree of confidence in the environmental protection movement than New Zealand.

Table 26

*Comparison of General, Psychological and Socioeconomic-Political Indicators among the Countries Included in Study 3*

Indicators	Category	Brazil	New Zealand	South Africa
<i>globalEDGE</i>				
Area (total)	Rank out of 197 countries	5 <sup>th</sup>	73 <sup>rd</sup>	24 <sup>th</sup>
Population		5 <sup>th</sup>	120 <sup>th</sup>	26 <sup>th</sup>
Population growth rate		107 <sup>th</sup>	109 <sup>th</sup>	190 <sup>th</sup>
GDP per capita		72 <sup>nd</sup>	33 <sup>rd</sup>	60 <sup>th</sup>
<i>World Values Survey<sup>a</sup></i>				
‘I would agree to an increase in taxes if the extra money were used to prevent environmental pollution’	Agree (%)	73.0%	54.9%	42.6%
	Disagree (%)	27.0%	45.1%	57.4%
Degree of confidence in the environmental protection movement	Great deal of confidence (%)	80.2%	48.3%	56.7%
	Not much confidence (%)	19.8%	51.7%	43.3%
	Protecting environment (%)	48.9%	50.4%	27.5%
Environmental protection vs. Economic growth	Economic growth (%)	46.6%	49.6%	72.3%
	Other answer (%)	4.5%	–	0.1%
	Coexist nature (%)	94.9%	93.7%	63.8%
Human and Nature	Master nature (%)	5.1%	6.3%	36.2%
<i>Environmental Sustainability Index</i>				
Based on twenty one indicators	Rank out of 146 countries (2005)	11 <sup>th</sup>	14 <sup>th</sup>	93 <sup>rd</sup>
<i>Environmental Performance Index</i>				
Based on sixteen indicators	Rank out of 133 countries (2005)	34 <sup>th</sup>	1 <sup>st</sup>	76 <sup>th</sup>

Note. GDP = gross domestic product. <sup>a</sup> Data based on the 1995/1998 wave. Data from Brazil ( $N = 1,143$ ) was collected in 1997. Data from New Zealand ( $N = 1,098$ ) was collected in 1998. Data from South Africa ( $N = 2,770$ ) was collected in 1997. Questions for environmental protection vs. economic growth: “Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs”, and “Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent”. Questions for human and nature: “Human beings should master nature”, and “Humans should coexist with nature”.

In brief, the data indicate that Brazil, although being the biggest, most populated, and poorest of the three countries, has a higher overall environmental orientation than either New Zealand or South Africa. This background information will be useful for understanding the findings of Study 3.

Predictions for Study 3 were formulated. These predictions are based on the theory and research presented in the literature review and the findings from both Study 1 and 2.

1. It was expected that EAI-S scales would show measurement invariance across samples from Brazil, New Zealand and South Africa.
2. It was expected that the EA scores (specifically for Preservation) would be higher for the Brazil sample than for New Zealand and South African samples because available data suggest that Brazilians are more concerned about the environment.
3. It was expected that value orientations would predict EA, and that EA would fully mediate the relationship between values and self-reported ecological behaviour because theory and research suggest the value → attitude → behaviour causal sequence.
4. It was expected that perceived environmental threat would be an additional predictor of EA, and that EA would also fully mediate the relationship between environmental threat and self-reported ecological behaviour (i.e., value/threat → attitude → behaviour causal sequence).

## ***METHOD***

### ***PARTICIPANTS AND PROCEDURE***

A questionnaire-based study was conducted in 2005 with undergraduate psychology students from Brazil, New Zealand, and South Africa. The Brazil sample was composed of 201 students from the Federal University of Paraiba (149 females, 52 males) with ages ranging from 18 to 47 years ( $M = 22.17$ ,  $SD = 4.27$ ), the New Zealand sample was composed of 226 students from the University of Auckland (159 females, 67 males) with ages ranging from 17 to 39 years ( $M = 19.48$ ,

$SD = 2.54$ ), and the South Africa sample was composed of 257 students from the University of Pretoria (187 females, 71 males) with ages ranging from 17 to 42 years ( $M = 19.36$ ,  $SD = 2.69$ ). The South African participants were able to choose between an English or Afrikaans version of the questionnaire since these were the languages of instruction of the university. The questionnaire was translated into Afrikaans using a bilingual committee approach (van de Vijver & Leung, 1997). Most of the participants (57.2%,  $n = 147$ ) chose the English version.

## ***INSTRUMENTS***

The responses to all measures were given on a 7-point Likert rating scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), except as noted. The questionnaire included the EAI-S, single self-reported items (religiosity, Biblical literalism, political orientation, self-perceived family economic status, inclusion with nature, and membership to an environmental organisation), the ecological behaviour scale, the economic liberalism scale, the values priorities scale (see Studies 1 and 2 for descriptions of these measures), plus the following measures.

*Sustainability.* A 3-item scale was created based on definitions of sustainable development from the United Nations (Brundtland, 1987), the World Conservation Union, the United Nations Environment Programme, and the World Wide Fund for Nature (IUCN, UNEP, & WWF, 1991). The items were: “In the development of our society we must strive to meet the needs of the present generations without compromising the ability of future generations to meet their own needs”, “The idea that we should try to meet the needs of the current generation without undermining the ability of future generations to meet their own needs is wrong” (reverse scored), and “We should try to improve the quality of life while living within the capacity of the environment”.

*Environmental Appraisal Inventory.* This 24-item scale was developed by Schmidt and Gifford (1989) to measure hazards in the physical environment across three dimensions: self, environment, and control appraisal. More recently, Walsh-Daneshmandi and MacLachlan (2000) proposed a version of the scale measuring the self dimension. This adapted version was used in this study and comprises 26 items measuring appraisal of threat to the individual from environmental

hazards. However, this inventory also measures the appraisal of threat from environmental hazards that are not directly related to environmental issues (e.g., fluorescent lighting, visual pollution, noise). Thus, only the ten items tapping specific threat from environmental problems (i.e., water pollution, pollution from cars, pollution from factories, pollution from burning rubbish, acid rain, number of people, water shortage, change to the ozone layer caused by pollution, impure drinking water, chemical dumps) were selected and used in the analyses reported. This 10-item version assessing specific perceived threats from environmental problems is referred to here as the Perceived Environmental Threat scale. Responses were given on a 7-point Likert rating scale, ranging from 1 (*no threat*) to 7 (*extreme threat*).

## ***RESULTS AND DISCUSSION***

### ***DESCRIPTIVE STATISTICS AND RELIABILITIES***

Table 27 shows the alpha coefficients, mean inter-item correlations, skewness and kurtosis for the twelve EAI-S scales as well as for Preservation, Utilization and GEA scores across countries. In general the internal reliabilities were lower in Brazil and in South Africa than in New Zealand. Van de Vijver and Leung's (1997, Box 4.1) procedure was again used to test equality of internal reliabilities, with New Zealand as the baseline sample. All but five scales (Scales 3, 4, 6, 9, and 11) had a significantly lower reliability in Brazil, and all but five scales (Scales 3, 4, 6, 7, and 11) had a significantly lower reliability in South Africa. The only problematic scales were Scales 4 and 7, especially in Brazil and South Africa. The low reliabilities of these scales may be due to the constructs they aim to measure. For instance, Thompson and Barton (1994) also found a low internal reliability ( $\alpha = .58$  in Study 1, and  $\alpha = .67$ , in Study 2) for their anthropocentric attitude scale. Using this scale, Schultz and Zelezny (1999) also reported a strong variability of the alpha reliabilities across 14 countries, ranging from .64 to .81. Thus, the low internal consistency of the Scale 4 may be due to the general aspect of the construct it aims to measure rather than a weakness of the scale per se. This may also be the case for Scale 7. Overall, however, most EAI-S scales showed satisfactory internal reliabilities and homogeneity, with alphas higher than .60 and mean

inter-item correlations higher than .15. The low homogeneity of the Preservation, Utilization and GEA scale scores are consistent with their expected multidimensionality. None of the scales showed serious deviation from normality.

Table 27

*Descriptive Scale Statistics for the EAI-S in Brazil, New Zealand and South Africa*

Scale	No. of items	Brazil				New Zealand				South Africa			
		$\alpha$	$M r$	Skewness	Kurtosis	$\alpha$	$M r$	Skewness	Kurtosis	$\alpha$	$M r$	Skewness	Kurtosis
1. Enjoyment of nature	6	.82	.44	-.58	-.52	.88	.55	-.67	.19	.81	.43	-.97	1.10
2. Conservation policies	6	.60	.21	-.66	-.22	.83	.45	-.48	-.07	.68	.27	-.80	1.69
3. Environmental activism	6	.85	.48	-.14	-.52	.87	.54	-.47	.31	.86	.50	-.34	.02
4. Anthropocentric concern	6	.44	.11	-.30	.32	.53	.16	-.01	-.13	.55	.16	.03	-.01
5. Confidence in Science	6	.77	.36	-.28	.02	.82	.44	.29	.77	.77	.36	-.01	.21
6. Environmental fragility	6	.75	.35	-.67	.33	.76	.34	.17	-.12	.71	.30	-.31	-.21
7. Altering nature	6	.58	.18	.19	.12	.67	.25	-.30	.54	.71	.28	-.22	.07
8. Personal conservation	6	.73	.33	-.58	.13	.84	.46	-.65	.76	.77	.35	-.86	1.35
9. Dominance over nature	6	.83	.44	.49	-.35	.86	.51	.48	-.20	.78	.37	.15	-.31
10. Utilization of nature	6	.67	.25	-.25	-.07	.78	.37	.12	.99	.67	.25	-.25	.17
11. Ecocentric concern	6	.66	.26	-.46	-.02	.71	.29	-.29	.20	.67	.26	-.35	-.32
12. Population growth	6	.83	.44	.12	-.25	.88	.54	.42	.03	.83	.45	-.05	-.22
Preservation	42	.88	.16	-.11	-.11	.91	.20	.01	.30	.87	.14	-.44	.70
Utilization	30	.81	.13	-.46	.15	.86	.17	-.25	.42	.82	.13	-.31	.11
GEA	72	.90	.12	.28	-.07	.93	.17	.19	.71	.90	.12	-.06	.60

Note. Brazil:  $N = 201$ . New Zealand:  $N = 226$ . South Africa:  $N = 257$ .  $M r$  = mean inter-item correlation. GEA = Generalized Environmental Attitudes (i.e., Preservation and Utilization combined).

The item means and standard deviations of all EAI-S scales, Preservation, Utilization, and GEA scores for each country are reported in Table 28. One-way ANOVAs were performed to compare these means across cultures. When significant differences emerged, post hoc multiple comparison Scheffe tests were conducted to evaluate which specific group means differed from each other. The *F* values indicated that only two Utilization scales (Scales 5 and 7) did not have significant differences between means. Four scales (Scales 4, 11, 12, and GEA) showed significantly different means between all three countries. Participants from Brazil and South Africa had similar means for the Preservation scales (Scales 1, 3, 6, 8, and Preservation), and participants from New Zealand and South Africa had similar means for the Utilization scales (Scales 9, 10, and Utilization) and for one Preservation scale (Scale 2). These significant mean differences provide some evidence of the usefulness of the Preservation and Utilization scores by showing that these dimensions discriminate participants from different countries. Overall, participants from Brazil showed significantly higher Preservation attitudes and lower Utilization attitudes than participants from both New Zealand and South Africa, and participants from these latter two countries did not differ significantly. These results support the data reported in Table 26.

Table 28

*Mean Comparison of the EAI-S Scales across Countries*

Scale	Brazil		New Zealand		South Africa		F
	M	SD	M	SD	M	SD	
1. Enjoyment of nature	5.55 <sup>a</sup>	1.02	5.25 <sup>b</sup>	1.18	5.49 <sup>a</sup>	1.09	4.74**
2. Conservation policies	6.00 <sup>a</sup>	.75	5.49 <sup>b</sup>	.98	5.67 <sup>b</sup>	.88	17.79***
3. Environmental activism	4.93 <sup>a</sup>	1.03	4.34 <sup>b</sup>	1.25	4.92 <sup>a</sup>	1.16	19.67***
4. Anthropocentric concern	3.34 <sup>a</sup>	.80	3.99 <sup>b</sup>	.86	3.68 <sup>c</sup>	.95	28.79***
5. Confidence in Science	3.87 <sup>a</sup>	1.00	3.69 <sup>a</sup>	1.02	3.77 <sup>a</sup>	1.06	1.53
6. Environmental fragility	5.63 <sup>a</sup>	.87	4.93 <sup>b</sup>	.84	5.45 <sup>a</sup>	.84	40.34***
7. Altering nature	4.08 <sup>a</sup>	.86	4.03 <sup>a</sup>	.89	4.19 <sup>a</sup>	1.03	1.88
8. Personal conservation	5.51 <sup>a</sup>	.86	5.03 <sup>b</sup>	1.11	5.37 <sup>a</sup>	1.03	13.42***
9. Dominance over nature	2.74 <sup>a</sup>	1.17	3.02 <sup>b</sup>	1.28	3.29 <sup>b</sup>	1.24	11.23***
10. Utilization of nature	2.85 <sup>a</sup>	.83	3.07 <sup>b</sup>	.90	3.18 <sup>b</sup>	.85	8.74***
11. Ecocentric concern	5.77 <sup>a</sup>	.75	5.28 <sup>b</sup>	.87	5.55 <sup>c</sup>	.89	18.03***
12. Population growth	3.69 <sup>a</sup>	1.20	3.20 <sup>b</sup>	1.35	4.08 <sup>c</sup>	1.34	27.63***
Preservation	5.30 <sup>a</sup>	.57	4.79 <sup>b</sup>	.68	5.22 <sup>a</sup>	.60	44.14***
Utilization	3.38 <sup>a</sup>	.59	3.56 <sup>b</sup>	.65	3.62 <sup>b</sup>	.65	8.92***
GEA	5.02 <sup>a</sup>	.51	4.64 <sup>b</sup>	.61	4.87 <sup>c</sup>	.55	24.53***

Note. Brazil:  $N = 201$ . New Zealand:  $N = 226$ . South Africa:  $N = 257$ . Means with the same superscript are not different from each other. Means across rows with different superscripts are significantly different from each other. GEA = Generalized Environmental Attitudes score (i.e., Preservation and Utilization combined).

\*\*  $p < .01$ . \*\*\*  $p < .001$ .

The descriptive statistics and reliabilities of all criterion variables were then assessed. Tables 29, 30 and 31 respectively present the descriptive scale statistics for the criterion variables in Brazil, New Zealand, and South Africa. It can be seen that certain scales exhibit lower ( $< .60$ ) alphas and moderate levels ( $> 1.0$ ) of skewness and kurtosis, especially in Brazil and in South Africa. Overall, however, all scales had high levels of homogeneity, and did not exhibit serious deviation from normality.



Table 29

*Descriptive Scale Statistics for the Criterion Scales in Brazil*

Scale	No. of items	$\alpha$	Mean inter-item correlation	$M$	$SD$	Skewness	Kurtosis
Altruistic values	3	.65	.39	5.82	1.09	-.84	.27
Biospheric values	3	.84	.63	5.19	1.41	-.67	.11
Conservatism values	3	.46	.24	5.06	1.06	-.30	-.16
Ecological behaviour	8	.79	.34	2.62	.79	.40	-.46
Economic liberalism	3	.69	.43	3.02	1.09	.04	-.49
Environment problems threat	10	.89	.46	5.36	.99	-.62	.01
Openness to change values	3	.72	.46	4.46	1.44	-.43	.31
Self-enhancement values	3	.60	.34	2.86	1.32	-.13	-.14
Self-transcendence values	3	.71	.45	5.69	1.14	-.93	.56
Sustainability	3	.54	.27	5.37	1.19	-.28	-.91

Note.  $N = 201$ .

Table 30

*Descriptive Scale Statistics for the Criterion Scales in New Zealand*

Scale	No. of items	$\alpha$	Mean inter-item correlation	$M$	$SD$	Skewness	Kurtosis
Altruistic values	3	.63	.36	5.37	1.23	-.66	-.17
Biospheric values	3	.86	.68	4.56	1.54	-.35	-.39
Conservatism values	3	.70	.44	5.25	1.26	-.83	.85
Ecological behaviour	8	.73	.26	3.31	.69	-.33	.55
Economic liberalism	3	.74	.49	3.64	1.08	.15	.59
Environmental problems threat	10	.90	.48	4.58	1.19	-.33	-.49
Openness to change values	3	.66	.39	4.71	1.28	-.37	-.17
Self-enhancement values	3	.60	.34	3.53	1.39	.00	-.43
Self-transcendence values	3	.70	.44	5.13	1.30	-.53	-.01
Sustainability	3	.62	.35	5.05	1.03	-.16	.59

Note.  $N = 226$ .

Table 31

*Descriptive Scale Statistics for the Criterion Scales in South Africa*

Scale	No. of items	$\alpha$	Mean inter-item correlation	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
Altruistic values	3	.58	.32	5.65	1.14	-.99	.81
Biospheric values	3	.81	.60	5.24	1.28	-.71	-.08
Conservatism values	3	.66	.40	5.96	1.01	-1.77	6.13
Ecological behaviour	8	.66	.21	2.84	.68	.03	-.11
Economic liberalism	3	.68	.42	3.86	1.11	.02	.51
Environmental problems threat	10	.87	.41	4.83	1.18	-.62	-.10
Openness to change values	3	.55	.29	5.05	1.23	-.60	.01
Self-enhancement values	3	.55	.29	3.88	1.39	-.31	.17
Self-transcendence values	3	.63	.37	5.57	1.12	-1.26	3.44
Sustainability	3	.54	.27	5.26	1.05	-.00	-.87

Note. *N* = 257.

***INTERCORRELATIONS OF THE EAI-S SCALES***

Table 32 presents the intercorrelations between all twelve EAI-S scales across countries. Although there were some variations, especially for Scales 4, 5 and 12, the overall correlational patterns were similar for Brazil, New Zealand and South Africa. The intercorrelations of the EAI-S scales were not too powerful (only 10 out of 198 were higher than .50) indicating considerable independence between the EAI-S scales, and the correlations seemed to reveal Preservation and Utilization variable clusters.

Table 32

*Intercorrelations of the EAI-S Scales across Countries (Study 3)*

Scale	1	2	3	4	5	6	7	8	9	10	11	12
Scale 1												
Brazil	—											
New Zealand	—											
South Africa	—											
Scale 2												
Brazil	.14*	—										
New Zealand	.38***	—										
South Africa	.28***	—										
Scale 3												
Brazil	.51***	.29***	—									
New Zealand	.42***	.40***	—									
South Africa	.27***	.16*	—									
Scale 4												
Brazil	-.10	-.32***	-.26***	—								
New Zealand	-.11	-.35***	-.37***	—								
South Africa	-.25***	-.23***	-.11	—								
Scale 5												
Brazil	.03	-.14*	-.02	.28***	—							
New Zealand	-.10	-.24***	-.14*	.21**	—							
South Africa	-.11	.01	.02	.18**	—							
Scale 6												
Brazil	.15*	.55***	.25***	-.40***	-.16*	—						
New Zealand	.23**	.52***	.31***	-.39***	-.34***	—						
South Africa	.25***	.37***	.18**	-.35***	-.24***	—						

Table 32 (continued)

Scale	1	2	3	4	5	6	7	8	9	10	11	12
Scale 7												
Brazil	-.30***	-.08	-.22**	.26***	.17*	-.17*	—					
New Zealand	-.35***	-.32***	-.41***	.36***	.16*	-.41***	—					
South Africa	-.30***	-.20**	-.30***	.24***	.10	-.29***	—					
Scale 8												
Brazil	.26***	.37***	.37***	-.21**	-.06	.32***	-.17*	—				
New Zealand	.43***	.34***	.52***	-.13	-.09	.15*	-.34***	—				
South Africa	.22***	.15*	.39***	-.26***	-.11	.29***	-.19**	—				
Scale 9												
Brazil	-.14*	-.29***	-.34***	.29***	.11	-.34***	.29***	-.19**	—			
New Zealand	-.25***	-.32***	-.20**	.31**	.08	-.21**	.42***	-.37***	—			
South Africa	-.17**	-.16*	-.22**	.32***	.02	-.22***	.39***	-.23***	—			
Scale 10												
Brazil	-.28***	-.36***	-.40***	.26***	.10	-.41***	.29***	-.38***	.45***	—		
New Zealand	-.43***	-.54***	-.46***	.39***	.26***	-.42***	.44***	-.46***	.31***	—		
South Africa	-.22***	-.41***	-.27***	.40***	.16**	-.54***	.34***	-.31***	.31***	—		
Scale 11												
Brazil	.32***	.42***	.38***	-.32***	-.16*	.52***	-.25***	.41***	-.29***	-.43***	—	
New Zealand	.38***	.50***	.34***	-.26***	-.20**	.37***	-.35***	.39***	-.36***	-.54***	—	
South Africa	.30***	.34***	.23***	-.38***	-.07	.48***	-.20**	.40***	-.19**	-.50***	—	
Scale 12												
Brazil	-.04	.16*	.20**	-.19**	-.08	.23**	-.19**	.06	-.22**	-.24**	.11	—
New Zealand	.08	.14*	.13	-.28***	.11	.14*	-.25***	.07	-.20**	-.16*	.02	—
South Africa	.06	.20**	-.02	-.13*	.08	.22***	-.16**	.14*	-.06	-.28***	.22***	—

Note. Brazil:  $N = 201$ . New Zealand:  $N = 226$ . South Africa:  $N = 257$ . Scale labels: Scale 1 = Enjoyment of Nature, Scale 2 = Support for Interventionist Conservation Policies, Scale 3 = Environmental Movement Activism, Scale 4 = Conservation Motivated by Anthropocentric Concern, Scale 5 = Confidence in Science and Technology, Scale 6 = Environmental Fragility, Scale 7 = Altering Nature, Scale 8 = Personal Conservation Behaviour, Scale 9 = Human Dominance Over Nature, Scale 10 = Human Utilization of Nature, Scale 11 = Ecocentric Concern, and Scale 12 = Support for Population Growth Policies.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ . Two-tailed.

### ***TESTING THE EAI-S STRUCTURAL MODEL***

The cross-cultural data enable a more systematic test of the EAI-S structural model, in particular of whether the EAI-S scales would have a one or two factor higher order structure. First, exploratory factor analyses were performed. This time, however, a more systematic approach was taken by employing Becker's (1996) procedure for meta-analyses of factor structure, which weights each group's correlation matrix equally (K. Leung & Bond, 2004; K. Leung et al., 2002). Following this procedure, a correlation matrix of the twelve EAI-S scales was calculated for each cultural group (as reported in Table 32), and the resulting correlations were transformed by the Fischer's *r*-to-*Z* transformation. These three transformed matrices were then averaged, and the resulting pooled matrix was then transformed back into correlations. This final averaged correlation matrix was used for factor analysis.

Exploratory PAF analysis was performed followed by oblique rotation (promax rotation with Kaiser normalization). The KMO showed adequate fit ( $KMO = .87$ ), indicating the possibility of underlying factors. Scree plots from the PCA and PAF eigenvalues indicated a substantial drop after the first eigenvalue. All twelve scales loaded quite strongly (from .26 for Scale 12 to .71 for Scale 10) on the first unrotated factor, and this first unrotated factor explained 33.6% of the total variance (compared to only 10% for the second factor extracted). However, three eigenvalues greater than one emerged (4.04, 1.20, 1.07), and parallel analysis indicated that the first two eigenvalues were higher than those that would be obtained from 100 replications of random data with the same number of scores and the same sample size. Therefore, the scree test, the parallel analysis, and the eigenvalues-greater-than-one rule suggested the extraction of one, two or three higher order factors, respectively.

These solutions were then forced, and the results are reported in Table 33. As can be seen, no clear pattern was suggested for the 3- and 2-factor solutions. That is, the factors derived by both

the 3- and 2-factor solutions yield constructs that are neither clear nor theoretically viable.<sup>8</sup> Taken together, therefore, these EFA results suggested that a single higher order factor underlies the EAI-S scales.

Table 33

*Higher Order Factor Loadings of the EAI-S based on a Meta-Analytical Approach (Study 3)*

Primary Factors	Higher Order Factor Loadings					
	3-factors solution			2-factors solution		1-factor solution
1. Enjoyment of nature	<b>.63</b>	-.11	-.03	-.14	<b>.68</b>	<b>.47</b>
2. Conservation policies	.17	<b>.57</b>	.09	<b>.50</b>	.14	<b>.59</b>
3. Environmental activism	<b>.71</b>	-.12	-.07	-.15	<b>.78</b>	<b>.55</b>
4. Anthropocentric concern	.12	<b>-.40</b>	<b>.36</b>	<b>-.58</b>	.03	<b>-.52</b>
5. Confidence in Science	.13	-.31	.08	<b>-.37</b>	.13	<b>-.23</b>
6. Environmental fragility	-.11	.79	-.05	<b>.80</b>	-.11	<b>.63</b>
7. Altering nature	-.13	.08	<b>.67</b>	-.25	<b>-.30</b>	<b>-.52</b>
8. Personal conservation	<b>.61</b>	.06	.06	-.01	<b>.60</b>	<b>.53</b>
9. Dominance over nature	-.11	-.10	<b>.40</b>	<b>-.30</b>	-.23	<b>-.49</b>
10. Utilization of nature	-.27	<b>-.41</b>	.14	<b>-.47</b>	<b>-.31</b>	<b>-.73</b>
11. Ecocentric concern	<b>.34</b>	<b>.47</b>	.09	<b>.40</b>	<b>.30</b>	<b>.66</b>
12. Population growth	-.12	.18	-.27	<b>.32</b>	-.05	.26

Note.  $N = 684$ . Factor loadings based on Principal Axis Factoring and Promax Rotation with Kaiser Normalization (rotation converged in 8 and 3 iterations for the 3- and 2-factors solutions, respectively). Loadings equal or above  $|.30|$  are given in bold face.

A confirmatory approach was then taken to systematically test alternative higher order models. In this study item parcels to perform CFA were created in a slightly different way. The samples were first combined, and the single factor method (cf. Landis, Beal, & Tesluk, 2000) for developing indicators used in previous studies was employed. That is, each of the twelve 6-item

<sup>8</sup> It should be noted that Scales 1, 3 and 8 tended to cluster together and apart from the other scales when the factor plot in the rotated factor space is analysed. As noted previously, these scales seem to share behavioural contents that may explain this grouping. This may support Dunlap and Jones' (2002) conclusion that in environmental attitude studies, the cognitive and affective aspects of attitude tend to merge together into a single dimension, while the behavioural aspect tend to form a separate dimension. Given that these three scales loaded heavily on the first unrotated factor and did not form a clear factor, the possibility of a behavioural factor was not investigated further.

scales were independently forced into a one-factor solution using EFA, and the items with the highest and lowest loadings were successively combined until all items from a given EAI-S scale had been assigned to one of its three parcels, with a pro- and a con-trait item comprising each parcel. Therefore, the same set of items forming the item parcels were used across samples. Six models were then tested for each sample.

**Model 1.** This was a one-first-order-factor model in which all item parcels are associated with each other and their correlations are jointly explained by a single factor.

**Model 2.** This was a two-correlated-first-order-factor model in which the Preservation item parcels load on one factor and the Utilization item parcels load on a second factor.

**Model 3.** This was a twelve-correlated-first-order-factor model in which the item parcels from each of the twelve scales were specified to load on their respective factors. This is the proposed EAI-S measurement model.

**Model 4.** This was a one-second-order-factor model in which the twelve first-order factors are associated with each other and their correlations are jointly explained by a single second-order factor.

**Model 5.** This was a two-uncorrelated-second-order-factors model in which seven first-order factors (i.e., Scales 1, 2, 3, 6, 8, 11, and 12) are associated with each other and their correlations are jointly explained by one second-order factor (i.e., Preservation), and the remaining five first-order factors (i.e., Scales 4, 5, 7, 9, and 10) are associated with each other and their correlations are jointly explained by another second-order factor (i.e., Utilization). Additionally, the two second-order factors are uncorrelated.

**Model 6.** This is a two-correlated-second-order-factors model in which seven first-order factors (i.e., Scales 1, 2, 3, 6, 8, 11, and 12) are associated with each other and their correlations are jointly explained by one second-order factor (i.e., Preservation), and the remaining five first-order factors (i.e., Scales 4, 5, 7, 9, and 10) are associated with each other and their correlations are jointly explained by another second-order factor (i.e., Utilization). Additionally, the two second-order factors are allowed to correlate.

Each of the six models was fitted to the data from each country separately. The results are reported in Table 34. The results show that Model 3 was the model with the better fit indices. This was expected because structural models (Models 4 to 6) are merely a more parsimonious representation of the covariance of the first-order factors and as such can never have better fit than the corresponding measurement model (see Marsh & Hocevar, 1985). Regarding the structural models, however, both the one-second-order-factor and the two-correlated-second-order-factors models (Models 4 and 6, respectively) had better overall fit indices than the two-uncorrelated-second-order-factors model (Model 5). The two-correlated-second-order-factors model was statistically better fitting than the one-second-order-factor model in Brazil,  $\chi^2(1) = 12.76, p < .001$ , and marginally better fitting in South Africa,  $\chi^2(1) = 3.04, p < .10$ . There was no significant difference between these two models in the New Zealand sample,  $\chi^2(1) = 0.14, p > .05$ . The correlations between the Preservation and Utilization latent factors were extremely high in all three countries: Brazil ( $\Phi = -.86$ ), New Zealand ( $\Phi = -.96$ ), and South Africa ( $\Phi = -.91$ ). In view of these extremely high correlations between the latent factors and the virtually identical model fit between the models for the samples from these three countries, it must again be concluded that the one-second-order-factor model is the most parsimonious explanation of the vertical structure of EA. The measurement invariance of this model was then tested.



Table 34

*Fit Indices for Alternative Models across Countries (Study 3)*

Model	$\chi^2$	<i>df</i>	$\chi^2/df$	RMSEA	RMSEA (90%CI)	SRMR	CFI	NNFI	ECVI	ECVI (90%CI)	CAIC	T
Model 1												
Brazil	2390.39	594	4.02	.12	(.12-.13)	.11	.75	.73	12.67	(11.94-13.44)	2844.23	NA
New Zealand	3439.37	594	5.79	.15	(.14-.15)	.12	.77	.76	15.93	(15.12-16.76)	3901.65	NA
South Africa	2991.40	594	5.04	.13	(.12-.13)	.11	.72	.70	12.25	(11.59-12.93)	3462.94	NA
Model 2												
Brazil	2306.53	593	3.89	.12	(.12-.13)	.11	.77	.76	12.26	(11.54-13.02)	2766.67	NA
New Zealand	3428.09	593	5.78	.15	(.14-.15)	.12	.78	.76	15.88	(15.08-16.72)	3896.79	NA
South Africa	2930.28	593	4.94	.12	(.12-.13)	.11	.73	.72	12.02	(11.37-12.69)	3408.37	NA
Model 3												
Brazil	654.55	528	1.24	.035	(.025-.043)	.055	.97	.96	4.65	(4.35-5.00)	1524.41	1.000
New Zealand	843.47	528	1.60	.052	(.045-.058)	.057	.97	.96	4.98	(4.64-5.35)	1729.51	1.000
South Africa	760.45	528	1.44	.041	(.035-.048)	.059	.96	.95	4.05	(3.78-4.35)	1664.23	1.000
Model 4												
Brazil	839.78	582	1.44	.047	(.040-.054)	.076	.95	.95	5.04	(4.67-5.44)	1369.26	.779
New Zealand	1056.51	582	1.82	.060	(.054-.066)	.076	.95	.95	5.44	(5.05-5.86)	1595.83	.798
South Africa	922.99	582	1.59	.048	(.042-.054)	.075	.95	.95	4.26	(3.95-4.60)	1473.11	.824

Table 34 (continued)

Model	$\chi^2$	<i>df</i>	$\chi^2/df$	RMSEA	RMSEA (90%CI)	SRMR	CFI	NNFI	ECVI	ECVI (90%CI)	CAIC	T
Model 5												
Brazil	873.68	582	1.50	.050	(.043-.057)	.14	.94	.93	5.21	(4.83-5.63)	1403.15	.749
New Zealand	1168.70	582	2.00	.067	(.061-.072)	.17	.94	.93	5.94	(5.52-6.39)	1708.02	.722
South Africa	1034.90	582	1.78	.055	(.050-.061)	.13	.93	.93	4.70	(4.36-5.06)	1585.02	.735
Model 6												
Brazil	827.02	581	1.42	.046	(.039-.053)	.075	.95	.95	4.99	(4.62-5.39)	1362.80	.791
New Zealand	1056.37	581	1.82	.060	(.054-.066)	.076	.95	.95	5.45	(5.06-5.87)	1602.12	.798
South Africa	919.95	581	1.58	.048	(.042-.053)	.075	.95	.95	4.26	(3.95-4.60)	1476.62	.827

Note. Brazil:  $N = 201$ . New Zealand:  $N = 226$ . South Africa:  $N = 257$ . Models: 1 = one-first-order-factor; 2 = two-correlated-first-order-factors; 3 = twelve-correlated-first-order-factors; 4 = one-second-order-factor; 5 = two-uncorrelated-second-order-factors; 6 = two-correlated-second-order-factors. All  $\chi^2$  statistics are significant at  $p < .001$ .  $\chi^2/df$  = the ratio of chi-square to degrees of freedom; RMSEA = root mean square error of approximation; 90%CI = 90 percent confidence interval; SRMR = standardized root mean square residual; CFI = comparative fit index; ECVI = expected cross-validation index; CAIC = consistent Akaike information criterion; T = target coefficient. NA = not applicable.

## ***MULTI-GROUP ANALYSIS: TEST OF MEASUREMENT INVARIANCE OF THE EAI-S***

Measurement invariance has become an important issue in recent years, especially in cross-cultural research, because it allows the researcher to check if members of different groups or cultures ascribe the same meanings to scale items or constructs investigated (Cheung & Rensvold, 1999, 2000; T. D. Little, 2000; Steenkamp & Baumgartner, 1998). This approach has also been used in environmental psychology research (e.g., Milfont, Duckitt, & Cameron, 2006; Schultz et al., 2005).

Jöreskog's (1971, 1993) strategy for the assessment of the comparability of factor structures is typically followed to test measurement invariance. In his strategy, nested models are organized in a hierarchical ordering with decreasing numbers of parameters (or increasing degrees of freedom), which entails adding parameter constraints one at a time. Multi-group confirmatory factor analyses (MGCFAs) are then performed to test these increasingly restrictive models (Cheung & Rensvold, 1999, 2002; Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). There are two types of MGCFA (Kaplan, 2000), one that is concerned with latent means, and thus incorporates the test of intercept terms invariance (e.g., Hong, Malik, & Lee, 2003; T. D. Little, 1997), and another that is not concerned with latent means (e.g., Marsh, 1994). This study is an example of the latter. Item parcels were again used, with the same items in each parcel across samples.<sup>9</sup>

The same absolute and incremental fit indices used in the previous studies were considered to compare an unconstrained model with one having measurement invariance constraints. In addition, three specific incremental indices suggested by Cheung and Rensvold (2002) for testing measurement invariance were used. These indices are based on the differences in Bentler's (1990)

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<sup>9</sup> Combining item-level data into parcels can mask a lack of invariance of specific items across groups (Meade & Kroustalis, 2006). Although this limitation is acknowledged, parcels were used in this research for several reasons. First, the multi-group analyses fail to converge when items were used as indicators, presumably because of the sheer size of the extremely large models tested. Second, the substantive aim of this research was to understand the nature of a set of constructs and how these constructs are related across cultures, and not to examine the structure of a set of items (cf. T. D. Little, Cunningham, Shahar, & Widaman, 2002). Finally, despite the potential limitations, several studies have also used parcels when examining measurement invariance (e.g., Gierl, 2000; Kim, Brody, & Murry, 2003; McCarthy, Simmons, Smith, Tomlinson, & Hill, 2002; Park, Huebner, Laughlin, Valois, & Gilman, 2004). Similarly, research testing the cross-cultural generality of the big-five model of personality has typically used facets rather than items as the basic unit in factor analysis (K. Leung & Bond, 2004, p. 153). Thus, the use of parcels in this research seems feasible.

comparative fit index (CFI), Steiger's (1989) gamma hat (GH), and McDonald's (1989) non-centrality index (NCI) that are obtained when comparing nested models. To calculate the GH and NCI, a free online program was used (Pirritano, 2005). If, in the sequence of the invariance tests, two nested models show a decrease in the value of CFI, GH and NCI greater than or equal to .01, .01, and .02 in magnitude, respectively, the more restrictive model should be rejected (Cheung, 2005; Cheung & Rensvold, 2002). Note, however, that these cut-off values are limited to a simulation study comparing structural models across only two groups. As the measurement invariance models reported here consider three groups, these fit indices should be interpreted with caution. Therefore, these indices as well as the others will be used only as indicative of overall model fit.

Measurement invariance of both measurement and structural models are necessary. Thus, the twelve-correlated-factor and one-second-order-factor models were tested. (The two-correlated-second-order-factors model was also tested to provide further information on the validity of the two higher order dimensions.) The five specific measurement invariance models tested are briefly described below (for a detailed presentation see Marsh, 1994; for a detailed presentation see Steenkamp & Baumgartner, 1998).

**Model A (*Configural invariance*).** This model (also known as the baseline model) is the first step to establish measurement invariance, and is satisfied if the basic model structure is invariant across groups, indicating that participants from different groups conceptualize the constructs in the same way. This model was tested by constraining the factorial structure to be equal across groups.

**Model B (*Metric invariance*).** This model tests if different groups respond to the items in the same way, and if the strengths of the relations between specific scale items and their respective underlying construct are the same across groups. Therefore, if metric invariance is satisfied, obtained ratings can be compared across groups and observed item differences will indicate group differences in the underlying latent construct. This model was tested by constraining all factor loadings to be equal across groups.

**Model C (Factor covariance invariance).** The stability of the factor relationships across groups is assessed in this model. This model was tested by constraining all factor loadings and factor covariances to be equal across groups,

**Model D (Factor variance invariance).** Invariance of factor variance indicates that the range of score on a factor do not vary across groups. This model was tested by constraining all factor loadings, factor covariances, and factor variances to be equal across groups.

**Model E (Error variance invariance).** In this final model, all parameters are constrained to be equal across groups. To test if the same level of measurement error is present for each item between groups, all factor loadings, factor covariances, factor variances, and error variances were constrained to be equal across groups.

Tables 35, 36 and 37 present the fit indices for the twelve-correlated-factor, one-second-order-factor, and two-correlated-second-order-factors models, respectively. The results indicate that the imposition of constraints resulted in statistically significant decreases in the fit of the models to the data. That is, increasingly restrictive models resulted in decreases in the fit, which indicates that the assumption of measurement invariance of the models tested in not upheld. For example, a comparison of the fully unconstrained model with the completely constrained model (i.e., Model A vs. Model E) reveals that the equality constraints on factor loadings, factor covariances, factor variances, and error variances significantly decreased model fit. This decrease in model fit was significant for the twelve-correlated-factor model [ $\chi^2(276) = 604.43, p < .001$ ], one-second-order-factor model [ $\chi^2(144) = 353.57, p < .001$ ], and two-correlated-second-order-factors model [ $\chi^2(170) = 423.60, p < .001$ ]. An inspection of these tables also indicate that Models C and E had poorer fit indices than the baseline model, as indicated particularly by the decrease in the CFI, GH and NCI values.

However, these results must be interpreted with caution. As discussed above, the sensitivity of the chi-square to sample size means that even small differences in parameter estimates between groups may be statistically significant. In addition, and more importantly, for all models the ratio of chi-square to degrees of freedom were lower than 2.0, the RMSEAs were lower than .06, and the

CFIs and NNFI were close to or higher than .95, suggesting that the measurement invariance of the models could be confirmed. Leung and Bond (2004) have argued that factors should be viewed as universal for practical purposes provided that they show a good level of similarity across cultures. Marsh (1994) has also noted that when “the lack of invariance is sufficiently small” one can conclude that the “parameter estimates are reasonably invariant across groups” (p. 16). Taken together, therefore, the results indicate that the assumption of measurement invariance of both EAI-S measurement and structural models was supported for practical purposes. That is, the EAI-S provides structurally similar measurement of EA across culture.

Table 35

*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)*

Model	$\chi^2$ ( <i>df</i> )	$\chi^2/df$	$\Delta\chi^2$ ( $\Delta df$ )	RMSEA	RMSEA (90%CI)	CFI ( $\Delta CFI$ )	GH ( $\Delta GH$ )	NCI ( $\Delta NCI$ )	NNFI	ECVI	ECVI (90%CI)	CAIC	T
A. Baseline	2258.48 (1584)	1.43	—	.043	(.039-.047)	.97 (—)	.95 (—)	.61 (—)	.96	4.53	(4.35-4.72)	5375.05	1.000
B. FL invariance	2315.21 (1632)	1.42	56.73 (48)	.043	(.039-.047)	.96 (-.01)	.95 (.00)	.61 (.00)	.96	4.47	(4.29-4.67)	5070.44	.975
C. FL, and FC invariance	2586.32 (1764)	1.47	271.11*** (132)	.045	(.042-.049)	.96 (.00)	.94 (.01)	.55 (-.06)	.96	4.49	(4.29-4.69)	4347.86	.873
D. FL, FC, and FV invariance	2632.21 (1788)	1.47	45.89*** (24)	.046	(.042-.049)	.96 (.00)	.94 (.00)	.54 (-.01)	.96	4.48	(4.29-4.69)	4213.08	.858
E. FL, FC, FV, and EV invariance	2862.91 (1860)	1.54	230.70*** (72)	.049	(.045-.052)	.95 (-.01)	.92 (.02)	.48 (-.06)	.95	4.61	(4.40-4.83)	3901.77	.789

Note.  $N = 684$ . All  $\chi^2$  statistics are significant at  $p < .001$ .  $\chi^2/df$  = the ratio of chi-square to degrees of freedom;  $\Delta\chi^2(\Delta df)$  = chi-square test; RMSEA = root mean square error of approximation; 90%CI = 90 percent confidence interval; CFI = comparative fit index;  $\Delta CFI$  = changes in the CFI; GH = gamma hat;  $\Delta GH$  = change in the gamma hat; NCI = noncentrality index;  $\Delta NCI$  = change in the NCI; NNFI = non-normed fit index; ECVI = expected cross-validation index; CAIC = consistent Akaike information criterion. FL = factor loadings; FC = factor covariances; FV = factor variances; EV = error variances.

\*\*\*  $p < .001$ .

Table 36

*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)*

Model	$\chi^2(df)$	$\chi^2/df$	$\Delta\chi^2(\Delta df)$	RMSEA	RMSEA (90%CI)	CFI ( $\Delta$ CFI)	GH ( $\Delta$ GH)	NCI ( $\Delta$ NCI)	NNFI	ECVI	ECVI (90%CI)	CAIC	T
A. Baseline	2875.60 (1770)	1.62	—	.052	(.049-.056)	.95 (—)	.92 (—)	.45 (—)	.95	4.89	(4.68-5.11)	4591.97	1.000
B. FL invariance	2998.10 (1840)	1.63	122.5*** (70)	.053	(.049-.056)	.95 (.00)	.91 (-.01)	.43 (-.02)	.95	4.87	(4.65-5.09)	4187.52	.959
C. FL, and FC invariance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. FL, FC, and FV invariance	3004.85 (1842)	1.63	6.75* (2)	.053	(.049-.056)	.95 (.00)	.91 (.00)	.43 (.00)	.95	4.87	(4.66-5.10)	4179.21	.957
E. FL, FC, FV, and EV invariance	3229.17 (1914)	1.69	224.32*** (72)	.055	(.052-.058)	.94 (-.01)	.90 (-.01)	.38 (-.05)	.94	4.99	(4.76-5.22)	3861.52	.891

Note.  $N = 684$ . All  $\chi^2$  statistics are significant at  $p < .001$ .  $\chi^2/df$  = the ratio of chi-square to degrees of freedom;  $\Delta\chi^2(\Delta df)$  = chi-square test; RMSEA = root mean square error of approximation; 90%CI = 90 percent confidence interval; CFI = comparative fit index;  $\Delta$ CFI = changes in the CFI; GH = gamma hat;  $\Delta$ GH = change in the gamma hat; NCI = noncentrality index;  $\Delta$ NCI = change in the NCI; NNFI = non-normed fit index; ECVI = expected cross-validation index; CAIC = consistent Akaike information criterion. FL = factor loadings; FC = factor covariances; FV = factor variances; EV = error variances. NA = not applicable.

\*  $p < .05$ . \*\*\*  $p < .001$ .



Table 37

*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)*

Model	$\chi^2(df)$	$\chi^2/df$	$\Delta\chi^2(\Delta df)$	RMSEA	RMSEA (90%CI)	CFI ( $\Delta$ CFI)	GH ( $\Delta$ GH)	NCI ( $\Delta$ NCI)	NNFI	ECVI	ECVI (90%CI)	CAIC	T
A. Baseline	2803.33 (1743)	1.61	—	.052	(.048-.055)	.95 (—)	.92 (—)	.46 (—)	.95	4.87	(4.66-5.08)	4722.96	1.000
B. FL invariance	2922.70 (1811)	1.61	119.37*** (68)	.052	(.048-.055)	.95 (.00)	.92 (.00)	.44 (-.02)	.95	4.84	(4.63-5.06)	4330.43	.959
C. FL, and FC invariance	2929.75 (1813)	1.62	7.05* (2)	.052	(.049-.056)	.95 (.00)	.92 (.00)	.44 (.00)	.95	4.85	(4.63-5.07)	4322.42	.957
D. FL, FC, and FV invariance	2934.01 (1817)	1.61	4.26 (4)	.052	(.049-.055)	.95 (.00)	.92 (.00)	.44 (.00)	.95	4.84	(4.63-5.06)	4296.57	.955
E. FL, FC, FV, and EV invariance	3226.93 (1913)	1.69	292.92*** (96)	.055	(.052-.058)	.94 (-.01)	.90 (-.02)	.38 (-.06)	.94	4.99	(4.76-5.22)	3866.81	.869

Note.  $N = 684$ . All  $\chi^2$  statistics are significant at  $p < .001$ .  $\chi^2/df$  = the ratio of chi-square to degrees of freedom;  $\Delta\chi^2(\Delta df)$  = chi-square test; RMSEA = root mean square error of approximation; 90%CI = 90 percent confidence interval; CFI = comparative fit index;  $\Delta$ CFI = changes in the CFI; GH = gamma hat;  $\Delta$ GH = change in the gamma hat; NCI = noncentrality index;  $\Delta$ NCI = change in the NCI; NNFI = non-normed fit index; ECVI = expected cross-validation index; CAIC = consistent Akaike information criterion. FL = factor loadings; FC = factor covariances; FV = factor variances; EV = error variances.

\*  $p < .05$ . \*\*\*  $p < .001$ .

## ***TESTING THE CONVERGENT AND DISCRIMINANT VALIDITY OF THE EAI-S STRUCTURAL MODEL***

Having established the measurement invariance of EAI-S for practical purposes, convergent and discriminant validity was assessed by relating the EA higher order dimensions with both ecological behaviour and economic liberalism. The full latent variable model was assessed through multi-group confirmatory factor analyses, and the relationship between the one-second-order-factor model and the criterion variables was assessed first.

In a first analysis, the factor loadings and the correlations between the latent factors were allowed to vary across countries. This model had good overall fit for the data ( $\chi^2 = 5308.39$ ;  $df = 3182$ ;  $\chi^2/df = 1.67$ ; RMSEA = .054, 90%CI = .052-.057; CFI = .93; NNFI = .93; ECVI = 8.39; 90%ECVI = 8.10-8.69; CAIC = 6829.03). One parameter from the manifested indicator to their respective latent variable was non-significant. This parameter corresponded to the loading of an ecological behaviour item (i.e., “Conserved gasoline (petrol) by walking or bicycling”) that did not reach significance for the South Africa sample. Given that the loading was marginally significant ( $t = 1.40$ ,  $p < .10$ ), this item was retained in analyses reported herein. All other parameters from the manifested indicators to their respective latent variable were significant ( $t > 1.96$ ,  $p < .05$ ). In a second analysis, all parameters (i.e., factor loadings, factor covariances, factor variances, and error variances) were constrained to be equal across groups. This fully constrained full latent variable model showed a significant decrease in model fit,  $\chi^2(94) = 168.67$ ,  $p < .001$ . However, the fit of both models were virtually identical ( $\chi^2 = 5477.06$ ;  $df = 3276$ ;  $\chi^2/df = 1.67$ ; RMSEA = .054, 90%CI = .052-.057; CFI = .93; NNFI = .93; ECVI = 8.36; 90%ECVI = 8.07-8.66; CAIC = 6290.07). Therefore, the completely constrained model, which specified equality of factor loadings, factor covariances, factor variances, and error variances across the three samples, was selected as the most parsimonious and adequate full latent variable model. This model is shown in Figure 10. The paths from the general EA score to both ecological behaviour and economic liberalism was powerful and significant, positively for the former and negatively for the latter.

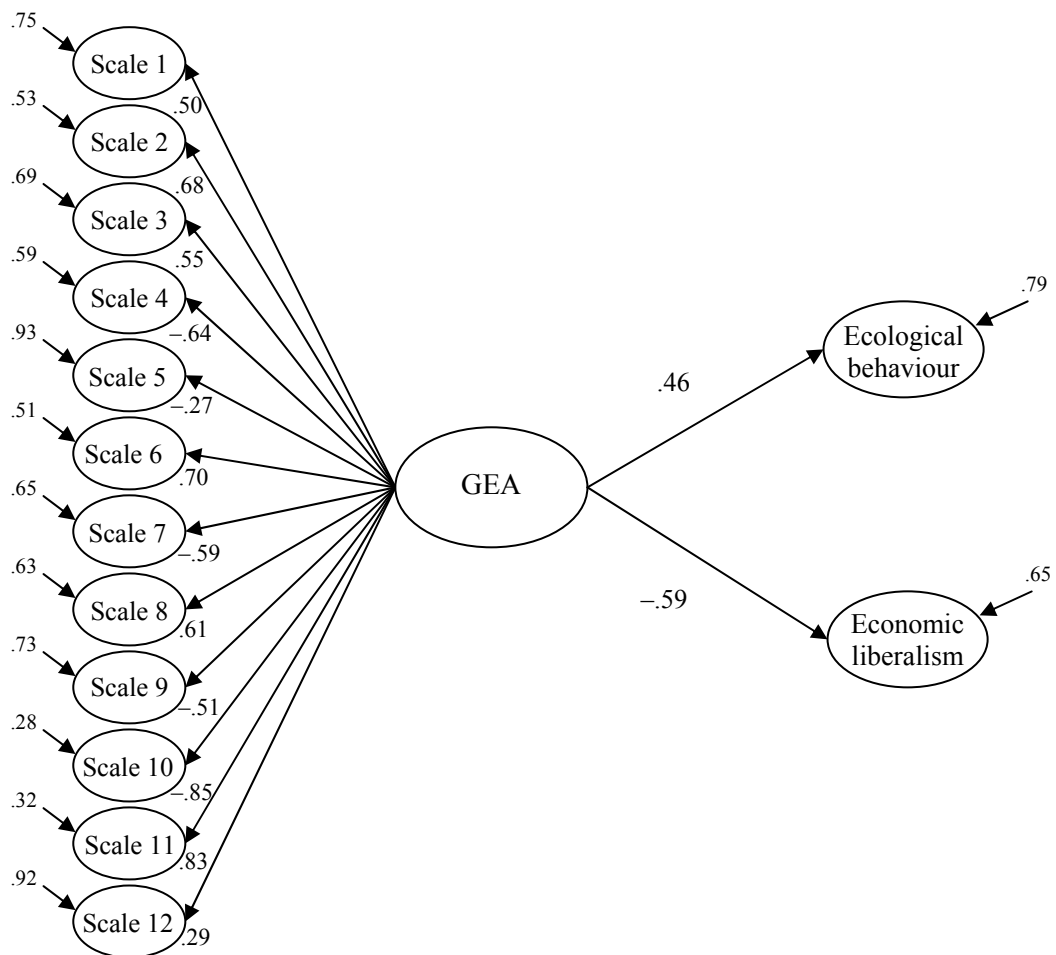


Figure 10

*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)*

Note. Brazil:  $N = 201$ . New Zealand:  $N = 226$ . South Africa:  $N = 257$ . To simplify, manifest variables and the paths from latent to manifest variables are not shown. All coefficients are significant ( $t > 1.96$ ,  $p < 0.05$ ). Arrows without origin indicate the error terms. Model fit is reported in text. GEA = Generalized Environmental Attitudes (i.e., Preservation and Utilization combined). Scale labels: Scale 1 = Enjoyment of Nature, Scale 2 = Support for Interventionist Conservation Policies, Scale 3 = Environmental Movement Activism, Scale 4 = Conservation Motivated by Anthropocentric Concern, Scale 5 = Confidence in Science and Technology, Scale 6 = Environmental Fragility, Scale 7 = Altering Nature, Scale 8 = Personal Conservation Behaviour, Scale 9 = Human Dominance Over Nature, Scale 10 = Human Utilization of Nature, Scale 11 = Ecocentric Concern, and Scale 12 = Support for Population Growth Policies.

Similar analyses were performed, this time assessing the relationship between the two-correlated-second-order-factors model and both ecological behaviour and economic liberalism simultaneously across the three samples. This model had good overall fit for the data ( $\chi^2 = 5273.11$ ;  $df = 3175$ ;  $\chi^2/df = 1.66$ ; RMSEA = .054, 90%CI = .051-.057; CFI = .93; NNFI = .93; ECVI = 8.36; 90%ECVI = 8.07-8.66; CAIC = 6846.45). The same ecological behaviour item did not reach significance for the South Africa sample ( $t = 1.37$ ,  $p < .10$ ). All parameters were then constrained to be equal across groups. Although showing a significant decrease in model fit,  $\chi^2(98) = 176.98$ ,  $p < .001$ , the overall fit of this fully constrained model was virtually identical to the previous model ( $\chi^2 = 5450.09$ ;  $df = 3273$ ;  $\chi^2/df = 1.67$ ; RMSEA = .054, 90%CI = .052-.057; CFI = .93; NNFI = .93; ECVI = 8.33; 90%ECVI = 8.04-8.63; CAIC = 6285.69). Therefore, the completely constrained model was selected as the most adequate full latent variable model. This model is shown in Figure 11. Preservation and Utilization showed some discriminant properties across samples: the path from Preservation to ecological behaviour was powerful and significant, but not to economic liberalism, and the path from Utilization to economic liberalism was powerful and significant, but not to ecological behaviour.

Given that the resulting completely constrained models are nested, they can be compared to each other. The results indicate that the two-correlated-second-order-factors full latent variable model was statistically better fitting than the one-second-order-factor full latent variable model,  $\chi^2(3) = 26.97$ ,  $p < .001$ . This indicates the usefulness of having two EA higher order factors rather than only one. However, some degree of content overlap between the two criterion variables and Preservation and Utilization could have influenced these findings.

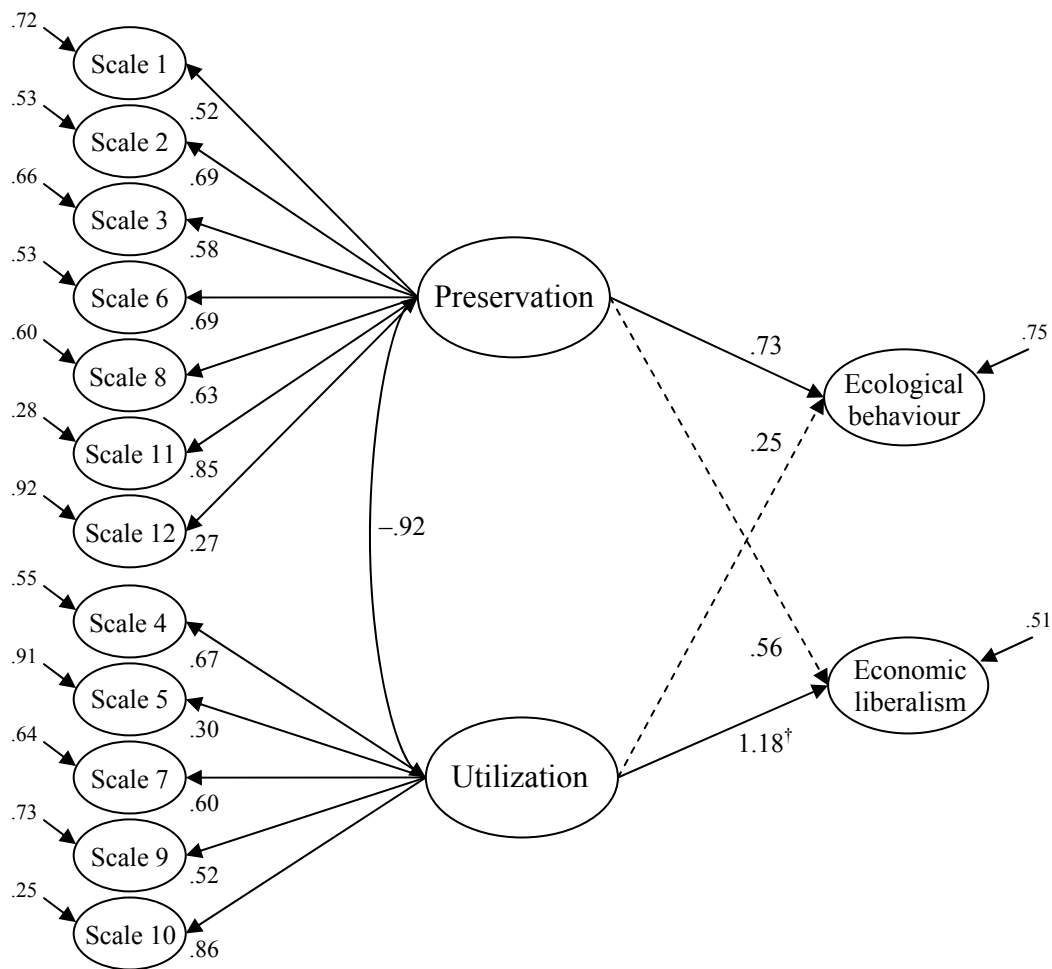


Figure 11

*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)*

Note. Brazil:  $N = 201$ . New Zealand:  $N = 226$ . South Africa:  $N = 257$ . To simplify, manifest variables and the paths from latent to manifest variables are not shown. Dotted arrows represent non-significant causal paths ( $t < 1.96$ ,  $p > 0.05$ ). All other coefficients from normal arrows are significant. Arrows without origin indicate the error terms. Model fit is reported in text. Scale labels: Scale 1 = Enjoyment of Nature, Scale 2 = Support for Interventionist Conservation Policies, Scale 3 = Environmental Movement Activism, Scale 4 = Conservation Motivated by Anthropocentric Concern, Scale 5 = Confidence in Science and Technology, Scale 6 = Environmental Fragility, Scale 7 = Altering Nature, Scale 8 = Personal Conservation Behaviour, Scale 9 = Human Dominance Over Nature, Scale 10 = Human Utilization of Nature, Scale 11 = Ecocentric Concern, and Scale 12 = Support for Population Growth Policies.

<sup>†</sup> Standardized coefficients can be larger than 1.0 in magnitude (Jöreskog, 1999).

Correlations and multiple regression analyses were then performed to evaluate the relationship between GEA (and also Preservation and Utilization) with criterion variables across countries. The results are reported on Table 38 and 39, respectively. Given that only regression results show a clear picture of the associations between the variables considered, only these results are discussed.

The tolerance coefficients for the multiple regression were higher than .20 (i.e., Brazil = both .67, New Zealand = both .54, and South Africa = both .71), and the variance-inflation factor coefficients were lower than 4.0 (i.e., Brazil = both 1.49, New Zealand = both 1.85, and South Africa = both 1.41). Half the associations between GEA, Preservation and Utilization, and nine validity criteria (religiosity, Biblical literalism, inclusion with nature, ecological behaviour, sustainability, self-transcendence, biospheric, altruistic, and environmental problems threat) were consistent across countries. Preservation accounted for significant non-overlapping variance in inclusion with nature, ecological behaviour, sustainability, self-enhancement, biospheric, altruistic, and environmental problems threat. Utilization, on the other hand, accounted for significant non-overlapping variance in Biblical literalism, economic liberalism (except for South Africa sample), and self-enhancement (except for Brazil sample). Again, however, a clear distinction between Preservation and Utilization is not supported because they do not seem to account for markedly more variance on the criterion variables than just the GEA.

Table 38

*Correlations between the Higher Order Factors of the EAI-S and Criterion Measures (Study 3)*

Criterion	Brazil			New Zealand			South Africa		
	PRES	UTIL	GEA	PRES	UTIL	GEA	PRES	UTIL	GEA
<i>Socio-demg. var.</i>									
Age	.06	-.11	-.02	.10	.06	.09	.14*	.17**	.17**
Being Judeo-Christian	-.08	-.16*	-.13	-.12	-.22**	-.17*	.02	-.10	-.04
Biblical literalism	-.09	-.25***	-.18*	-.12	-.23**	-.18**	-.11	-.22***	-.18**
Gender (being male)	-.04	-.05	-.05	-.27***	-.24**	-.28***	-.12	-.13*	-.14*
Political conservatism	-.08	-.18*	-.14*	-.05	-.16*	-.10	-.02	-.02	-.02
Religiosity	.04	-.15*	-.05	.00	-.15*	-.06	.02	-.22***	-.10
Self-perceived family economic status	-.06	-.11	-.09	-.07	.01	-.04	.06	.05	.07
<i>Psych. var.</i>									
Altruistic	.20**	.12	.18**	.08	.15*	.12	.08	.17**	.13*
Biospheric	.55***	.37***	.54***	.61***	.49***	.61***	.56***	.42***	.57***
Conservatism	-.33***	-.33***	-.38***	-.14*	-.10	-.13	-.10	-.02	-.08
Openness to change	-.05	.07	-.00	-.04	-.01	-.03	-.23***	-.22***	-.25***
Self-enhancement	-.34***	-.24**	-.33***	-.46***	-.47***	-.50***	-.31***	-.32***	-.36***
Self-transcendence	.33***	.19**	.30***	.37***	.32***	.38***	.27***	.22***	.28***
<i>Envr. rel. var.</i>									
Ecological behaviour	.32***	.28***	.35***	.53***	.37***	.51***	.40***	.27***	.39***
Economic liberalism	-.30***	-.39***	-.38***	-.43***	-.51***	-.50***	-.35***	-.45***	-.45***
Inclusion with nature	.25***	.22**	.33***	.46***	.26***	.41***	.34***	.16*	.30***
Membership	.03	.02	.03	.31***	.28***	.32***	.02	.08	.05
Perceived environmental threat	.37***	.18**	.32***	.20**	.09	.17*	.15*	-.03	.08
Sustainability	.28***	.20**	.28***	.35***	.32***	.37***	.24***	.21**	.26***

Note. Brazil:  $N = 201$ . New Zealand:  $N = 226$ . South Africa:  $N = 257$ . Positive correlations with membership indicate affiliation to an environmental organization. Utilization was reverse scored to have the same score direction as Preservation and GEA. The value clusters are centered scores to control for individual differences in response style. PRE = Preservation dimension; UTIL = Utilization dimension; GEA = Generalized Environmental Attitudes (i.e., Preservation and Utilization combined).

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Two-tailed.

Table 39

*Beta Coefficients of the Simultaneous Multiple Regressions of the Validity Criteria on the Higher Order Factors of the EAI-S (Study 3)*

Criterion	Brazil			New Zealand			South Africa		
	PRES( $\beta$ )	UTIL( $\beta$ )	GEA( $\beta$ )	PRES( $\beta$ )	UTIL( $\beta$ )	GEA( $\beta$ )	PRES( $\beta$ )	UTIL( $\beta$ )	GEA( $\beta$ )
<i>Socio-demg. Variables</i>									
Age	.18*	.21*	-.02	.12	.02	.09	.07	-.13	.17**
Being Judeo-Christian	.01	.16	-.13	.06	.27**	-.18**	.10	.16	-.04
Biblical literalism	.09	.30***	-.18*	.06	.26**	-.18**	.02	.24***	-.18**
Gender (being male)	-.01	.04	-.05	-.21*	.10	-.28***	-.06	.10	-.14*
Political conservatism	.03	.20*	-.14*	.10	.23*	-.10	-.01	.01	-.02
Religiosity	.18*	.25**	-.05	.19*	.28**	-.06	.19*	.32***	-.10
Self-perceived family economic status	.01	.12	-.09	-.13	-.10	-.04	.05	-.02	.07
<i>Psych. Variables</i>									
Altruistic	.47***	.06	.38***	.25**	-.01	.24***	.18*	.04	.13*
Biospheric	.62***	-.01	.58***	.57***	.01	.53***	.52***	.03	.45***
Conservatism	.18*	.23**	-.03	.20*	.14	.06	.13	.16*	-.02
Openness to change	.15	-.06	.19**	.23*	.10	.13	.07	.26***	-.16*
Self-enhancement	.02	.10	-.07	.03	.36***	-.29***	.02	.30***	-.23***
Self-transcendence	.54***	.06	.45***	.45***	.05	.38***	.35***	.10	.24***
<i>Envr. Variables</i>									
Ecological behaviour	.24**	-.15	.35***	.52***	-.02	.51***	.36***	-.07	.39***
Economic liberalism	-.11	.33***	-.38***	-.15	.41***	-.50***	-.15*	.37***	-.45***
Inclusion with nature	.33***	-.03	.33***	.53***	.10	.41***	.36***	.04	.30***
Membership	-.03	.00	-.03	.21*	.14	-.32***	.04	.11	-.05
Perceived environmental threat	.46***	-.02	.44***	.27**	.05	.21**	.24**	.09	.14*
Sustainability	.25**	-.05	.28***	.26**	-.14	.37***	.18*	-.12	.26***

Note. Brazil:  $N = 201$ . New Zealand:  $N = 226$ . South Africa:  $N = 257$ . Positive  $\beta$  in membership indicates that members of environmental organization were higher on EA. Utilization was reverse scored to have the same score direction as Preservation and GEA. The value clusters are centered scores to control for individual differences in response style. PRE = Preservation dimension; UTIL = Utilization dimension; GEA = Generalized Environmental Attitudes (i.e., Preservation and Utilization combined).

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Two-tailed.



### ***TESTING THE VALUE/THREAT → ATTITUDE → BEHAVIOUR MODEL***

Based on Homer and Kahle's (1988) value → attitude → behaviour cognitive hierarchical model, it was predicted that the impact of values on behaviour would be entirely mediated by attitudes. Specifically, it was expected that altruistic and self-enhancement would have significant positive and significant negative paths respectively to EA, which in turn would have a significant positive path to ecological behaviour. This model was also expanded into the social-situational domain, with the expectation that the impact of perceived threat from environmental problems on ecological behaviour would be entirely mediated by EA (i.e., value/threat → attitude → behaviour). The EA higher order dimension (i.e., GEA) was measured with the twelve EAI-S scale scores as observed variables, and all other latent variables were measured with their respective items as observed variables.

It seems theoretically feasible that values and threat might interact in predicting EA. Hence, possible interactions between altruistic values, self-enhancement values and perceived environmental threat were analyzed. Following the procedures outlined by Aiken and West (1991), these three variables were centered and their multiplicative product computed (i.e., altruistic × self-enhancement, altruistic × threat, self-enhancement × threat, and altruistic × self-enhancement × threat). The results from the hierarchical multiple regression analyses indicated no interactions between altruistic, self-enhancement and environmental problems threat in predicting either EA or ecological behaviour.<sup>10</sup> With the possibility that values and perceived threat would interact in predicting EA thus rejected, the mediation model was then tested.

In a first analysis, the factor loadings and the path coefficients between the latent factors were allowed to vary across countries. The overall fit for this unconstrained mediation model was acceptable:  $\chi^2 = 4280.38$ ;  $df = 1840$ ;  $\chi^2/df = 2.33$ ; RMSEA = .076, 90%CI = .073-.079; CFI = .87; NNFI = .87; ECVI = 6.75; 90%ECVI = 6.47-7.04; CAIC = 5469.80. In a second analysis, all parameters were constrained to be equal across groups. This fully constrained full latent variable

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<sup>10</sup> Tables D1, D2 and D3 in Appendix D show the results of these multiple regressions for Brazil, New Zealand and South Africa, respectively.

model showed a significant decrease in model fit,  $\chi^2(76) = 172.68, p < .001$ , but had fits virtually identical to the unconstrained model ( $\chi^2 = 4453.06; df = 1916; \chi^2/df = 2.32; RMSEA = .076, 90\%CI = .073-.079; CFI = .87; NNFI = .87; ECVI = 6.78; 90\%ECVI = 6.50-7.07; CAIC = 5070.36$ ). Hence, the completely constrained model was selected as the most parsimonious and adequate mediation model. This model is shown in Figure 12.<sup>11</sup>

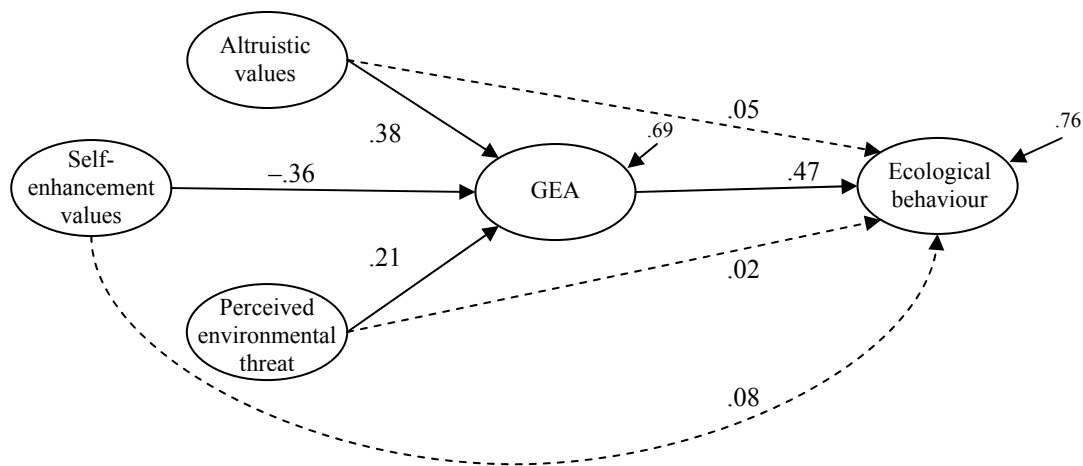


Figure 12

*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)*

Note. Brazil:  $N = 201$ . New Zealand:  $N = 226$ . South Africa:  $N = 257$ . To simplify, manifest variables and the paths from latent to manifest variables are not shown. Dotted arrows represent non-significant causal paths ( $t < 1.96, p > 0.05$ ). All other coefficients from normal arrows are significant. Arrows without origin indicate the error terms. Model fit is reported in text.

<sup>11</sup> When this completely constrained model was tested for the two higher order factors, the paths from perceived environmental threat were not significant, and the paths from Preservation and Utilization to ecological behaviour were also not significant. For this reason, the subsequent analyses were performed considering only the generalized environmental attitude factor.

The role of both values and perceived threat in the formation and determination of EA was supported by the strong and significant path coefficients from altruistic values ( $\beta = .38, p < .001$ ), self-enhancement values ( $\beta = -.36, p < .001$ ), and perceived environmental threat ( $\beta = .21, p < .001$ ) to EA. Thirty-one percent of the variance of EA could be explained by these three determinants. This model also supported the positive influence of attitude on behaviour as shown by the strong and significant path coefficient ( $\beta = .47, p < .001$ ) from EA to ecological behaviour. More importantly, the mediating role of EA was supported by the non-significant path coefficients between both values and perceived threat and ecological behaviour, but these variables had significant indirect effects on behaviour: altruistic (indirect effect = .13;  $t > 1.96, p < 0.05$ ), self-enhancement (indirect effect =  $-.11$ ;  $t > 1.96, p < 0.05$ ), and environmental threat (indirect effect = .08;  $t > 1.96, p < 0.05$ ). This indicates a full mediation model in which the impact of both values and perceived environmental threat on ecological behaviour was entirely mediated by EA. To further test the mediation model, a country-by-country analysis of this model was conducted. These models are shown in Figures 13, 14 and 15.

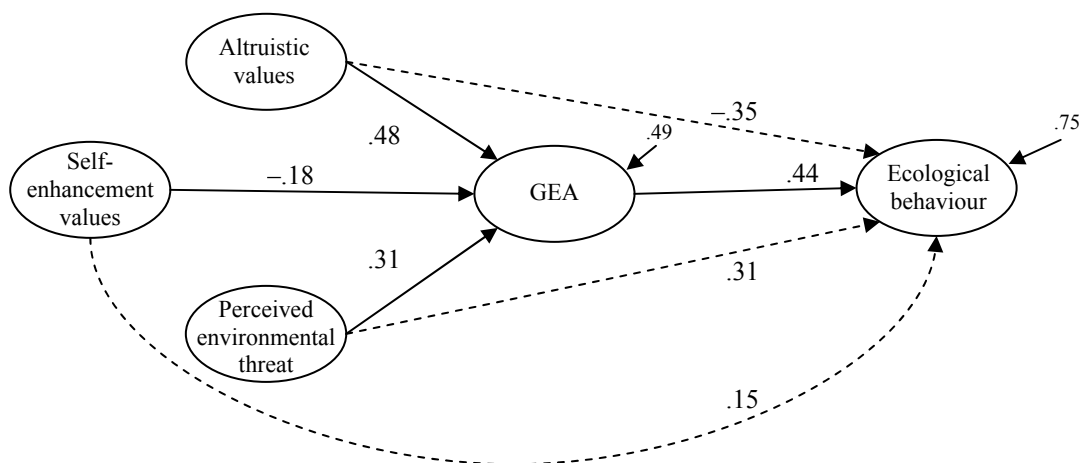


Figure 13  
*Standardized Multiple Regression for the Full Latent Variable Model of Direct and Mediated (through Environmental Attitudes) Effects of Values and Environmental Threat on Self-Reported Ecological Behaviour for the Brazil Sample*

Note.  $N = 201$ . To simplify, manifest variables and the paths from latent to manifest variables are not shown. Dotted arrows represent non-significant causal paths ( $t < 1.96, p > 0.05$ ). All other coefficients from normal arrows are significant. Arrows without origin indicate the error terms. Model fit:  $\chi^2 = 1150.90; df = 585; \chi^2/df = 1.97; RMSEA = .070, 90\%CI = .064-.075; SRMR = .071; CFI = .92; NNFI = .92$ . The error term of one self-enhancement item (i.e., “authority”) was not significant and was then fixed to .05.

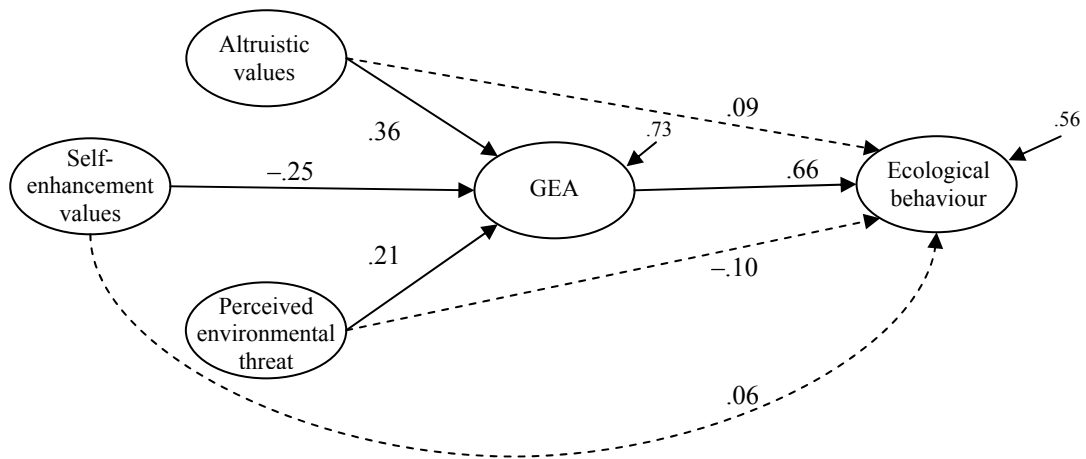


Figure 14

*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*

Note.  $N = 226$ . To simplify, manifest variables and the paths from latent to manifest variables are not shown. Dotted arrows represent non-significant causal paths ( $t < 1.96, p > 0.05$ ). All other coefficients from normal arrows are significant. Arrows without origin indicate the error terms. Model fit:  $\chi^2 = 1377.31; df = 585; \chi^2/df = 2.35; RMSEA = .078, 90\%CI = .072-.083; SRMR = .085; CFI = .89; NNFI = .88$ . The error term of one self-enhancement item (i.e., “authority”) was not significant and was then fixed to .05.

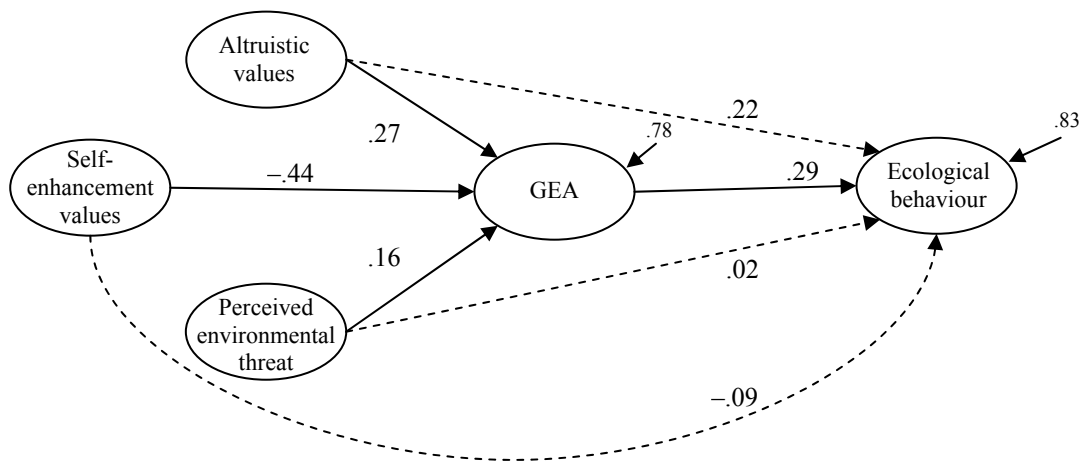


Figure 15

*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*

Note.  $N = 257$ . To simplify, manifest variables and the paths from latent to manifest variables are not shown. Dotted arrows represent non-significant causal paths ( $t < 1.96, p > 0.05$ ). All other coefficients from normal arrows are significant. Arrows without origin indicate the error terms. Model fit:  $\chi^2 = 1249.44; df = 584; \chi^2/df = 2.14; RMSEA = .067, 90\%CI = .062-.072; SRMR = .075; CFI = .87; NNFI = .86$ .

Overall, the results from the country-by-country analysis confirmed the mediating role of EA. However, two different causal patterns were observed in the three countries. First, the explained variance of ecological behaviour varied across countries. The model predicted 25%, 44% and 17% of the respondents' self-reported ecological behaviour in Brazil, New Zealand and South Africa, respectively. Therefore, the model was more suitable in New Zealand, and indicated that different implications for ecological behaviour prediction were obtained in these three cultures. This suggests that attending to cultural differentiations may be critical to understanding ways in which ecological behaviours are predicted. Second, the full mediation model only held for the New Zealand sample. For both the Brazil and South Africa samples, the direct path from altruistic values to ecological behaviour was significant, and the path from perceived threat to ecological behaviour was also significant for the Brazil sample. That is, there was only partial mediation for altruistic in both Brazil and South Africa, and there was also only partial mediation for perceived threat in Brazil. This may indicate that while EA completely mediates the influence of both value and threat on behaviour in some cultures, in others the mediating role of EA is weaker. Nonetheless, it should be noted that one could get full mediation in one model and partial in another due to a rather slight (and nonsignificant) differences between the actual effects. Hence, the findings by and large support the mediating role of EA.

Tables 40 and 41 show respectively the total (i.e., the sum of the direct and mediated indirect effect) and indirect effects of the full latent variable models depicted above. As seen in Table 40, the Brazil sample showed somewhat different results than the other two samples. In Brazil, altruistic had a negative total effect on ecological behaviour and self-enhancement had a positive effect, though not significant. This indicates that in Brazil ecological behaviours seem to be judged in terms of the costs or benefits to oneself, activating self-enhancement values. In New Zealand and South Africa, in contrast, such behaviours seem to be judged in terms of the costs or benefits for the community or all humanity, activating altruistic values. This may be a result of Brazil being a poor developing country, where dealing with poverty and economic underdevelopment are major social issues, so that environmental problems are seen in terms of

personal interests. However, this is only a speculative explanation. The variation in the direction of the effects in Brazil could have been a result of different interpretations of the value items or even a result of chance. Therefore, this finding needs to be replicated before it can be concluded that it is a robust effect.

Table 40

*Standardized Total Effects for the Value/Threat–Attitude–Behaviour Full Latent Variable Model*

	Altruistic values	Self-enhancement values	Perceived environmental threat	Environmental attitudes
<i>Completely constrained model</i>				
Environmental Attitudes	.38***	-.36***	.21***	—
Ecological Behaviour	.23***	-.09	.12*	.47***
<i>Brazil (N = 201)</i>				
Environmental Attitudes	.48***	-.18*	.31**	—
Ecological Behaviour	-.13	.06	.45***	.44**
<i>New Zealand (N = 226)</i>				
Environmental Attitudes	.36***	-.25***	.21**	—
Ecological Behaviour	.32**	-.11	.14	.66***
<i>South Africa (N = 257)</i>				
Environmental Attitudes	.27*	-.44**	.16*	—
Ecological Behaviour	.30**	-.22*	.07	.29**

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Table 41

*Standardized Indirect Effects for the Value/Threat–Attitude–Behaviour Full Latent Variable Model*

	Altruistic values	Self-enhancement values	Perceived environmental threat
<i>Completely constrained model</i>			
Ecological Behaviour	.18***	-.17***	.10***
<i>Brazil (N = 201)</i>			
Ecological Behaviour	.21*	-.08*	.14*
<i>New Zealand (N = 226)</i>			
Ecological Behaviour	.24**	-.17**	.14*
<i>South Africa (N = 257)</i>			
Ecological Behaviour	.08*	-.13*	.05

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

A potential alternative model was also tested in which ecological behaviour predicts EA, and the mediating role of ecological behaviour in the value/threat-attitude relationship is assumed (i.e., value/threat → ecological behaviour → EA). This model did not show a significant decrease in model fit ( $\chi^2 = 4453.07$ ;  $df = 1916$ ;  $\chi^2/df = 2.32$ ; RMSEA = .076, 90%CI = .073-.079; CFI = .87; NNFI = .87; ECVI = 6.78; 90%ECVI = 6.50-7.07; CAIC = 5070.36) when compared to the constrained mediation model depicted in Figure 12, and the path coefficient from ecological behaviour to EA was strong and significant ( $\beta = .36$ ,  $p < .001$ ). However, all path coefficients between both values and perceived threat and EA were significant. This demonstrates that a mediating role of ecological behaviour can be rejected and accordingly provides additional confirmation for the value/threat → attitude → behaviour causal model.

### ***SUMMARY AND CONCLUSIONS FROM STUDY 3***

Study 3 tested the structure of EA cross-culturally and addressed five main points. First, this study offered further evidence of the psychometric properties of the short-form of the Environmental Attitudes Inventory (EAI-S). Overall, the EAI-S scales had reasonable internal consistency and homogeneity. Only two scales (Scale 4 and 7) had poor psychometric properties, but within acceptable limits for research purposes. Second, the measurement invariance of the EAI-S across the Brazil, New Zealand, and South Africa samples was found to be adequate for practical purposes. This suggests that participants from Brazil, New Zealand and South Africa conceptualize EA and their components in the same way. It also suggests that the relations between the EAI-S underlying construct, the stability of the EAI-S factors relationships, and the level of measurement error present for the item parcels were similar across countries.

Third, Study 3 supported the robustness and generality of the value-attitude-behaviour cognitive hierarchical model. Overall, the impact of altruistic and self-enhancement values on ecological behaviour was fully mediated by EA. For both Brazil and South Africa, however, only partial mediation for altruistic values was supported because altruistic had direct effects on ecological behaviour. Fourth, the findings offered evidence for the inclusion of a situational

variable into this model. Perceived environmental threat explained an additional 4% of the variance of EA (see Figure 12). As expected, it was found that the impact of perceived environmental threat on ecological behaviour was entirely mediated by EA, except for Brazil where threat also had a direct impact on ecological behaviour, indicating only partial mediation.

Finally, and most importantly, the findings also offered further evidence for the hierarchical structure of EA. Once again, the two-correlated-second-order-factors model fitted the data slightly better, and Preservation and Utilization predicted some external variables differently. For instance, based on the Preservation and Utilization mean scores it was observed that participants from Brazil reported a higher environmental concern than participants from both New Zealand and South Africa. This finding is clearly consistent with data from the World Value Survey (see Table 26) that also indicates an overall higher environmental orientation for Brazilians when compared to New Zealanders and South Africans. Nevertheless, given the similarity of the fit indices and the extremely high correlation between Preservation and Utilization across countries (average  $\Phi = -.91$ ), the one-second-order-factor model still remains preferred on the grounds of the principle of parsimony. Moreover, when Preservation and Utilization were examined in the value/threat-attitude-behaviour model, these EA dimensions did not provide discriminant validity (see Footnote 12). Even so, given that several scholars have proposed that EA are rooted in two higher order sets of environmental values (e.g., Brown & Cameron, 2000; e.g., Stokols, 1990; Wiseman & Bogner, 2003), the two-correlated-second-order-factors model, and more particularly its Preservation and Utilization factors, should be investigated further. This issue will require additional research to resolve whether the two-dimensional higher order structure model of EA does have significant empirical advantages over the more parsimonious one higher order structure model.



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*Chapter Seven*

***Discussion and Conclusions***

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***INTRODUCTION***

This research has aimed to advance knowledge on the psychology of environmental attitudes (EA). Specifically, the present research sought to examine three topics: (1) the dimensionality of EA, (2) the nomological network of EA, and (3) the value/threat–attitude–behaviour model. This chapter reviews the findings of the present research and discusses them in light of the relevant literature. This chapter also discusses limitations of the research and suggestions for further research.

***OUTLINE OF THE STUDIES***

This research comprised three empirical studies, involving a total of 2,150 student and general population participants. Study 1 was conducted in New Zealand and tested the dimensionality and hierarchical structure of EA (Milfont & Duckitt, 2004b). Study 2a was also conducted in New Zealand and describes the development of a new culture-general and fully-balanced tool, the Environmental Attitudes Inventory (EAI), for measuring EA (Milfont & Duckitt, 2006). Study 2b was a Web-based survey conducted in Brazil, and assessed the validity and reliability of the EAI in this different cultural context. Study 2c was also a Web-based survey conducted with participants from more than fifty countries, and 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 tested the validity, reliability and measurement invariance of the EAI-S across samples from Brazil, New Zealand and South Africa. This cross-cultural study also investigated causal models of antecedents and consequences of EA, and the value–attitude–behaviour cognitive hierarchy model across these cultures. In the following section, the findings from the three studies are summarized and their theoretical implications and contributions to the literature are considered.

The discussion of the findings and implications is divided into three parts according to the main topics covered.

## ***DISCUSSION AND IMPLICATIONS OF FINDINGS***

### ***THE STRUCTURE OF ENVIRONMENTAL ATTITUDES***

The main aim of this research was to address the dimensionality of EA. In particular, both the horizontal and vertical structures of EA were systematically investigated. Taken together, the findings from both exploratory and confirmatory factor analytic approaches showed EA to possess a stable horizontal and vertical internal structure. Hence, a central conclusion is that EA are a multidimensional construct organized hierarchically.

Research on EA has previously been criticised as being noncumulative and atheoretical (Dietz, Stern, & Guagnano, 1998; Heberlein, 1981; Stern, 1992). By demonstrating the multidimensional and hierarchical nature of EA, the present research has provided a research framework that will be useful for bringing greater clarity to the field. For instance, very few researchers have previously examined the vertical structure of EA. Those that have done so have mainly investigated it as comprising two higher order dimensions (Bogner & Wiseman, 1999; Wiseman & Bogner, 2003), although the possibility of a general EA factor has also been investigated (Carman, 1998; Xiao & Dunlap, 2007). The present research tested both a single general dimension and a two-dimensional higher order structure, and so significantly strengthened understanding of the hierarchical, vertical structure of EA.

The findings regarding the horizontal structure were straightforward. EA are a multidimensional construct with a number of specific evaluating perceptions of or beliefs regarding the natural environment. A set of twelve such perceptions and beliefs were identified as specific facets/dimensions of EA that comprise their horizontal structure. These are:

- Enjoyment of nature;
- Support for interventionist conservation policies;
- Environmental movement activism;

- Conservation motivated by anthropocentric concern;
- Confidence in science and technology;
- Environmental fragility;
- Altering nature;
- Personal conservation behaviour;
- Human dominance over nature;
- Human utilization of nature;
- Ecocentric concern; and
- Support for population growth policies.

The definition of these separate dimensions or of the constellation of dimensions may change as data from more cultural populations accumulate, but this should not affect the viability of the notion of the multidimensionality of EA. Moreover, given that all twelve dimensions relate clearly to prior research, it can be concluded that they constitute the core horizontal structure of EA.

These dimensions were then operationalized as scales of the EAI. Findings from Study 2 and 3, comprising six independent samples, supported the horizontal structure of EA by showing that responses to EAI or EAI-S could be explained by the proposed twelve first-order factors. The findings of these studies also demonstrated the validity and reliability of both the EAI and EAI-S.

The findings regarding the vertical structure were not straightforward. Although the findings demonstrated that EA are organized in a hierarchical fashion, whether this vertical structure comprises one or two higher order dimensions was not clear. Based on this research, it can be concluded that the vertical structure of EA is comprised by 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). Both the one and two higher order factor models have support in the literature. The single general factor has been the traditional view in the literature, in which EA express a unidimensional, bipolar construct that ranges from

*unconcerned* about the environment at the low end to *concerned* about the environment at the high end (Dunlap, Van Liere, Mertig, & Jones, 2000; Pierce & Lovrich, 1980; Poortinga, Steg, & Vlek, 2002; Schultz, 2000). Pierce and Lovrich (1980) expressed this view, for example, when pointing to an underlying fundamental orientation to which EA beliefs are jointly connected.

This line of thinking supports, therefore, the generality of EA. That is, correlations between diverse evaluating perceptions of or beliefs regarding the natural environment are invariably positive and substantial. Hence, individuals who support EA in a specific domain will tend to support EA in other domains, and certain individuals will tend to be more favourable to such domains in general. This was demonstrated in this research by the strong and significant loadings of all twelve EAI and EAI-S factors on the Generalized Environmental Attitudes second-order factor. This was also supported when previously published data from Tognacci et al. (1972), Maloney et al. (1975), Borden and Francis (1978), Van Liere and Dunlap (1981), and Blaikie (1992) were subjected to second-order factor analyses (see Chapter Two).

The alternative proposition that Preservation and Utilization form the vertical structure of EA is also theoretically meaningful. Preservation expresses the general belief that priority should be given to preserving nature and the diversity of natural species in its original natural state, and protecting it from human use and alteration. In contrast, Utilization expresses the general belief that it is right, appropriate and necessary for nature and all natural phenomena and species to be used and altered for human objectives. The distinction between two such beliefs is articulated in a number of theories (Barbieri, 1997; Berger, 1979; Dobson, 1998; Dunlap & Van Liere, 1978; Kortenkamp & Moore, 2001; Lima & Castro, 2005; Stokols, 1990; S. C. G. Thompson & Barton, 1994; Witten-Hannah, 2000, 2004). For example, Preservation and Utilization are related, respectively, to the spiritual and the instrumental views of people-environment relations (Stokols, 1990). According to Stokols (1990), the spiritual view sees the environment as an end in itself, whereas the instrumental view sees the environment as a means for human objectives. Similarly, Preservation and Utilization are respectively related to the distinction made by Kaiser and Fuhler (2003) between moral/altruistic and utilitarian values. According to these theories, therefore, EA

can be seen as rooted in two philosophical or ideological principles that would be expressed in two correlated higher-order sets of environmental values. These environmental values reflect conservation and protection of the environment (i.e., Preservation) on the one hand, and utilization of natural resources (i.e., Utilization) on the other (Wiseman & Bogner, 2003), that is, the dilemma which people experience in trying to decide whether natural resources should be preserved or developed (Blaikie, 1992; Pierce & Lovrich, 1980).

However, the findings of this research do not show clearly whether Preservation and Utilization, taken as distinct second-order EA factors, are more empirically meaningful than a single and generalised EA higher order factor. Thus, on grounds of parsimony the single higher order model is preferable. However, given that this research was pioneering in its efforts to systematically consider the vertical structure of EA, future research should consider both models. The Preservation and Utilization factors appear to be theoretically promising, but only additional research can clarify if the two higher order factors model does have significant empirical advantages over the more parsimonious one higher order factor model. It is possible that there may well be samples or situations in which Preservation and Utilization might be found to be clearly empirically distinct and conceptually superior to the Generalized Environmental Attitudes factor.

This dimensionality issue is also problematic for other psychological constructs, such as individualism and collectivism (Ho & Chiu, 1994), attitudes toward war and peace (Bizumic, Mellon, Van der Linden, & Stubager, 2003), social-emotional and instrumental social support (Ong & Ward, 2005), and the “big two” dimensions of affect (i.e., positive affect and negative affect, D. Watson & Clark, 1997). As in the case for Preservation and Utilization, these constructs could also be seen as opposite ends of a continuum, that is, they may together form a single dimension. Hence, one could assume that a participant with high scores on a positive affect measure should have low scores on a negative affect measure. However, researchers have argued that these constructs are in fact conceptually and empirically distinct, and that there is no necessary contradiction in holding both at the same time. For instance, Ho and Chiu (1994) argue that “individualism and collectivism should not be constructed as a dichotomy or two opposing value constellations, that is, as opposite

ends of a single continuum. Rather, they are distinct; one is not reducible simply to the antithesis of the other” (p. 155). Based on factor analytic techniques, Bizumic et al. (2003) also found that attitudes towards peace and attitudes toward war are two distinct, yet related, dimensions. Finally, Ong and Ward (2005) found a very high correlation ( $r = .73$ ) between two latent variables of social support, but kept these variables as distinct constructs for empirical and theoretical reasons.

That there is no necessary contradiction in holding Preservation and Utilization attitudes at the same time seems also true. Corral-Verdugo and Armendáriz (2000), for instance, found high covariances between NEP and DSP factors in a Mexican community sample. They argued that there is a dualism in peoples’ environmental beliefs in Western countries (e.g., U.S.A.), where findings have shown that these two factors are mutually exclusive (i.e., people are either pro-NEP or pro-DSP), while there is no conflict in holding both belief systems in other countries, such as Brazil, Japan, Mexico, and Peru (cf. Bechtel, Corral-Verdugo, Asai, & Riesle, 2006; cf. Bechtel, Corral-Verdugo, & Pinheiro, 1999).

Moreover, the strength of the negative correlation between Preservation and Utilization might also be theoretically useful for discriminating samples a priori. That is, this correlation may vary across samples in a predictable way. Herek’s (2000) distinction between functional consensus (i.e., an attitude domain that elicits one function within a particular population) and functional divergence (i.e., an attitude domain that elicits multiple functions within a particular population) can be used to explain this variation. Following Herek’s distinction, one may expect that the correlation between the two higher-order factors would be higher (i.e., Preservation and Utilization would be less independent) in a sample with environmentally orientated participants, because EA will have a functional consensus among these participants. Conversely, in a sample where the EA will have a functional divergence, the correlation between the two higher-order factors would be lower (i.e., Preservation and Utilization would be more distinct).

Following this rationale, the correlation between Preservation and Utilization could be tested in known groups and across cultures. This correlation should be higher for environmentalists and biology students than for the general public and business students, for instance. Another possibility

is that the correlation between Preservation and Utilization might be stronger in industrialised societies than in less industrialised ones, as a result of the shift from materialist to post-materialist values (Inglehart, 1995). In line with this, the correlation between Preservation and Utilization was significantly higher ( $p < .05$ ) in New Zealand ( $r = -.68$ ) than in South Africa ( $r = -.54$ )—the correlation in Brazil was also lower ( $r = -.57$ ) than in New Zealand, though not significant. Thus, the Preservation and Utilization dimensions may be important theoretical and empirical tools for understanding the cognitive structure of people's attitudes toward the environment. It seems worthwhile thus to assess them separately as they may provide complementary information.

To conclude, the primary contribution of this research was the confirmation that EA are a multidimensional construct that can be organized in a hierarchical fashion, with either one or two higher order dimensions. Another contribution to the field was the development of a valid and reliable measure that covers both the horizontal and vertical structure of EA. This measure would be useful for studying temporal variations in people's EA structure, and could also be used for investigating cultural variations in EA.

### ***THE NOMOLOGICAL NETWORK OF ENVIRONMENTAL ATTITUDES***

This part of the research was designed to test the extent to which individuals with pro-EA share general patterns of demographic, psychological, and ideological characteristics. That is, what are the social-structural and social-psychological bases of EA (cf. Dietz, Stern, & Guagnano, 1998; Fransson & Gärling, 1999; cf. Van Liere & Dunlap, 1980). This was systematically analysed after the development of the EAI and EAI-S in Studies 2 and 3. Taken together, the findings showed that EA possess a logical external structure of nomological relationships, as reviewed below.

A meta-analytic summary of the relationships between the higher order EA factors and criterion variables was undertaken, using variables included in at least two studies in this research. Hedges and Olkin's (1985) approach was used to calculate the pooled correlations. The raw correlations were transformed using Fischer's r-to-Z transformation, and the sample size weighted transformed correlations were then averaged. The resulting weighted pooled values were then

transformed back into correlations, thus providing sample size weighted mean  $r$  for each variable. Confidence intervals for the effect sizes are also reported (see Table 42).

For convenience of interpretation, Utilization was again reverse scored to have the same direction as Preservation and GEA. As can be seen in Table 42, the confidence intervals for religiosity, altruistic values and environmental threat did not overlap for Preservation and Utilization. This indicates significant discriminant properties for Preservation and Utilization, given that there is not any clear evidence of content overlap between these constructs. Altruistic values may thus be said to underlie Preservation orientations, indicating that people orientated by such values judge environmental issues on the basis of costs or benefits for the community, ethnic group or all humanity, which is in line with previous research (e.g., Coelho, Gouveia, & Milfont, 2006; Schultz et al., 2005; Schultz & Zelezny, 1999; Stern & Dietz, 1994). People holding Preservation attitudes are also more predisposed to perceive threats from environmental problems. This is also consistent with studies showing significant correlations between EA and environmental threat (Pahl, Harris, Todd, & Rutter, 2005; Walsh-Daneshmandi & MacLachlan, 2000). In contrast, people holding Utilization attitudes are religiously orientated. The weighted correlations between being Judeo-Christian and Biblical literalism were also stronger for Utilization than for Preservation. This supports White's (1967) general claim that Christian axioms toward human-nature relations emphasize a belief in human dominance over nature. Empirical studies have shown that persons from a Judeo-Christian tradition, and persons expressing high levels of religiosity and literal beliefs in the Bible, are less environmentally concerned (Gardner & Stern, 2002; Schultz, Zelezny, & Dalrymple, 2000). Thus, this meta-analytic summary provides some evidence for the discriminant validity of Preservation and Utilization. It suggests that these two EA dimensions are conceptually and (to some extent) empirically distinct constructs whose correlations with other variables may differ, depending on the variables considered.



Table 42

*Meta-Analytic Summary of the Correlations between the Higher Order Factors of the Environmental Attitudes Inventory and External Variables across Studies*

	Preservation			Utilization			GEA		
	Weighted mean <i>r</i>	L95%CI	U95%CI	Weighted mean <i>r</i>	L95%CI	U95%CI	Weighted mean <i>r</i>	L95%CI	U95%CI
<i>Socio-demographic variables</i>									
Age	.11***	.06	.16	.04	-.01	.09	.09***	.04	.14
Being Judeo-Christian	-.12***	-.18	-.06	-.20***	-.26	-.14	-.16***	-.10	-.22
Biblical literalism	-.13***	-.18	-.08	-.23***	-.28	-.18	-.19***	-.14	-.24
Gender (being male)	-.14***	-.19	-.09	-.13***	-.18	-.08	-.15***	-.10	-.20
Political conservatism	-.18***	-.23	-.13	-.22***	-.27	-.17	-.21***	-.16	-.26
Religiosity	-.05	-.10	.00	-.20***	-.25	-.15	-.12***	-.07	-.17
<i>Psychological variables</i>									
Altruistic values	.19***	.13	.25	.03	-.03	.09	.21***	.15	.27
Biospheric values	.60***	.54	.66	.13***	.07	.19	.61***	.55	.67
Conservatism values	-.22***	-.28	-.16	-.21***	-.27	-.15	-.23***	-.17	-.29
Openness to change values	-.06*	-.12	.00	-.02	-.08	.04	-.05	-.11	.01
Self-enhancement values	-.46***	-.52	-.40	-.42***	-.48	-.36	-.48***	-.42	-.54
Self-transcendence values	.38***	.32	.44	.30***	.24	.36	.38***	.32	.44
<i>Environmentally related variables</i>									
Ecological behaviour	.50***	.44	.56	.35***	.29	.41	.48***	.42	.54
Economic liberalism	-.38***	-.44	-.32	-.47***	-.53	-.41	-.46***	-.40	-.52
Environmental threat	.23***	.15	.31	.07	-.01	.15	.18***	.10	.26
Environmental organization membership	.12**	.04	.20	.13***	.05	.21	.14***	.06	.22
Inclusion with nature	.37***	.31	.43	.25***	.19	.31	.36***	.30	.42
Sustainability	.27***	.21	.33	.21***	.15	.27	.27***	.21	.33

Note. Utilization was reverse scored to have the same score direction as Preservation and GEA. The value clusters are centered scores to control for individual differences in response style.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Taking the general EA dimension into account, in aggregate it can be said that 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.

As can be seen in Table 42, the most important socio-demographic predictor is political conservatism. This supports several studies indicating that EA is positively related to liberal political ideology (Diekmann & Preisendörfer, 1998; Fransson & Gärling, 1999; Mayton, 1986; Theodori & Luloff, 2002; Van Liere & Dunlap, 1980). Psychological variables, and in particular values, also seem important predictors of EA. In line with previous research, (e.g., Coelho, Gouveia, & Milfont, 2006; Schultz et al., 2005; Schultz & Zelezny, 1999), it was found that EA were positively related to altruistic values, negatively related to self-enhancement values, and somewhat inconsistently related to openness to change values. A novel finding of this research was to show a consistent, negative correlation between EA and conservatism values. Prior research has reported inconsistent findings (cf. Schultz et al., 2005). Another point worth mentioning is the very high weighted correlation between EA and biospheric values. This suggests content overlap between these variables, indicating that value items with environmental content should be excluded from Schwartz's (1994) self-transcendence value clusters prior to analysis (cf. Milfont & Gouveia, 2006; Schultz et al., 2005; cf. Stern, Guagnano, & Dietz, 1998). It also indicates that these biospheric values (protecting the environment, unity with nature, and respecting the earth) could be used as an economical measure for testing the convergent validity of EA measures.

Content overlap may also explain the strong relationship between EA and the other environmentally related variables. A point worth noting, however, is the positive correlation between EA and sustainability principles. Although this relationship is theoretically expected (cf.

Schmuck & Schultz, 2002), it has not previously been tested empirically. This is therefore another novel contribution of this research. Another noteworthy point is the magnitude of the effect sizes. The average effect size for the socio-demographic, psychological and environmentally related variables were respectively  $|.16|$ ,  $|.33|$  and  $|.33|$ , and the average effect size across all eighteen variables was  $|.27|$ . Therefore, according to Cohen (1988) and Hemphill's (2003) guidelines, these effect sizes ranged from small to medium.

Moderate effect sizes can also be seen in the association between EA and ecological behaviour. Of the two prior meta-analyses, Hines et al. (1987) reported a mean correlation of  $r = .37$  (9 studies) and Bamberg and Möser (2007)  $r = .42$  (17 studies), with a 95% confidence interval ranging from  $.26$  to  $.56$ . The mean correlation in the current study was slightly higher ( $r = .48$ , 5 studies), but within Bamberg and Möser's confidence interval. Moreover, Bamberg and Möser found that only 27% of the variance of ecological behaviour was explained by intention (a more proximal behavioural determinant than attitude), and that reporting bias (i.e., only significant results tend to be published) might have inflated this.

Therefore, the effect sizes in the environmental domain seem small or at best medium. It is important to keep in mind, however, that small and medium effect sizes in psychology are not uncommon, and that even small effect sizes can be practically important. For instance, analyzing the magnitude of meta-analytic effect sizes for 474 social psychology effects, Richard, Bond and Stokes-Zoota (2003) concluded that the effects typically yielded a value of  $.21$ , and that 30.44% yielded an  $r$  of  $.10$  or less. The effect sizes reported in the present research are thus within the range usually found in psychology.

A central conclusion to be drawn from this research is that environmental concern is still a "sectarian" phenomenon, in which only certain people (e.g., primarily those who are women, who are liberal in socio-political orientations, or who endorse altruistic values) tend to support pro-EA. The implications of these findings for the resolution of current environmental issues are worrying because in order to change environmental problems, pro-EA have to be held by a much more diverse constituency (cf. Tognacci, Weigel, Wideen, & Vernon, 1972).

### ***THE VALUE/THREAT-ATTITUDE-BEHAVIOUR MODEL***

This research also tested Homer and Kahle's (1988) value-attitude-behaviour cognitive hierarchical model. Research has almost uniformly shown the influence of values on both EA and ecological behaviour (e.g., Lévy-Leboyer, Bonnes, Chase, & Ferreira-Marques, 1996; Milfont & Gouveia, 2006; e.g., Poortinga, Steg, & Vlek, 2004; Schultz & Zelezny, 1999; Stern & Dietz, 1994). Interestingly, however, only a few researchers have conducted studies that explicitly examine the mediating role of EA on the value and behaviour relationship (Grob, 1995; Tarrant, Bright, & Cordell, 1997; Vaske & Donnelly, 1999; Vaske, Donnelly, Williams, & Jonker, 2001). These researchers found, in line with Homer and Kahle's (1988) model, that EA mediate the influence of values on ecological behaviour. The present research provided additional empirical support for this model. The role of altruistic and self-enhancement values in the formation and determination of EA was confirmed, and the impact of these values on ecological behaviour was entirely mediated by EA.

This research also went beyond previous studies by extending the model to include perceived threats from environmental problems. The expanded model followed from a number of studies showing the influence of perceived threat on EA and ecological behaviour (Axelrod & Lehman, 1993; Baldassare & Katz, 1992; Lai, Brennan, Chan, & Tao, 2003; Lévy-Leboyer, Bonnes, Chase, & Ferreira-Marques, 1996; Pahl, Harris, Todd, & Rutter, 2005; Walsh-Daneshmandi & MacLachlan, 2000). In line with this expanded model, the findings indicated that threat is related to EA, and the inclusion of perceived environmental threat in the model increased the proportion of explained variance of EA by 4%. The findings also supported the expanded model by showing that the impact of threat on ecological behaviours was also entirely mediated by EA. This supports the extension of Homer and Kahle's (1988) model into the socio-situational domain.

Taken together, therefore, this research has led to a number of significant outcomes and 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 threats in the formation and determination of EA, and (5) support for the mediating role of EA on the relationship between both values and perceived threat on ecological behaviour.

### ***LIMITATIONS OF THIS RESEARCH***

The findings of the present research are limited in terms of generalizability. Given that the participants consisted mainly of undergraduate psychology students, the findings may not be representative of the general population. Mayer and Frantz (2004, Study 3) found, for instance, that students from different courses (i.e., environmental studies, chemistry, math, and psychology students) had different scores in their measure of connectedness to nature, with environmental studies students being more connected to nature than their counterparts. This suggests that psychology students may likewise show specificities regarding EA that may limit the generalizability of the findings reported here. However, given that the findings rely more on the diversity of participants' responses on the variables considered than on their socio-demographic characteristics (cf. F. G. Kaiser & Scheuthle, 2003), a certain degree of generalizability seems reasonably likely.

Another possible limitation of this research might be from its use of Web-based surveys (i.e., Study 2b and Study 2c). Given that these surveys were advertised through email lists and Web pages, the topic of the research would be apparent. This might have resulted in a self-selection bias resulting in more environmentally-friendly participants (cf. F. G. Kaiser, Wölfing, & Fuhler, 1999). This bias might have resulted in higher scores on EA and other environmentally related variables in these Web-based studies. For instance, the mean GEA score for the participants in Study 2b ( $M = 5.20$ ,  $SD = .49$ ), which was a Web-based survey, was significantly higher ( $p < .001$ ,  $d = 1.05$ ) than the mean GEA score for the participants in Study 2a ( $M = 4.63$ ,  $SD = .58$ ). However, this is not specific to the present study, nor is it a result of the data collection methodology employed. Studies in the environmental domain using the same or other survey methodologies, such as mailing

questionnaires (e.g., F. G. Kaiser, Wölfing, & Fuhler, 1999; e.g., Kuhn & Jackson, 1989), may also be subject to the same “‘green’ or ‘anti-green’ bias” (Grob, 1995, p. 216). Moreover, the possibility of this bias seems unlikely to threaten the main findings of these studies.

The findings of the present study are also limited because they are based only on survey methodologies and on correlational research. Like the majority of the studies measuring EA (Corral-Verdugo, 1997), the present research relied on self-report techniques. However, research has shown discrepancies between self-reports and observations of ecological behaviours (Corral-Verdugo, 1997; Hines, Hungerford, & Tomera, 1987), indicating that self-report measures may be problematic. Moreover, the present research used only correlational designs to examine causal relations, such as Homer and Kahle’s (1988) model. Thus, the findings from this research do not permit causal inference. However, the causal relations examined here were theoretically very plausible. Nevertheless, they do need to be replicated by experimental and longitudinal research.

Despite these limitations, consistent findings were obtained across two different data collection methodologies (i.e., paper-and-pencil, and Web-based surveys), across samples from three cultures (i.e., Brazil, New Zealand, and South Africa), and in a general population sample (i.e., Study 2c). This consistency of the findings gives support for the generalizability, reliability, and validity of the results. The findings should be replicated, however, with representative samples from the general population and employing different methodologies for measuring EA, such as peer ratings, implicit attitude measures (e.g., Schultz, Shriver, Tabanico, & Khazian, 2004) and direct observations of ecological behaviour (Corral-Verdugo, 1997). The causal relations also need to be tested using longitudinal and experimental design.

### ***SUGGESTIONS FOR FURTHER RESEARCH***

First, future research should clarify the vertical structure of EA by testing the dimensionality of the higher order factors in different samples. There is some evidence that Preservation and Utilization are conceptually and empirically distinct, yet related constructs. It would be interesting to test whether the discriminant validity of Preservation and Utilization regarding religiosity,

altruistic values and environmental threat held in new samples. It would also be interesting to try and expand the nomological network of these dimensions by relating Preservation and Utilization with other variables. For instance, these factors may correlate differently with social axioms (K. Leung & Bond, 2004; K. Leung et al., 2002), with Preservation correlating negatively with fate control (a deterministic view of social events) and Utilization correlating positively with spirituality (belief in the existence of supernatural forces and functions of religious belief). Thus, future research could use the framework developed here to assemble new evidence to come to more definitive conclusions about the higher order dimensionality of EA.

Second, future research should go beyond pure correlational research designs when investigating EA, and conduct experimental studies. Studies of this type have showed that manipulating social threat, with scenarios depicting threatening and dangerous social changes, increased authoritarianism (Duckitt & Fisher, 2003). Similar experiments could be conducted manipulating threatening (i.e., depicting a future with serious environmental problems), secure (i.e., depicting a future safe and secure from environmental problems), and control future scenarios. This manipulation could be expected to shift individual's attitudes and behaviour. It is likely that a threatening future condition would increase participants' EA and ecological behaviour, and increase the relationship between these two constructs. In line with this, Van Vugt and Samuelson (1999) found that participants' water conservation behaviours were greater when they perceived a water shortage to be severe (i.e., a threatening scenario). Therefore, it would be possible to draw strong inferences about the influence of threat and other situational variables on EA by using experimental designs. Moreover, experimental research could be useful for providing evidence for the discriminant validity of Preservation and Utilization. For instance, and in line with the present results, individuals with higher scores in Preservation may be more influenced by environmental threat manipulations than individuals with high scores in Utilization. Therefore, experimental designs could guide upcoming research in the field (cf. Bamberg & Möser, 2007).

Third, in this research only the EAI and EAI-S higher order dimension(s) were considered. Future research needs to establish the discriminant validity of the twelve EAI and EAI-S scales by

showing that these differentially predict external validity criteria. These twelve scales may be useful in particular studies focusing on specific aspects of environmental issues. For example, the Support for Population Growth Policies scale can be used for tracking changing approval for family planning programs (cf. Bandura, 2002), and the Human Utilization of Nature scale can be used for predicting overconsumption tendencies (cf. Brown & Cameron, 2000). These scales may also be useful for differentiating samples. For instance, it was shown in Study 3 that ten EAI-S scales showed significantly different means across Brazil, New Zealand, and South Africa. More systematic such research would show whether the twelve EAI and EAI-S scales are useful for empirical research or whether only the higher order dimension(s) are needed.

Fourth, this research expanded Homer and Kahle's (1988) model by showing that both values and perceived environmental threat influence ecological behaviour through EA. This causal model could be further expanded to include other relevant variables for predicting ecological behaviour. For example, Kollmuss and Agyeman (2002) proposed an extensive theoretical model that can be use for deriving specific causal hyphotesis for predicting ecological behaviour. More recently, Bamberg and Möser (2007) proposed a model integrating Schwartz's (1977) norm-activation theory and Ajzen's (1991) theory of planned behaviour so that both pro-social and self-interest motives are considered for predicting ecological behaviour. With the clearer understanding of the structure of EA provided here, the expansion of predictive models of ecological behaviour that include EA could be facilitated.

Finally, future research should investigate the universality of the hierarchical structure of EA across a broader range of countries, and evaluate the meaning of this structure by relating the second-order factor(s) with societal characteristics. For instance, the higher order EAI dimensions could be related to psychological variables, such as cultural dimensions of values (Schwartz, 1994b; P. B. Smith et al., 2002), social axioms (K. Leung & Bond, 2004) and personality factors (McCrae & Allik, 2002), and could also be related to socio-economic indicators, such as environmental indices (Environmental Performance Index, 2006; Environmental Sustainability Index, 2005), and per capita gross domestic product. Several studies have demonstrated the social-psychological bases



of EA, and it would be interesting if societal bases of EA could also be demonstrated (cf. Gelissen, 2007).

## ***CONCLUDING COMMENTS***

Overall, this research has a number of implications. The research focused on the psychology of EA because attitudes underlie many human behaviours, and many, if not all, of the current environmental problems are a result of human activities. It is hoped that this research will contribute to a better understanding of human-environment relations, and ultimately be useful in helping to alleviate current environmental problems.

Apart from the empirical evidence reported here and the implications of this research for the psychology of EA, there are many unanswered questions and issues. Indeed, there seem to be many more questions than answers. This was what both motivated and frustrated the author over many long hours in the last 4 years while preparing this thesis. The lack of conclusive evidence seems an unalterable corollary of research journeys. As Gazzaniga (2006) wisely commented recently: “One of the hallmarks of a gifted mind is its steadfast belief that, in fact, not much of anything relates to anything else” (p. 88). It may be advisable that we researchers keep these words in mind in our scientific endeavour.

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# *Appendices*

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## APPENDIX A. ETHIC APPROVALS



THE UNIVERSITY OF AUCKLAND  
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### UNIVERSITY OF AUCKLAND HUMAN SUBJECTS ETHICS COMMITTEE

10 July, 2003

#### MEMORANDUM TO:

Taciano Lemos Milfont  
Room 037 The Railway Campus  
Te Taou Crescent  
Auckland

Re: Anonymous Questionnaire

I wish to advise you that the Committee met on 9 July, 2003 and reviewed the Anonymous Questionnaire titled "Investigating the structure of environmental attitudes" (Our Ref. 2003 / Q / 020).

Ethics approval was given conditional on

1. Tell participants in the PIS that there will be a de-briefing, and tell them what to do with the completed questionnaire.
2. Review the tenses in the de-briefing sheet
3. Please provide all revised documentation to the Committee before the close of the next Agenda (July 30).

If the project changes significantly you are required to resubmit your application to the Committee for further consideration.

In order that an up-to-date record can be maintained, it would be appreciated if you could notify the Committee once your project is completed.

Please contact the Chair if you have any specific queries relating to your application. She and the members of the Committee would be most happy to discuss general matters relating to ethics provisions if you wish to do so.

PP *Kal*

Margaret Rotondo  
Executive Secretary  
University of Auckland Human Subjects Ethics Committee

c.c. Head of Department, Psychology





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UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS  
ETHICS COMMITTEE

16 February, 2004

MEMORANDUM TO:

T.L. Milfont  
Psychology

**Re: Change to application - Anonymous Questionnaire**

I wish to advise you that the Committee met on 11 February, 2004 and reviewed the request for change to your Anonymous Questionnaire titled "Investigating the structure of environmental attitudes" (Our Ref. 2003 / Q / 020).

Ethics approval was given for three years conditional on

1. Please specify in the Participant Information Sheet that participation is voluntary and the student can leave at any time if they want.
2. Please check the stated time taken now that additional questions are being added.
3. Please provide the revised documents to the Committee as soon as possible for inclusion in the next agenda (23 February).

Margaret Rotondo  
Executive Secretary  
University of Auckland Human Subjects Ethics Committee

c.c. Head of Department, Psychology

Taciano Lemos Milfont  
Room 037 The Railway Campus  
Te Taou Crescent  
Auckland

All communications with the committee regarding this application should indicate this reference number - (2003/020).



THE UNIVERSITY OF AUCKLAND  
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UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS  
ETHICS COMMITTEE

15 October, 2004

MEMORANDUM TO:

T.L. Milfont

Psychology

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Re: Change to application - Anonymous Questionnaire

I wish to advise you that the Committee met on 13 October, 2004 and reviewed the request for change to your Anonymous Questionnaire titled "Investigating the structure of environmental attitudes" (Our Ref. 2003 / Q / 020).

Ethics approval was given for three years conditional on

1. There should be an introduction on the survey explaining the purpose of the research and that it is for the purposes of PhD research.
2. In the last page of the Debrief, please change 'The survey you have done...' to 'The survey you have participated in...'
3. The Committee requests you to simplify the Debrief using plain English so that the participants are able to understand easily.
4. Please provide the above revisions as soon as possible for inclusion in the next agenda. (20/10).

Margaret Rotondo

Executive Secretary

University of Auckland Human Subjects Ethics Committee

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c.c. Head of Department, Psychology

Taciano Lemos Milfont

Room 037 The Railway Campus

Te Taou Crescent

Auckland

All communications with the committee regarding this application should indicate this reference number - (2003/020).

## ***APPENDIX B. ADDITIONAL INFORMATION FROM STUDY 1***

Table B1

*Reliability, Means, Standard Deviations, Factor Loadings and Communalities of Exploratory Factor Analysis of the Environmental Attitudes Items*

Item	Exploratory Factor analysis			
	<i>M</i>	<i>SD</i>	Loading	<i>h</i> <sup>2</sup>
Factor I: Enjoyment of Nature ( $\alpha = .91$ ; mean inter-item correlation = .47)				
I am NOT the kind of person who loves spending time in wild, untamed wilderness areas. EPS_RE03	2.95	1.60	-.80	.64
I really like going on trips into the countryside, for example to forests or fields. EPS08	5.30	1.40	.79	.60
I find it very boring being out in the wild countryside. EPS_RE08	2.73	1.33	-.75	.60
Sometimes when I am unhappy, I find comfort in nature. ECO06	5.02	1.50	.71	.58
Being out in nature is a great stress reducer for me. ECO09	5.40	1.27	.68	.60
I would rather spend my weekend in the city than in wilderness areas. EPS_RE18	3.84	1.50	-.66	.52
I can enjoy spending time in natural settings just for the sake of being out in nature. ECO02	5.71	1.21	.66	.47
I have a sense of well-being in the silence of nature. EPS03	5.24	1.29	.64	.57
I find it more interesting in a shopping mall than out in the forest looking at trees and birds. EPS_RE13	3.71	1.53	-.60	.52
I need time in nature to be happy. ECO05	4.80	1.49	.58	.58
I would really enjoy sitting at the edge of a pond watching dragonflies in flight. EPS18	4.40	1.59	.49	.45
I specially love the soft rustling of leaves when the wind blows through the treetops. EPS13	5.03	1.40	.46	.33
Factor II: External Control/Effective Commitment ( $\alpha = .86$ ; ; mean inter-item correlation = .28)				
Industry should be required to use recycled materials even when it costs less to make the same products from new raw materials. EWV17	5.30	1.19	.76	.50
Governments should control the rate at which raw materials are used, to ensure that they last as long as possible. EWV10	5.30	1.25	.71	.39
Controls should be placed on industry to protect the environment from pollution, even if it means things will cost more. EWV14	5.32	1.14	.68	.42
People in developed societies are going to have to adopt a more conserving life-style in the future. EWV13	5.20	1.23	.66	.46
The government should give generous financial support to research related to the development of solar energy. EWV19	5.37	1.27	.62	.35
Priority should be given to developing alternatives to fossil and nuclear fuel as primary energy sources. EWV01	5.33	1.46	.57	.37
Humans must live in harmony with nature in order for it to survive. EWV05	5.78	1.18	.54	.40
It makes me sad to see natural environments destroyed. ECO07	5.94	1.10	.50	.49
Nature is valuable for its own sake. ECO08	5.84	1.15	.44	.38

Table B1 (continued)

One of the worst things about overpopulation is that many natural areas are getting destroyed. ECO01	5.64	1.20	.40	.31
I prefer wildlife reserves to zoos. ECO04	5.60	1.43	.38	.27
I do not believe protecting the environment is an important issue. EPS_RE10	2.24	1.23	-.37	.39
Despite our special abilities humans are still subject to the laws of nature. NEP09	5.48	1.16	.34	.26
The so-called "ecological crisis" facing humankind has been greatly exaggerated. NEP10	3.44	1.22	-.33	.32
Draining swamps should be opposed even if pests such as mosquitoes and flies breed in them. EPS_RE06	4.37	1.30	.31	.30
Sometimes it makes me sad to see forests cleared for agriculture. ECO03	5.44	1.22	.30	.31
Factor III: Intent of Support ( $\alpha = .89$ ; mean inter-item correlation = .51)				
If I ever get extra income I will donate some money to an environmental organisation. EPS01	4.48	1.66	.71	.54
I would like to join and actively participate in an environmentalist group. EPS11	3.60	1.45	.71	.65
I don't think I would help to raise funds for environmental protection. EPS_RE15	3.44	1.40	-.71	.60
I would NOT get involved in an environmentalist organization. EPS_RE07	3.71	1.50	-.67	.59
Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort. EPS06	4.34	1.38	.65	.59
I would not want to donate money to support an environmentalist cause. EPS_RE20	3.16	1.39	-.62	.50
I would NOT go out of my way to help recycling campaigns. EPS_RE05	3.30	1.42	-.48	.42
I often try to persuade others that the environment is an important thing. EPS16	4.30	1.50	.43	.47
Factor IV: Anthropocentric Concern ( $\alpha = .72$ ; mean inter-item correlation = .31)				
One of the most important reasons to conserve is to ensure a continued high standard of living. ANTHR11	4.37	1.31	.76	.54
One of the best things about recycling is that it saves money. ANTHR08	3.63	1.52	.66	.40
The worst thing about the loss of the rain forest is that it will restrict the development of new medicines. ANTHR01	3.71	1.48	.55	.29
One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy water sports. ANTHR06	3.51	1.60	.55	.31
Nature is important because of what it can contribute to the pleasure and welfare of humans. ANTHR09	4.66	1.46	.55	.29
The thing that concerns me most about deforestation is that there will not be enough lumber for future generations. ANTHR05	3.60	1.60	.49	.38
Factor V: Rejection of Exemptionalism/Confidence in Science and Technology ( $\alpha = .74$ ; mean inter-item correlation = .29)				
Most problems can be solved by applying more and better technology. EWV16	3.79	1.33	.70	.45
Science and technology will eventually solve our problems with pollution, overpopulation, and diminishing resources. ANTHR04	3.61	1.44	.68	.47
Through science and technology we can continue to raise our standard of living. EWV04	4.84	1.20	.62	.43
Humans will eventually learn enough about how nature works to be able to control it. NEP14	3.65	1.52	.58	.37
We cannot keep counting on science and technology to solve our problems. EWV12	4.70	1.44	-.54	.38

Table B1 (continued)

Human ingenuity will insure that we do NOT make the earth unlivable. NEP04	3.80	1.40	.44	.31
Science and technology do as much harm as good. EWV07	4.50	1.45	-.40	.28
Factor VI: Ecocrisis/Limits to Growth/Nature's Balance ( $\alpha = .73$ ; mean inter-item correlation = .29)				
If things continue on their present course, we will soon experience a major ecological catastrophe. NEP15	4.91	1.24	.61	.48
The earth is like a spaceship with very limited room and resources. NEP11	4.45	1.45	.60	.35
We are approaching the limit of the number of people the earth can support. NEP01	4.51	1.41	.50	.30
Rapid economic growth often creates more problems than benefits. EWV02	4.90	1.19	.42	.34
The balance of nature is very delicate and easily upset. NEP13	4.93	1.30	.36	.20
When humans interfere with nature it often produces disastrous consequences. NEP03	5.01	1.41	.35	.21
Humans are severely abusing the environment. NEP05	5.24	1.34	.35	.30
Factor VII: Human Dominance/Altering Nature ( $\alpha = .68$ ; mean inter-item correlation = .26)				
Grass and weeds growing between paving stones may be untidy but it is natural and should be left alone. EPS_RE11	3.81	1.40	.51	.30
Grass and weeds growing between pavement stones really looks untidy. EPS05	4.30	1.60	-.47	.36
I oppose any removal of wilderness areas no matter how economically beneficial their development may be. EPS_RE17	4.20	1.33	.43	.39
I'd prefer a garden that is wild and natural to a well groomed and ordered one. EPS_RE01	4.10	1.49	.42	.37
Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us. EPS_RE02	4.20	1.30	.41	.35
Turning new unused land over to cultivation and agricultural development should be stopped. EPS_RE12	3.93	1.12	.31	.22
Factor VIII: Care with Resources ( $\alpha = .75$ ; mean inter-item correlation = .34)				
I always switch the light off when I don't need it any more. EPS02	5.19	1.65	.74	.42
I make sure that during the winter the heating system in my room is not switched on too high. EPS12	4.70	1.52	.72	.42
In my daily life I'm just not interested in trying to conserve water or power. EPS_RE14	3.05	1.35	-.64	.56
Whenever possible, I take a shower instead of a bath in order to conserve water. EPS07	5.39	1.60	.54	.35
I could not be bothered to save water or other natural resources. EPS_RE19	2.71	1.21	-.47	.51
I drive whenever it suits me, even if it does pollute the atmosphere. EPS_RE09	3.87	1.57	-.33	.25
Factor IX: Antianthropocentrism ( $\alpha = .73$ ; mean inter-item correlation = .35)				
Humans were meant to rule over the rest of nature. NEP12	3.25	1.72	.69	.50
Human beings were created or evolved to dominate the rest of nature. EWV03	3.43	1.65	.58	.42
Plants and animals have as much right as humans to exist. NEP07	5.90	1.32	-.49	.40

Table B1 (continued)

Plants and animals exist primarily to be used by humans. EWV18	2.54	1.49	.44	.46
Humans are as much a part of the ecosystem as other animals. ECO12	5.60	1.14	-.39	.27
Factor X: Necessity of Development ( $\alpha = .58$ ; mean inter-item correlation = .26)				
A community's standards for the control of pollution should not be so strict that they discourage industrial development. EWV06	3.93	1.30	.52	.25
The positive benefits of economic growth far outweigh any negative consequences. EWV11	3.46	1.19	.44	.41
Weeds should be eradicated because they inhibit the full development of useful and ornamental plants. EPS10	3.90	1.35	.38	.26
Humans need not adapt to the natural environment because they can remake it to suit their needs. EWV09	3.04	1.44	.32	.39

Note. Factor loadings based on Principal Axis Factoring and Promax Rotation with Kaiser Normalization (rotation converged in 9 iterations). The number of factors was specified in 10. In order to save space only loadings above .30 were presented in the Table. The percentage of cumulative variance for the ten factors was 38.6%. EPS\_RE = items from the Environmental Perception Reversed Items Scale, EPS = items from the Environmental Perception Scale, ECO = items from the Ecocentric Scale, EWV = items from the Ecological World View Scale, NEP = items from the New Ecological Paradigm (NEP) Scale, ANTHR = items from the Anthropocentric Scale.

## ***APPENDIX C. ADDITIONAL INFORMATION FROM STUDY 2***

Table C1

*List of the 193 Items Used in Study 2a*

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### **Scale 1. Enjoyment of Nature**

- I am NOT the kind of person who loves spending time in wild, untamed wilderness areas.(R)
- I really like going on trips into the countryside, for example to forests or fields.
- I find it very boring being out in the wild countryside.(R)
- Sometimes when I am unhappy, I find comfort in nature.
- Being out in nature is a great stress reducer for me.
- I would rather spend my weekend in the city than in wilderness areas.(R)
- I can enjoy spending time in natural settings just for the sake of being out in nature.
- I have a sense of well-being in the silence of nature.
- I find it more interesting in a shopping mall than out in the forest looking at trees and birds.(R)
- I need time in nature to be happy.
- I think spending time in nature is boring.(R)
- I just do NOT enjoy spending time out in nature in wilderness areas.(R)

### **Scale 2. Support for Interventionist Conservation Policies**

- Industry should be required to use recycled materials even when it costs less to make the same products from new raw materials.
- Governments should control the rate at which raw materials are used to ensure that they last as long as possible.
- Controls should be placed on industry to protect the environment from pollution, even if it means things will cost more.
- People in developed societies are going to have to adopt a more conserving life-style in the future.
- The government should give generous financial support to research related to the development of alternative energy sources, such as solar energy.
- Priority should be given to developing alternatives to fossil and nuclear fuel as primary energy sources.
- If it costs less to make products from new raw materials, industry should be allowed to use them rather than recycled materials.(R)
- Industries should be able to use raw materials rather than recycled materials whenever the raw materials lead to lower prices and costs, even if it means the raw materials will eventually be used up.(R)
- I don't think people in developed societies are going to have to adopt a more conserving life-style in the future.(R)
- The government shouldn't give so much financial support to research related to the development of alternative energy sources, such as solar energy.(R)
- I don't think priority should be given to developing alternatives to fossil and nuclear fuel as primary energy sources.(R)
- Where natural resources are privately owned, society should have NO control over what the owner does with them.(R)
- Government must take stronger steps to conserve our nation's resources.
- The government has no right to require business or industry to implement pro-environmental or conservationist policies.(R)
- It is wrong for governments or the authorities to try and compel business and industry to put conservation before producing goods in the most efficient and cost effective manner.(R)
- I am completely opposed to measures that would force industry to use recycled materials if this would make products more expensive.(R)
- I am opposed to governments controlling and regulating the way raw materials are used in order to try and make them last longer.(R)
- I oppose the government giving subsidies (financial support) to research trying to develop solar energy.(R)
- The idea that people in more developed economies must adopt a more conserving life style is wrong.(R)

Table C1 (continued)

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**Scale 3. Intent of Support / Environmental movement activism**

- If I ever get extra income I will donate some money to an environmental organisation.
- I would like to join and actively participate in an environmentalist group.
- I don't think I would help to raise funds for environmental protection.(R)
- I would NOT get involved in an environmentalist organization.(R)
- Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort.
- I would not want to donate money to support an environmentalist cause.(R)
- I would NOT go out of my way to help recycling campaigns.(R)
- I often try to persuade others that the environment is an important thing.
- I would never try to persuade others that the environmental protection is an important thing.(R)
- I am NOT the kind of person who would ever get involved in an environmentalist organization.(R)
- I would like to effectively support an environmental organization.
- I am ready to spend time supporting environmental protection campaigns.

**Scale 4. Conservation motivated by anthropocentric concern**

- One of the most important reasons to conserve is to ensure a continued high standard of living.
- One of the best things about recycling is that it saves money.
- The worst thing about the loss of the rain forest is that it will restrict the development of new medicines.
- One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy water sports.
- Nature is important because of what it can contribute to the pleasure and welfare of humans.
- The thing that concerns me most about deforestation is that there will not be enough lumber for future generations.
- I don't think the earth's resources should be used to the fullest to increase human's standard of living.(R)
- We should protect the environment for the well being of plants and animals rather than for the welfare of humans.(R)
- Human happiness and human reproduction are less important than a healthy planet.(R)
- Conservation is important because it protects the environment, not because it might ensure a continued high standard of living.(R)
- Conservation is important even if it lowers peoples' standard of living.(R)
- We need to keep rivers and lakes clean in order to protect the environment, and NOT as places for people to enjoy water sports.(R)
- Recycling is important, not because it saves money or benefits people, but because it helps to protect the environment.(R)
- Nature is important in itself, and not just for what it contributes to human welfare.(R)
- We should protect the environment even if it means peoples' welfare will suffer.(R)

**Scale 5. Confidence in Science and Technology**

- Most problems can be solved by applying more and better technology.
- Science and technology will eventually solve our problems with pollution, overpopulation, and diminishing resources.
- Through science and technology we can continue to raise our standard of living.
- Humans will eventually learn enough about how nature works to be able to control it.
- We cannot keep counting on science and technology to solve our problems.(R)
- Human ingenuity will insure that we do NOT make the earth unlivable.
- Science and technology do as much harm as good.(R)
- Humans will eventually learn how to renew aspects of nature that we think are irreplaceable.
- Humans will never learn enough about how nature works to be able to control it.(R)
- Even with human ingenuity we can make the earth unlivable.(R)
- We cannot count on science and technology to solve our environmental problems.(R)
- I cannot believe that science and technology will solve our problems with pollution, overpopulation, and diminishing resources.(R)
- We shouldn't worry about depleting our energy reserves because technology will always develop new ones.



Table C1 (continued)

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We cannot rely on technology to develop new energy reserves when we finally exhaust our current energy resources.(R)

Any change humans cause in nature – no matter how scientific – is likely to make things worse.(R)

Modern science will solve our environmental problems with little change to our way of life.

Modern science will NOT be able to solve our environmental problems.(R)

Science and technology cannot solve the grave threats to our environment.(R)

The belief that advances in science and technology can solve our environmental problems is completely wrong and misguided.(R)

### **Scale 6. Environmental Fragility**

If things continue on their present course, we will soon experience a major ecological catastrophe.

The earth is like a spaceship with very limited room and resources.

We are approaching the limit of the number of people the earth can support.

Rapid economic growth often creates more problems than benefits.

The balance of nature is very delicate and easily upset.

When humans interfere with nature it often produces disastrous consequences.

Humans are severely abusing the environment.

The idea that we will experience a major ecological catastrophe if things continue on their present course is misguided nonsense.(R)

People who say that the earth is like a spaceship with very limited room and resources are being far too pessimistic.(R)

The earth can probably support an unlimited number of people.(R)

I cannot see any problem created by rapid economic growth. It only creates benefits.(R)

The idea that the balance of nature is terribly delicate and easily upset is much too pessimistic and probably completely wrong.(R)

The idea that human interference with nature may produce disastrous consequences is much too pessimistic and alarmist and most likely completely wrong.(R)

I just do not believe that the environment has been severely abused by humans.(R)

People who say that the unrelenting exploitation of nature has driven us to the brink of ecological collapse are completely and utterly wrong.(R)

People who say that the oceans are gradually dying because of pollution and the dumping of waste are talking complete nonsense.(R)

What human beings are currently doing to nature can be fairly characterized as an “eco-holocaust” (i.e., an ecological disaster).

### **Scale 7. Total Preservation of Nature**

Grass and weeds growing between paving stones may be untidy but it is natural and should be left alone.

Grass and weeds growing between pavement stones really looks untidy.(R)

I oppose any removal of wilderness areas no matter how economically beneficial their development may be.

I’d prefer a garden that is wild and natural to a well groomed and ordered one.

Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us.

Turning new unused land over to cultivation and agricultural development should be stopped.

I am in favour of the removal of wilderness areas if this is economically beneficial.(R)

I’d much prefer a garden that is well groomed and ordered to a wild and natural one.(R)

When nature is uncomfortable and inconvenient for humans we have every right to change and remake it to suit ourselves.(R)

Turning new unused land over to cultivation and agricultural development is positive and should be supported.(R)

The idea that all organisms’ lives are precious and worth preserving is simply wrong.(R)

I do not think natural areas should be maintained as they are.(R)

The idea that natural areas should be maintained exactly as they are is silly, wasteful, and wrong.(R)

Nature would be at peace and in harmony if only human beings would leave it alone.

All organisms’ lives are precious and worth preserving.

Almost everything we do in modern life harms the environment.

Table C1 (continued)

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**Scale 8. Personal conservation behaviour**

- I always switch the light off when I don't need it on any more.
- I make sure that during the winter the heating system in my room is not switched on too high.
- In my daily life I'm just not interested in trying to conserve water or power.(R)
- Whenever possible, I take a shower instead of a bath in order to conserve water.
- I could not be bothered to save water or other natural resources.(R)
- I drive whenever it suits me, even if it does pollute the atmosphere.(R)
- We humans should use all the natural resources we need, even non-renewable ones.(R)
- In recent years, there has been too much emphasis on conserving natural resources and not enough on using them.(R)
- To reduce air pollution I purposefully walk short distances rather than take bus or use a car.
- I am NOT the kind of person who makes efforts to conserve natural resources.(R)
- In my daily life I try to find ways to conserve water and/or power.
- Whenever possible, we should try to save natural resources.
- We are fast using up the world's natural resources.
- We should make personal sacrifices for the sake of slowing down the unnecessary consumption of natural resources.
- Natural resources must be preserved for the future, even if people must do without.
- Much more energy should be expended in conserving what mankind does know, than in discovering what it does not know.
- Even if public transportation was more efficient than it is, I would prefer to drive my car to work or university.(R)
- We must prevent any type of animal from becoming extinct, even if it means sacrificing some things for ourselves.

**Scale 9. Human dominance over nature**

- Humans were meant to rule over the rest of nature.
- Human beings were created or evolved to dominate the rest of nature.
- Plants and animals have as much right as humans to exist.(R)
- Plants and animals exist primarily to be used by humans.
- Humans are as much a part of the ecosystem as other animals.(R)
- What is best for humans is more important than what is best for nature.
- Humans are no more important in nature than other living things.(R)
- Nature exists primarily for human use.
- Nature in all its forms and manifestations should be controlled by humans.
- I DO NOT believe humans were created or evolved to dominate the rest of nature.(R)
- Humans are no more important than any other species.(R)
- The earth's value does not depend on people; it is valuable in itself.(R)
- All living beings (micro-organisms, plants, animals, and humans) are interdependent with one another.(R)
- Everything is only best for humans if it is best for nature as well.(R)

**Scale 10. Human Utilization of Nature**

- The positive benefits of economic growth far outweigh any negative consequences.
- Humans need not adapt to the natural environment because they can remake it to suit their needs.
- People worry too much about human progress harming the environment.
- Economic goals are more important than environmental goals.
- Using our own property as we choose is more important than protecting endangered species.
- It is alright for humans to use nature as a resource for economic purposes.
- Protecting peoples' jobs is more important than protecting the environment.
- Economic growth does as much harm as good.(R)
- Humans do NOT have the right to change the environment just to get greater economic growth.(R)
- People have been giving far too little attention to how human progress has been damaging the environment.(R)
- Protecting the environment is more important than protecting economic growth.(R)
- Property owners should not be allowed to use their property in a way that might harm any endangered species.(R)

Table C1 (continued)

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Property owners should have to protect any endangered species on their property.(R)  
We should no longer use nature as a resource for economic purposes.(R)  
Protecting the environment is more important than protecting peoples' jobs.(R)  
Economic growth always harms the environment.(R)  
We worry too much about the future of the environment and not enough about prices and jobs today.  
In order to protect the environment, we need economic growth.  
The question of the environment is secondary to the economy growth.  
The benefits of modern consumer products are more important than the pollution that results from their production and use.  
To maintain a healthy environment we will have to develop a "steady-state" economy where industrial growth is controlled.(R)  
No wild place will be safe from us until we reconsider our belief that economic growth is always good.(R)

**Scale 11. Ecocentric Concern**

Humans must live in harmony with nature in order for it to survive.  
It makes me sad to see natural environments destroyed.  
Nature is valuable for its own sake.  
One of the worst things about overpopulation is that many natural areas are getting destroyed.  
I prefer wildlife reserves to zoos.  
I do not believe protecting the environment is an important issue.(R)  
Despite our special abilities humans are still subject to the laws of nature.  
The so-called "ecological crisis" facing humankind has been greatly exaggerated.(R)  
It makes me sad to see forests cleared for agriculture.  
We should do what we can to preserve nature.  
It does NOT make me sad to see natural environments destroyed.(R)  
I do not believe nature is valuable for its own sake.(R)  
We shouldn't worry so much about preserving nature.(R)  
The idea that humans have to live in harmony with nature isn't really true at all.(R)  
I don't get upset at the idea of forests being cleared for agriculture.(R)  
Animals are probably much better off in zoos than in the wild.(R)  
The idea that nature is valuable for its own sake is naïve and wrong.(R)  
The idea that humans MUST live in harmony with nature is oversimplified and wrong.(R)

**Scale 12.Support for Control of Population Growth Policies**

We would be better off if we dramatically reduced the number of people on the Earth.  
Government should attempt to persuade people to have more children and if necessary restrict birth control information for the benefit of our national defence.  
Families should be encouraged to limit themselves to two children or less.  
A married couple should have as many children as they wish, as long as they can adequately provide for them.(R)  
Our government should educate people concerning the importance of having two children or less.  
We should never put limits on the number of children a couple can have.(R)  
We should strive for the goal of "zero population growth".  
This country would be better off if its population stopped growing.  
The idea that we should control the population growth is wrong.(R)  
People who say overpopulation is a problem are completely incorrect.(R)  
The government has no right to require married couples to limit the number of children they can have.(R)

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Appendix C (continued)

Table C2

*List of the 59 Countries from All Six Inhabited Continents that had Participants in Study 2b (N = 468)*

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<b>Africa (n = 9)</b>	Estonia 1
Ghana 1	France 3
Kenya 1	Germany 5
Nigeria 2	Great Britain (United Kingdom) 7
South Africa 5	Ireland 2
	Italy 1
<b>Asia (n = 35)</b>	Luxembourg 1
China 2	Netherlands 20
Hong Kong 3	Norway 3
India 4	Russian Federation 1
Indonesia 1	Scotland (United Kingdom) 7
Iran 1	Spain 1
Israel 1	Svalbard and Jan Mayen Islands 1
Japan 2	Switzerland 3
Lebanon 1	Ukraine 1
Malaysia 7	United Kingdom 31
Nepal 1	Wales (United Kingdom) 1
Oman 1	
Pakistan 1	<b>North America (n = 80)</b>
Philippines 1	Canada 15
Singapore 2	El Salvador 1
Sri Lanka 3	Honduras 1
Taiwan 1	Mexico 1
Thailand 1	United States of America 62
United Arab Emirates 2	
	<b>South America (n = 21)</b>
<b>Australia and Oceania (n = 216)</b>	Argentina 1
Australia 23	Brazil 14
Fiji 4	Chile 1
New Zealand 188	Peru 2
Solomon Islands 1	Suriname 1
	Uruguay 1
<b>Europe (n = 107)</b>	Venezuela 1
Austria 2	
Belarus 2	
Bosnia and Herzegovina 1	
England (United Kingdom) 13	

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Appendix C (continued)

Table C3

*List of Definers from 'Environmental Preservation' from the Test-Retest Study of Study 2c (N = 80)*

<b>SW</b>	<b>Definers (NTD)</b>	<b>SW</b>	<b>Definers (NTD)</b>
1	abundance	2	forever
5	air	2	forward-thinking
2	alternatives	1	fresh
5	altruism	2	frogs
8	animals (2)	3	frustrating
2	atmosphere	26	Future (9)
1	attention	2	fuzzy animals
14	balance (4)	2	generations
1	banana slug	5	global importance
9	beauty (3)	7	good (2)
2	behaviour	4	government (2)
4	bicycles (2)	11	green (3)
2	biodegradable	4	green products
3	biosphere	5	greenies (2)
5	bottom-of-cliff	9	Greenpeace (2)
2	building	2	growth
5	care	5	habitat (2)
5	caretaker-ship	3	hard work
3	caring	6	harmony (3)
11	caring (3)	7	health (4)
4	catch limits	3	helping
1	caution	7	heritage (2)
2	challenging	2	hope
2	chaotic	1	human
3	chemical	5	husbanding
3	children	4	hydrogen energy
8	clean (2)	3	imperialism
2	climate	11	important (3)
3	compost	2	improving
4	compromised	2	indigenous wildlife
1	conscience	3	indisputable
68	conservation (19)	2	innovation
3	consideration	1	integration of people as a part of nature
4	continuity of life	1	intrinsic value
4	controversial	3	irrational
1	cookies	5	kaitiakitanga
4	costly (2)	5	kind
6	deforestation (2)	6	laws (3)
13	department of conservation (3)	4	legacy
20	difficult (5)	4	life (2)
1	diversity	2	light
1	draining	3	limit
1	duty	2	little-by-little
3	earth (3)	4	lobby
7	ecology (3)	2	lockup
4	ecosystem	9	long term (3)
2	ecosystem-protection	4	love
5	eden	4	manaakitanga
4	electric car	3	managing

Table C3 (continued)

SW	Definers (NTD)	SW	Definers (NTD)
3	me	5	responsibility (3)
5	minimise	4	restriction
3	moral	11	reuse (5)
2	mountains	4	rivers
3	native bush	2	roads
5	native forests	2	rocks
5	natural (4)	4	safe
15	nature (8)	4	sanctuary
22	necessary (5)	25	saving (7)
1	needed	4	science (2)
3	New Zealand	4	self-discipline
3	ngahere	8	sensible (3)
1	no overestimation of human kind	5	serene
3	no pollution	2	sharing
5	nurturing	2	smart
4	oil	4	solar
2	organic	2	solar power
4	organic shopping	1	standard
16	parks (4)	4	stewardship
1	peace	1	stop plastic bags
3	permaculture	1	survival
3	Planning	7	sustainability (4)
10	pollution (3)	1	thoughtful
2	positive	5	thoughtfulness
5	power	4	time
4	preservationists	3	tranquility
9	preserving (2)	2	transformation of the way people think
2	primeval	23	trees (6)
7	pristine (2)	4	uncompromising
1	proactive	3	unrecognised
2	protected land	3	untouched
43	protecting (13)	3	versus
5	protesters	2	virgin forest
3	prudent	5	walking
3	public transport	4	waste management
4	pure	4	wastes (2)
1	quality-of-life	14	water (4)
3	quiet	1	water quality
8	rainforest (2)	5	waterways
8	recreation (2)	6	welfare (2)
50	recycling (15)	1	well-being
10	reduce (2)	1	wetlands
5	reforestation	4	whining
2	refuge	3	wideranging
4	renaturation	4	wilderness
2	replacement	15	wildlife (4)
8	replanting (3)	3	wind power
2	required	3	woods
18	reserves (5)	5	worthwhile
4	resource management		
3	resources (2)		
4	respect		
2	respecting nature		

Note.  $N = 80$ . SW = semantic weight; NTD = number of times the definer was listed.

Table C4

*List of Definers from 'Environmental Utilization' from the Test-Retest Study of Study 2c (N = 80)*

<b>SW</b>	<b>Definers (NTD)</b>	<b>SW</b>	<b>Definers (NTD)</b>
15	abuse (4)	3	everything
6	agriculture (2)	1	exchange
5	air pollution (2)	57	exploitation (13)
1	animals	9	extraction (3)
13	balance (3)	20	farming (6)
7	beneficial (3)	1	finite
5	big corporations	5	fishing (2)
3	bio-patents	13	food (4)
1	bulldozer	18	forests (5)
2	business (2)	4	function
3	care (2)	2	future
16	cautions (4)	5	garbage
1	clean	1	gasoline
10	clear cutting (2)	2	George Bush
5	clunky	1	goods
4	commerce	6	greed (3)
4	common sense	6	green (4)
2	community	3	green peace
1	compromise	1	growth
2	conflicted	3	harmony
11	conservation (3)	2	harms (2)
1	considerate	4	heath
1	consumerism	4	herbs
4	contamination	4	hiking
5	corporate jargon	2	holliday
1	corrupt	15	humans (5)
1	cost-benefit	3	hydro-power
2	damage	5	industry
7	death (2)	1	integrated
6	deforestation (4)	3	intentional
6	degradation (2)	4	interest
2	desertification	4	inter-relation
12	destruction (4)	1	invent
5	development	4	jobs
5	dirty	5	kaitiakitanga
5	disasters (2)	3	landcare
1	dogmatic	5	leisure time
4	dominance	3	life
2	earth	7	limitation(s) (2)
14	economy (4)	5	long-term (2)
1	ecotourism	3	loss of beauty
8	efficient (2)	2	low-price flights
2	endangered	2	machines
4	energy (2)	2	management
2	engineering	4	mauri / entity
5	environment	2	measured
2	environmentalism	6	mining (2)
1	erosion	2	mitigation
2	euphemism	5	moderation (2)

Table C4 (continued)

SW	Definers (NTD)	SW	Definers (NTD)
1	money	3	sea
3	murder/abuse	2	self-detrimental
6	natural (2)	9	selfish (3)
10	necessary (3)	5	sharing
5	need (2)	2	shopping
2	negative	2	short-sighted
13	none (5)	3	soap
5	order	1	solar power
4	outdoor pursuits	5	stewardship
5	outside	4	strip
6	overfishing (2)	2	study
1	overuse	1	stupid
3	parks (2)	2	suburbanisation
1	partnership	5	sun
1	peace	3	survive
1	people	47	sustainability (12)
2	pillage	1	swimming
3	pioneer	5	technology (2)
4	planned	1	think
25	pollution (7)	2	thoughtful
1	population	3	together
8	practical (2)	3	too much driving
2	pragmatic (2)	5	tourism
1	production	1	tramping
5	profit	3	transformation
5	progress	1	trees
4	protected bushes	3	unbalanced
4	protection (2)	3	uncaring
2	providing	4	unclear
3	rape	3	uncontrolled
1	rational	2	unnatural
4	raw materials (2)	2	unrespectful
1	reasonable	28	use (8)
5	reciprocity	4	usefulness
10	recreation (3)	1	value
4	Re-cycle	3	wairua / spirit
8	reduce (2)	2	walking
3	reforestation	4	washing machine
1	regulation	9	waste (3)
1	replacement	22	water (6)
3	reserves	5	water power
12	resources (3)	2	watercare
5	respect (2)	3	western
11	responsibility (3)	3	wetlands
8	reuse (2)	4	wilderness
2	salt lakes	1	wind
2	sand-mining	4	wind (2)
4	science	3	wood (2)
3	scrape		

Note.  $N = 80$ . SW = semantic weight; NTD = number of times the definer was listed.



## **APPENDIX D. ADDITIONAL INFORMATION FROM STUDY 3**

Table D1

*Hierarchical Multiple Regression Predicting Environmental Attitudes and Ecological Behavior for the Brazil Sample*

		Preservation		Utilization		GEA		Ecological behav.	
		$\beta$	$Adj. R^2$	$\beta$	$Adj. R^2$	$\beta$	$Adj. R^2$	$\beta$	$Adj. R^2$
Step 1 (entry of sum of values)	Mean value rating	.37**	.14***	-.22	.02*	.34**	.10***	.06	.01
Step 2 (entry of main effects)	Altr	.10	.28***	.09	.07**	.02	.22***	-.05	.08**
	Self	-.27**		.20*		-.27**		.02	
	Threat	.23**		-.12		.21**		.32***	
Step 3 (entry of the two-way interaction terms)	Altr $\times$ Self	-.05	.27	.17	.08	-.11	.22	.04	.06
	Altr $\times$ Threat	-.01		-.08		.03		-.07	
	Self $\times$ Threat	-.01		.02		-.01		-.01	
Step 4 (entry of the three- way interaction term)	Altr $\times$ Self $\times$ Threat	-.03	.27	.01	.07	-.02	.22	-.13	.07

Note.  $N = 201$ . The adjusted  $R^2$  is displayed for each step, the significance of the *adjusted  $R^2$*  indicates whether the linear combination of variables entered at that step predicted significant additional variance in either environmental attitude or ecological behavior (rather than whether the overall model was significant at each step). Altr = altruistic values. Self = self-enhancement values. Threat = perceived environmental threat. GEA = General Environmental Attitudes (i.e., Preservation and Utilization combined).

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table D2

*Hierarchical Multiple Regression Predicting Environmental Attitudes and Ecological Behavior for the New Zealand Sample*

		Preservation		Utilization		GEA		Ecological behav.	
		$\beta$	<i>Adj. R</i> <sup>2</sup>	$\beta$	<i>Adj. R</i> <sup>2</sup>	$\beta$	<i>Adj. R</i> <sup>2</sup>	$\beta$	<i>Adj. R</i> <sup>2</sup>
Step 1 (entry of sum of values)	Mean value rating	.72***	.06***	-.51***	.00	.69***	.04**	.65***	.08**
Step 2 (entry of main effects)	Altr	-.20*	.26***	.14	.21***	-.19*	.27***	-.17	.17***
	Self	-.60***		.63***		-.67***		-.43***	
	Threat	.11		-.02		.08		-.04	
Step 3 (entry of the two-way interaction terms)	Altr × Self	.00	.26	.00	.20	.00	.27	.01	.16
	Altr × Threat	.10		.01		.06		-.04	
	Self × Threat	.01		.04		-.01		.06	
Step 4 (entry of the three-way interaction term)	Altr × Self × Threat	.08	.26	-.01	.20	.08	.27	.09	.19

Note.  $N = 226$ . The adjusted  $R^2$  is displayed for each step, the significance of the *adjusted R*<sup>2</sup> indicates whether the linear combination of variables entered at that step predicted significant additional variance in either environmental attitude or ecological behavior (rather than whether the overall model was significant at each step). Altr = altruistic values. Self = self-enhancement values. Threat = perceived environmental threat. GEA = General Environmental Attitudes (i.e., Preservation and Utilization combined).

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table D3

*Hierarchical Multiple Regression Predicting Environmental Attitudes and Ecological Behavior for the South Africa Sample*

		Preservation		Utilization		GEA		Ecological behav.	
		$\beta$	<i>Adj. R</i> <sup>2</sup>	$\beta$	<i>Adj. R</i> <sup>2</sup>	$\beta$	<i>Adj. R</i> <sup>2</sup>	$\beta$	<i>Adj. R</i> <sup>2</sup>
Step 1 (entry of sum of values)	Mean value rating	.60***	.02*	-.25	.00	.51***	-.00	.46**	.03**
Step 2 (entry of main effects)	Altr	-.15	.13***	.02	.10***	-.11	.13***	-.05	.08**
	Self	-.55***		.44***		-.57***		-.36**	
	Threat	.10		.06		.04		.01	
Step 3 (entry of the two-way interaction terms)	Altr × Self	-.01	.13	.07	.09	-.04	.13	.02	.07
	Altr × Threat	-.03		.02		-.03		-.01	
	Self × Threat	-.11		-.02		-.06		-.00	
Step 4 (entry of the three-way interaction term)	Altr × Self × Threat	.03	.13	.05	.09	-.00	.12	-.08	.07

Note.  $N = 257$ . The adjusted  $R^2$  is displayed for each step, the significance of the *adjusted R*<sup>2</sup> indicates whether the linear combination of variables entered at that step predicted significant additional variance in either environmental attitude or ecological behavior (rather than whether the overall model was significant at each step). Altr = altruistic values. Self = self-enhancement values. Threat = perceived environmental threat. GEA = General Environmental Attitudes (i.e., Preservation and Utilization combined).

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

## ***APPENDIX E. QUESTIONNAIRES USED***

Participants received a Participant Information Sheet and a Debrief Sheet in all studies. The sheets used in Study 1 are shown below only as an example.



**THE UNIVERSITY OF AUCKLAND**  
**NEW ZEALAND**

### **DEPARTMENT OF PSYCHOLOGY**

Level 6, Human Sciences Building  
10 Symonds Street, Auckland  
Ph: 373-7599 ext 88557  
Fax: 373-7450

### **PARTICIPANT INFORMATION SHEET**

#### **Investigating the structure of environmental attitudes**

My name is Taciano Lemos Milfont. I am a PhD student at the University of Auckland conducting an ongoing programme of research with Associate Professor John Duckitt on environmental issues. This research investigation consists of a survey questionnaire that asks about opinions, attitudes and behaviours on a variety of such environmental issues. I would like to invite you to participate in this research by completing this survey questionnaire. Completing the questionnaire should take about 20 minutes, and after that you should give it to the research assistant in class. The questionnaire is totally anonymous so no individual's responses can or would be identified. The analysis of the findings will be purely statistical using all responses as a single sample and looking at how the sample as a whole responded and this data may be used for publication in social scientific journals.

Thank you very much for your time and help in making this study possible. Next week, I will give you a debrief sheet explaining in detail the objectives of my research. If you have any queries or wish to know more about the research, I can be contacted at Room 632, Level 6, Human Sciences Building, 10 Symonds Street, Auckland. Alternatively you could contact my supervisor at the address below.

My supervisor is:

Assoc. Prof. John Duckitt  
Psychology Department  
University of Auckland  
Private Bag 92019, Auckland  
Tel. (09) 373 7599 ext. 8511

The Head of the Psychology Department is:

Prof. Dianne McCarthy  
Psychology Department  
University of Auckland  
Private Bag 92019, Auckland  
Tel. (09) 373 7599 ext. 8516

For any queries regarding ethical concerns please contact:

The Chair, The University of Auckland Human Subjects Ethics Committee, The University of Auckland, Research Office - Office of the Vice Chancellor, Private Bag 92019, Auckland. Tel. (09) 373-7999 ext. 87830

**APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN SUBJECTS ETHICS COMMITTEE on 09/07/2003 for a period of 1 year, from 09/07/2003. Reference no. 2003 / Q / 020.**

Debrief sheet: Research Questionnaire: Investigating the structure of environmental attitudes

Many thanks for completing the questionnaire last week. This research project is being conducted by Taciano Lemos Milfont and John Duckitt, and has the objective of investigating the structure of environmental attitudes. Thus, the statements in the questionnaire that you were asked to agree or disagree with (i.e., Likert item format) express environmental concerns and beliefs.

As a result of increasing interest in environmental issues, many scales have been developed to measure environmental attitudes. These have been traditionally viewed as organised along a single dimension ranging from *unconcerned* at the low end, to *concerned* at the high end, such as the New Environmental Paradigm (NEP, Dunlap & Van Liere, 1978; Dunlap *et al.*, 2000). These scales, however, do not present a theoretical rationale to support them. For this reason, several theoretical frameworks have been developed to understand environmental concerns. Thompson and Barton (1994), for instance, presented a classification of environmental attitudes as rooted either in a concern for all living things (*Ecocentric*) or in a concern for humans (*Anthropocentric*). In addition, Schultz (2001), following Stern and Dietz's (1994) value-basis theory, proposed that environmental concerns have three correlated factors. These are, concern for the self (*Egoistic*), other people (*Altruistic*), and the biosphere (*Biospheric*).

Today, attempts to present such a theoretical approach have begun to use factor analysis of items from many scales to find environmental attitudes' primary factors. These first-order factors are then used as the variables for a further factor analysis, trying to identify second-order or higher-order factors. Using this strategy, Wiseman and Bogner (2003) analysed the five primary factors of their environmental attitudes battery and the three primary factors of the NEP scale. They found two uncorrelated higher-order factors and presented a two-dimensional Model of Ecological Values (MEV). This model has two orthogonal dimensions, *Preservation* and *Utilisation*. The former reflects conservation and protection of the environment, and the latter the utilisation of natural resources. This is what our questionnaire investigates. We aim to test this two higher-order structure, incorporating other environmental attitude measures into the model. We will use factor analytical techniques to see if the items do form two different dimensions. Secondly, the two different dimensions, if they really are distinct, should differentially predict people's pro-environmental behaviour (hence the questions about behavioural self description in the questionnaire), and different concerns about social and political issues (hence the support or opposition to particular social and political issues section). The questionnaire you have done should enable us to understand how environmental attitudes are structured, and how they predict people's behaviour.

We are very grateful for your help with the research. Please don't hesitate to approach us if you have any questions about it.

Taciano Lemos Milfont & John Duckitt  
Psychology Department

**Questionnaire used in Study 1**

**Could you please tell us what you think ...?**

The purpose of this questionnaire is to investigate people's attitudes and opinions on environmental issues. The questionnaire is totally anonymous so no individual's responses can or will be identified. Please answer the following questions honestly and accurately. Read each question carefully, and select the response that best reflects your "gut reaction" to the question or item. There are no right or wrong answers; we are interested in your own personal opinions and perceptions, whatever they are. Please try to answer all the questions, as the success of the research depends on each questionnaire being as fully completed as possible.



**BACKGROUND ITEMS**

How old are you? _____ years.									
What is your gender? (circle)									
1. Female					2. Male				
How would you classify your ethnic affiliation? (circle)									
1. Asian			4. Pakeha/NZ European						
2. Maori			5. Other _____						
3. Pacific Islander									
How religious are you, if at all? (circle)									
Not at all								Very religious	
0	1	2	3	4	5	6	7	8	
What kind of income bracket would you see your family being in: (circle)									
Lower			Middle				Upper		
1	2	3	4	5	6	7	8	9	

**SECTION A:**

Please indicate the extent to which you agree or disagree with each of the following statements by circling one of the set of numbers following each statement that best reflects your degree of agreement or disagreement according to the following scale.

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
We are approaching the limit of the number of people the earth can support.						
Humans have the right to modify the natural environment to suit their needs.						
When humans interfere with nature it often produces disastrous consequences.						
Human ingenuity will insure that we do NOT make the earth unlivable.						
Humans are severely abusing the environment.						
The earth has plenty of natural resources if we just learn how to develop them.						
Plants and animals have as much right as humans to exist.						
The balance of nature is strong enough to cope with the impacts of modern industrial nations.						
Despite our special abilities humans are still subject to the laws of nature.						
The so-called "ecological crisis" facing humankind has been greatly exaggerated.						
The earth is like a spaceship with very limited room and resources.						
Humans were meant to rule over the rest of nature.						
The balance of nature is very delicate and easily upset.						
Humans will eventually learn enough about how nature works to be able to control it.						
If things continue on their present course, we will soon experience a major ecological catastrophe.						
One of the worst things about overpopulation is that many natural areas are getting destroyed.						
I can enjoy spending time in natural settings just for the sake of being out in nature.						
The worst thing about the loss of the rain forest is that it will restrict the development of new medicines.						
Sometimes it makes me sad to see forests cleared for agriculture.						
I prefer wildlife reserves to zoos.						
The best thing about camping is that it is a cheap vacation.						
It bothers me that humans are running out of their supply of oil.						
I need time in nature to be happy.						
Science and technology will eventually solve our problems with pollution, overpopulation, and diminishing resources.						

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
The thing that concerns me most about deforestation is that there will not be enough lumber for future generations.						
1	2	3	4	5	6	7
Sometimes when I am unhappy, I find comfort in nature.						
1	2	3	4	5	6	7
One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy water sports.						
1	2	3	4	5	6	7
It makes me sad to see natural environments destroyed.						
1	2	3	4	5	6	7
The most important reason for conservation is human survival.						
1	2	3	4	5	6	7
One of the best things about recycling is that it saves money.						
1	2	3	4	5	6	7
Nature is important because of what it can contribute to the pleasure and welfare of humans.						
1	2	3	4	5	6	7
Nature is valuable for its own sake.						
1	2	3	4	5	6	7
We need to preserve resources to maintain a high quality of life.						
1	2	3	4	5	6	7
Being out in nature is a great stress reducer for me.						
1	2	3	4	5	6	7
One of the most important reasons to conserve is to ensure a continued high standard of living.						
1	2	3	4	5	6	7
One of the most important reasons to conserve is to preserve wild areas.						
1	2	3	4	5	6	7
Continued land development is good idea as long as a high quality of life can be preserved.						
1	2	3	4	5	6	7
Sometimes animals seem almost human to me.						
1	2	3	4	5	6	7
Humans are as much a part of the ecosystem as other animals.						
1	2	3	4	5	6	7
It is inevitable and desirable that nature in all its forms and manifestation should be altered and used by humans to satisfy their needs.						
1	2	3	4	5	6	7
It is critical that humans immediately stop using up the earth's natural resources.						
1	2	3	4	5	6	7
We can no longer afford to continue using nature and the earth's resources to satisfy our human needs.						
1	2	3	4	5	6	7
Human beings have the right to change and alter nature and all natural phenomena in order to serve human goals and satisfy human needs.						
1	2	3	4	5	6	7
It's perfectly OK for humans to continue using nature and natural resources in order to achieve human goals and objectives.						
1	2	3	4	5	6	7
We should place a high priority on preventing existing species or kinds of plants and animals from becoming extinct.						
1	2	3	4	5	6	7
We should give our full support to those people and organizations that are campaigning to preserve nature from being used or altered by human activity.						
1	2	3	4	5	6	7
It is essential that nature in all its forms be preserved in as close to its natural state as possible.						
1	2	3	4	5	6	7
We have to get used to the idea that further economic growth is not desirable.						
1	2	3	4	5	6	7
It's just a completely waste of time and effort trying to prevent plant and animal species from becoming extinct.						
1	2	3	4	5	6	7



1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
Humans have to continue using natural resources productively to satisfy human needs.						
1	2	3	4	5	6	7
For the growth and development of human society and welfare, humans need to continue making use of the earth's natural resources.						
1	2	3	4	5	6	7
Further use of natural resources and alternation of nature by humans for human objectives should be stopped.						
1	2	3	4	5	6	7
It is important to persuade people that we cannot continue using the earth's natural resources to satisfy our needs.						
1	2	3	4	5	6	7
Trying to preserve nature in its natural state is unnecessary and undesirable.						
1	2	3	4	5	6	7
Trying to prevent animal and plant species from becoming extinct is unimportant.						
1	2	3	4	5	6	7
Those people who are insisting that we should try and preserve nature at all costs are just being unreasonable.						
1	2	3	4	5	6	7
We must prevent any further loss of diversity in plant and animal species.						
1	2	3	4	5	6	7
If I ever get extra income I will donate some money to an environmental organisation.						
1	2	3	4	5	6	7
I always switch the light off when I don't need it any more.						
1	2	3	4	5	6	7
I have a sense of well-being in the silence of nature.						
1	2	3	4	5	6	7
Construction of motorways and bypass roads is so important that it justifies the removal of forests and meadows.						
1	2	3	4	5	6	7
Grass and weeds growing between pavement stones really looks untidy.						
1	2	3	4	5	6	7
Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort.						
1	2	3	4	5	6	7
Whenever possible, I take a shower instead of a bath in order to conserve water.						
1	2	3	4	5	6	7
I really like going on trips into the countryside, for example to forests or fields.						
1	2	3	4	5	6	7
In order to feed human beings, nature must be cleared, so that, for example, grain can be grown.						
1	2	3	4	5	6	7
Weeds should be eradicated because they inhibit the full development of useful and ornamental plants.						
1	2	3	4	5	6	7
I would like to join and actively participate in an environmentalist group.						
1	2	3	4	5	6	7
I make sure that during the winter the heating system in my room is not switched on too high.						
1	2	3	4	5	6	7
I specially love the soft rustling of leaves when the wind blows through the treetops.						
1	2	3	4	5	6	7
Since mosquitoes develop in ponds it would be better to drain these and reclaim them for agriculture.						
1	2	3	4	5	6	7
A real nature lover brings home beautiful and rare plants when s/he has been out in the countryside.						
1	2	3	4	5	6	7
I often try to persuade others that the environment is an important thing.						
1	2	3	4	5	6	7

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
I purposefully walk short distances rather than asking for a lift in order to reduce air pollution.						
1	2	3	4	5	6	7
I would really enjoy sitting at the edge of a pond watching dragonflies in flight.						
1	2	3	4	5	6	7
People should keep swimming pools in rivers free from creepers and climbing plants.						
1	2	3	4	5	6	7
I prefer a well cared for lawn to a wild meadow where flowers grow in a disorderly way.						
1	2	3	4	5	6	7
Priority should be given to developing alternatives to fossil and nuclear fuel as primary energy sources.						
1	2	3	4	5	6	7
Rapid economic growth often creates more problems than benefits.						
1	2	3	4	5	6	7
Human beings were created or evolved to dominate the rest of nature.						
1	2	3	4	5	6	7
Through science and technology we can continue to raise our standard of living.						
1	2	3	4	5	6	7
Humans must live in harmony with nature in order for it to survive.						
1	2	3	4	5	6	7
A community's standards for the control of pollution should not be so strict that they discourage industrial development.						
1	2	3	4	5	6	7
Science and technology do as much harm as good.						
1	2	3	4	5	6	7
Because of problems with pollution, we need to decrease the use of the motor car as a major means of transportation.						
1	2	3	4	5	6	7

**SECTION B:**

People around the world are generally concerned about environment problems because of the consequences that result from harming nature. However, people differ in the consequences that concern them the most. Please rate each of the following items from 1 (**not important**) to 7 (**supreme importance**), by circling one of the set of numbers following each item, in responses to the question:

*I am concerned about environmental problems because of the consequences for \_\_\_\_.*

Plants	Not important	1	2	3	4	5	6	7	Supreme importance
Marine life	Not important	1	2	3	4	5	6	7	Supreme importance
Birds	Not important	1	2	3	4	5	6	7	Supreme importance
Animals	Not important	1	2	3	4	5	6	7	Supreme importance
Me	Not important	1	2	3	4	5	6	7	Supreme importance
My lifestyle	Not important	1	2	3	4	5	6	7	Supreme importance
My health	Not important	1	2	3	4	5	6	7	Supreme importance
My future	Not important	1	2	3	4	5	6	7	Supreme importance
People in my country	Not important	1	2	3	4	5	6	7	Supreme importance
All people	Not important	1	2	3	4	5	6	7	Supreme importance
Children	Not important	1	2	3	4	5	6	7	Supreme importance
Future generations	Not important	1	2	3	4	5	6	7	Supreme importance

**SECTION C:**

How often have you performed each of the following behaviours in the last year? Please use the following scale.

<b>1 Never</b>	<b>2 Rarely</b>	<b>3 Sometimes</b>	<b>4 Often</b>	<b>5 Very often</b>	
Looked for ways to reuse things.	1	2	3	4	5
Recycled newspapers.	1	2	3	4	5
Recycled cans or bottles.	1	2	3	4	5
Encouraged friends or family to recycle.	1	2	3	4	5
Purchased products in reusable or recyclable containers.	1	2	3	4	5
Picked up litter that was not your own.	1	2	3	4	5
Composted food scraps.	1	2	3	4	5
Conserved gasoline by walking or bicycling.	1	2	3	4	5

**SECTION D:**

Use the following scale to indicate agreement or disagreement to the following statements of opinion about social, political and environmental issues:

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
All groups should be given an equal chance in life.						
It's OK if some groups have more of a chance in life than others.						
It is better to live in an orderly society than to allow people so much freedom that they can become disruptive.						
Democracy is for everyone equally, even for those who work against it.						
What my country really needs is a strong determined leader who will crush evil, and take us back to our true path.						
We should treat protestors and radicals with open arms and open minds, since new ideas are the lifeblood of progressive change.						
We focus too much on economic measures of well-being.						
Individual behaviour should be determined by economic self-interest.						
The best measure of progress is economic.						
If the economy continues to grow, everyone benefits.						
Humans need not adapt to the natural environment because they can remake it to suit their needs.						
Governments should control the rate at which raw materials are used, to ensure that they last as long as possible.						
The positive benefits of economic growth far outweigh any negative consequences.						
We cannot keep counting on science and technology to solve our problems.						
People in developed societies are going to have to adopt a more conserving life-style in the future.						
Controls should be placed on industry to protect the environment from pollution, even if it means things will cost more.						
Most of the concern about environmental problems has been exaggerated.						
Most problems can be solved by applying more and better technology.						
Industry should be required to use recycled materials even when it costs less to make the same products from new raw materials.						
Plants and animals exist primarily to be used by humans.						
The government should give generous financial support to research related to the development of solar energy.						
To ensure a future for succeeding generations, we have to develop a no-growth economy.						
I'd prefer a garden that is wild and natural to a well groomed and ordered one.						

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us.						
I am NOT the kind of person who loves spending time in wild, untamed wilderness areas.						
A real lover of nature leaves wilderness areas exactly as they were and never picks flowers or removes plants.						
I would NOT go out of my way to help recycling campaigns.						
Draining swamps should be opposed even if pests such as mosquitoes and flies breed in them.						
I would NOT get involved in an environmentalist organization.						
I find it very boring being out in the wild countryside.						
I drive whenever it suits me, even if it does pollute the atmosphere.						
I do not believe protecting the environment is an important issue.						
Grass and weeds growing between paving stones may be untidy but it is natural and should be left alone.						
Turning new unused land over to cultivation and agricultural development should be stopped.						
I find it more interesting in a shopping mall than out in the forest looking at trees and birds.						
In my daily life I'm just not interested in trying to conserve water or power.						
I don't think I would help to raise funds for environmental protection.						
I like wild, natural areas even if they are untidy and full of weeds.						
I oppose any removal of wilderness areas no matter how economically beneficial their development may be.						
I would rather spend my weekend in the city than in wilderness areas.						
I could not be bothered to save water or other natural resources.						
I would not want to donate money to support an environmentalist cause.						
We humans should use all the natural resources we need, even non-renewable ones.						
People worry too much about human progress harming the environment.						
Although there is pollution of our oceans, streams, and air, nature's purifying processes soon return them to normal.						
What is best for humans is more important than what is best for nature.						
Humans are no more important in nature than other living things.						
Economic goals are more important than environmental goals.						
Using our own property as we choose is more important than protecting endangered species.						
It is alright for humans to use nature as a resource for economic purposes.						
Protecting peoples' jobs is more important than protecting the environment.						

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
The earth's resources should be used to the fullest to increase human's standard of living.						
1	2	3	4	5	6	7
I think spending time in nature is boring.						
1	2	3	4	5	6	7
We should do what we can to preserve nature.						
1	2	3	4	5	6	7
I would never try to persuade others that the environmental protection is an important thing.						
1	2	3	4	5	6	7
There has been too much emphasis on conserving natural resources and not enough on using them, in recent years.						
1	2	3	4	5	6	7
I do not feel that humans are dependent on nature to survive.						
1	2	3	4	5	6	7
Nature exists primarily for human use.						
1	2	3	4	5	6	7
Humans will eventually learn how to renew aspects of nature that we think are irreplaceable.						
1	2	3	4	5	6	7
Too many living things are unnecessarily being threatened with extinction.						
1	2	3	4	5	6	7

**Questionnaire used in Study 2a (Version A)**

**Could you please tell us what you think ...?**

The purpose of this questionnaire is to investigate people's attitudes and opinions on environmental issues. The questionnaire is totally anonymous so no individual's responses can or will be identified. Please answer the following questions honestly and accurately. Read each question carefully, and select the response that best reflects your "gut reaction" to the question or item. There are no right or wrong answers; we are interested in your own personal opinions and perceptions, whatever they are. Please try to answer all the questions, as the success of the research depends on each questionnaire being as fully completed as possible.

**BACKGROUND ITEMS**

How old are you? _____ years.	What is your gender? (circle) 1. Female      2. Male
How would you classify your ethnic affiliation? (circle) 1. Asian      2. Maori      3. Pacific Islander      4. Pakeha/NZ European 5. Other: _____	
How religious are you, if at all? (circle) Not religious at all      0      1      2      3      4      5      6      7      Very religious	
Which of the following statements best describes your beliefs in the Bible? (circle) 1. The Bible is the actual word of God and should be taken literally, word for word. 2. The Bible is the inspired word of God, but it was written by men and women and contains some human errors. 3. The Bible is an ancient book of history and legends; God had nothing to do with it.	
In general, when it comes to politics, do you usually think of yourself as... (circle) Extremely liberal      Liberal      Slightly liberal      Moderate      Slightly conservative      Conservative      Extremely conservative 1      2      3      4      5      6      7	
What kind of income bracket would you see your family being in: (circle) Lower      Middle      Upper 1      2      3      4      5      6      7      8      9	
Please circle the picture below that best describes your relationship with the natural environment. <i>How interconnected are you with nature?</i>	

**SECTION A:**

Please indicate the extent to which you agree or disagree with each of the following statements by circling one of the set of numbers following each statement that best reflects your degree of agreement or disagreement according to the following scale.

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree					
I am NOT the kind of person who loves spending time in wild, untamed wilderness areas.					1	2	3	4	5	6	7
I really like going on trips into the countryside, for example to forests or fields.					1	2	3	4	5	6	7
I find it very boring being out in wilderness areas.					1	2	3	4	5	6	7
Sometimes when I am unhappy, I find comfort in nature.					1	2	3	4	5	6	7
Being out in nature is a great stress reducer for me.					1	2	3	4	5	6	7
I would rather spend my weekend in the city than in wilderness areas.					1	2	3	4	5	6	7
I enjoy spending time in natural settings just for the sake of being out in nature.					1	2	3	4	5	6	7
I have a sense of well-being in the silence of nature.					1	2	3	4	5	6	7
I find it more interesting in a shopping mall than out in the forest looking at trees and birds.					1	2	3	4	5	6	7
I need time in nature to be happy.					1	2	3	4	5	6	7
I think spending time in nature is boring.					1	2	3	4	5	6	7
I just do NOT enjoy spending time out in wilderness areas.					1	2	3	4	5	6	7
Industry should be required to use recycled materials even when this costs more than making the same products from new raw materials.					1	2	3	4	5	6	7
Governments should control the rate at which raw materials are used to ensure that they last as long as possible.					1	2	3	4	5	6	7
Controls should be placed on industry to protect the environment from pollution, even if it means things will cost more.					1	2	3	4	5	6	7
People in developed societies are going to have to adopt a more conserving life-style in the future.					1	2	3	4	5	6	7
The government should give generous financial support to research related to the development of alternative energy sources, such as solar energy.					1	2	3	4	5	6	7
Priority should be given to developing alternatives to fossil and nuclear fuel as primary energy sources.					1	2	3	4	5	6	7
If it costs less to make products from new raw materials, industry should be allowed to use them rather than recycled materials.					1	2	3	4	5	6	7
I don't think people in developed societies are going to have to adopt a more conserving life-style in the future.					1	2	3	4	5	6	7
Industries should be able to use raw materials rather than recycled ones if this leads to lower prices and costs, even if it means the raw materials will eventually be used up.					1	2	3	4	5	6	7
The government shouldn't give financial support to research on the development of alternative energy sources, such as solar energy.					1	2	3	4	5	6	7



1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
I don't think priority should be given to developing alternatives to fossil and nuclear fuel as primary energy sources.						
1	2	3	4	5	6	7
Where natural resources are privately owned, society should have NO control over what the owner does with them.						
1	2	3	4	5	6	7
Government must take stronger steps to conserve our nation's resources.						
1	2	3	4	5	6	7
The government has no right to require business or industry to implement pro-environmental or conservationist policies.						
1	2	3	4	5	6	7
It is wrong for governments to try and compel business and industry to put conservation before producing goods in the most efficient and cost effective manner.						
1	2	3	4	5	6	7
I am completely opposed to measures that would force industry to use recycled materials if this would make products more expensive.						
1	2	3	4	5	6	7
I am opposed to governments controlling and regulating the way raw materials are used in order to try and make them last longer.						
1	2	3	4	5	6	7
I oppose the government giving subsidies (financial support) to research trying to develop solar energy.						
1	2	3	4	5	6	7
The idea that people in more developed economies must adopt a more conserving life style is wrong.						
1	2	3	4	5	6	7
If I ever get extra income I will donate some money to an environmental organisation.						
1	2	3	4	5	6	7
I would like to join and actively participate in an environmentalist group.						
1	2	3	4	5	6	7
I don't think I would help to raise funds for environmental protection.						
1	2	3	4	5	6	7
I would NOT get involved in an environmentalist organization.						
1	2	3	4	5	6	7
Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort.						
1	2	3	4	5	6	7
I would not want to donate money to support an environmentalist cause.						
1	2	3	4	5	6	7
I would NOT go out of my way to help recycling campaigns.						
1	2	3	4	5	6	7
I often try to persuade others that the environment is important.						
1	2	3	4	5	6	7
I would like to support an environmental organization.						
1	2	3	4	5	6	7
I would never try to persuade others that environmental protection is important.						
1	2	3	4	5	6	7
I am NOT the kind of person who would ever get involved in an environmentalist organization.						
1	2	3	4	5	6	7
I am ready to spend time supporting environmental protection campaigns.						
1	2	3	4	5	6	7
One of the most important reasons to conserve is to ensure a continued high standard of living.						
1	2	3	4	5	6	7
One of the best things about recycling is that it saves money.						
1	2	3	4	5	6	7
The worst thing about the loss of the rain forest is that it will restrict the development of new medicines.						
1	2	3	4	5	6	7
One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy water sports.						
1	2	3	4	5	6	7

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
Nature is important because of what it can contribute to the pleasure and welfare of humans.						
The thing that concerns me most about deforestation is that there will not be enough lumber for future generations.						
I don't think the earth's resources should be used to the fullest to increase human's standard of living.						
We should protect the environment for the well being of plants and animals rather than for the welfare of humans.						
Human happiness and human reproduction are less important than a healthy planet.						
Conservation is important because it protects the environment, not because it might ensure a continued high standard of living.						
Conservation is important even if it lowers peoples' standard of living.						
We need to keep rivers and lakes clean in order to protect the environment, and NOT as places for people to enjoy water sports.						
Recycling is important, not because it saves money or benefits people, but because it helps to protect the environment.						
Nature is important in itself, and not just for what it contributes to human welfare.						
We should protect the environment even if it means peoples' welfare will suffer.						
Most environmental problems can be solved by applying more and better technology.						
Science and technology will eventually solve our problems with pollution, overpopulation, and diminishing resources.						
Science and technology do as much environmental harm as good.						
Through science and technology we can continue to raise our standard of living.						
Despite human ingenuity, we can make the earth unlivable.						
Modern science will NOT be able to solve our environmental problems.						
We cannot keep counting on science and technology to solve our environmental problems.						
Human ingenuity will insure that we do NOT make the earth unlivable.						
Humans will eventually learn how to solve all environmental problems.						
Humans will never learn enough about how nature works to be able to control it.						
We cannot count on science and technology to solve our environmental problems.						
I do not believe that science and technology will solve our problems with pollution, overpopulation, and diminishing resources.						
We shouldn't worry about depleting our energy reserves because technology will always develop new sources of energy.						

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
Any change humans cause in nature – no matter how scientific – is likely to make things worse.						
We cannot rely on technology to develop new energy reserves when we finally exhaust our current energy resources.						
The belief that advances in science and technology can solve our environmental problems is completely wrong and misguided.						
Humans will eventually learn enough about how nature works to be able to control it.						
Science and technology cannot solve the grave threats to our environment.						
Modern science will solve our environmental problems.						
If things continue on their present course, we will soon experience a major ecological catastrophe.						
The earth is like a spaceship with very limited room and resources.						
We are approaching the limit of the number of people the earth can support.						
Rapid economic growth often creates more environmental problems than benefits.						
The balance of nature is very delicate and easily upset.						
When humans interfere with nature it often produces disastrous consequences.						
Humans are severely abusing the environment.						
The earth can probably support an unlimited number of people.						
The idea that we will experience a major ecological catastrophe if things continue on their present course is misguided nonsense.						
People who say that the earth is like a spaceship with very limited room and resources are being far too pessimistic.						
I cannot see any real environmental problems being created by rapid economic growth. It only creates benefits.						
The idea that the balance of nature is terribly delicate and easily upset is much too pessimistic.						
I do not believe that the environment has been severely abused by humans.						
The idea that human interference with nature may produce disastrous consequences is much too pessimistic.						
People who say that the unrelenting exploitation of nature has driven us to the brink of ecological collapse are wrong.						
People who say that the oceans are gradually dying because of pollution and the dumping of waste are talking complete nonsense.						
What human beings are currently doing to nature can be fairly characterized as an “eco-holocaust” (i.e., an ecological disaster).						
Grass and weeds growing between paving stones may be untidy but are natural and should be left alone.						

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
The idea that natural areas should be maintained exactly as they are is silly, wasteful, and wrong.						
Almost everything we do in modern life harms the environment.						
I'd prefer a garden that is wild and natural to a well groomed and ordered one.						
Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us.						
Turning new unused land over to cultivation and agricultural development should be stopped.						
I am in favour of the removal of wilderness areas if this is economically beneficial.						
I'd much prefer a garden that is well groomed and ordered to a wild and natural one.						
When nature is uncomfortable and inconvenient for humans we have every right to change and remake it to suit ourselves.						
Turning new unused land over to cultivation and agricultural development is positive and should be supported.						
I do not think natural areas should be maintained as they are.						
All species are precious and worth preserving.						

**SECTION B:**

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is **true** or **false** as it pertains to you personally. Please use the following scale.

Not true	1	2	3	4	5	6	7	Very true
When I hear other people talking privately, I avoid listening.								
There have been occasions when I have taken advantage of someone.								
I never cover up my mistakes.								
I sometimes try to get even rather than forgive and forget.								
I always obey laws, even if I'm unlikely to get caught.								
I have said something bad about a friend behind his or her back.								
I never swear.								
I have received too much change from a salesperson without telling him or her.								
I have never dropped litter on the street.								
I sometimes tell lies if I have to.								

**SECTION C:**

How often have you performed each of the following behaviours in the last year? Please use the following scale.

<b>1 Never</b>	<b>2 Rarely</b>	<b>3 Sometimes</b>	<b>4 Often</b>	<b>5 Very often</b>			
Looked for ways to reuse things.			1	2	3	4	5
Recycled newspapers.			1	2	3	4	5
Recycled cans or bottles.			1	2	3	4	5
Encouraged friends or family to recycle.			1	2	3	4	5
Purchased products in reusable or recyclable containers.			1	2	3	4	5
Picked up litter that was not your own.			1	2	3	4	5
Composted food scraps.			1	2	3	4	5
Conserved gasoline by walking or bicycling.			1	2	3	4	5

**SECTION D:**

Use the following scale to indicate agreement or disagreement to the following statements of opinion about social, political and environmental issues:

<b>1 Strongly disagree</b>	<b>2 Disagree</b>	<b>3 Somewhat disagree</b>	<b>4 Unsure/ neutral</b>	<b>5 Somewhat agree</b>	<b>6 Agree</b>	<b>7 Strongly agree</b>					
In the development of our society we must strive to meet the needs of the present without compromising the ability of future generations to meet their own needs.					1	2	3	4	5	6	7
If the economy continues to grow, everyone benefits.					1	2	3	4	5	6	7
We should NOT worry about establishing limits to economic growth.					1	2	3	4	5	6	7
Individual behaviour should be determined by economic self-interest.					1	2	3	4	5	6	7
We focus too much on economic measures of well-being.					1	2	3	4	5	6	7
The best measure of progress is economic.					1	2	3	4	5	6	7
There are limits to economic growth beyond which our industrialized society cannot expand.					1	2	3	4	5	6	7
The idea that we should try to meet the needs of the current generation without undermining the ability of future generations to meet their own needs is wrong.					1	2	3	4	5	6	7
Nature would be at peace and in harmony if only human beings would leave it alone.					1	2	3	4	5	6	7

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
Grass and weeds growing between pavement stones really looks untidy.						
1	2	3	4	5	6	7
I oppose any removal of wilderness areas no matter how economically beneficial their development may be.						
1	2	3	4	5	6	7
The idea that all species are precious and worth preserving is simply wrong.						
1	2	3	4	5	6	7
I could not be bothered to save water or other natural resources.						
1	2	3	4	5	6	7
I make sure that during the winter the heating system in my room is not switched on too high.						
1	2	3	4	5	6	7
In my daily life I'm just not interested in trying to conserve water and/or power.						
1	2	3	4	5	6	7
Whenever possible, I take a short shower in order to conserve water.						
1	2	3	4	5	6	7
I always switch the light off when I don't need it on any more.						
1	2	3	4	5	6	7
I drive whenever it suits me, even if it does pollute the atmosphere.						
1	2	3	4	5	6	7
We humans should use all the natural resources we need, even non-renewable ones.						
1	2	3	4	5	6	7
In recent years, there has been too much emphasis on conserving natural resources and not enough on using them.						
1	2	3	4	5	6	7
In my daily life I try to find ways to conserve water or power.						
1	2	3	4	5	6	7
To reduce air pollution I purposefully walk short distances rather than take bus or use a car.						
1	2	3	4	5	6	7
I am NOT the kind of person who makes efforts to conserve natural resources.						
1	2	3	4	5	6	7
Whenever possible, I try to save natural resources.						
1	2	3	4	5	6	7
We should make personal sacrifices for the sake of slowing down the consumption of natural resources.						
1	2	3	4	5	6	7
We must prevent any type of animal from becoming extinct, even if it means sacrificing some things for ourselves.						
1	2	3	4	5	6	7
We are fast using up the world's natural resources.						
1	2	3	4	5	6	7
Natural resources must be preserved for the future, even if people must do without today.						
1	2	3	4	5	6	7
Much more energy should be expended in conserving what mankind does know, than in discovering what it does not know.						
1	2	3	4	5	6	7
Even if public transportation was more efficient than it is, I would prefer to drive my car.						
1	2	3	4	5	6	7
Humans were meant to rule over the rest of nature.						
1	2	3	4	5	6	7
Human beings were created or evolved to dominate the rest of nature.						
1	2	3	4	5	6	7
Plants and animals have as much right as humans to exist.						
1	2	3	4	5	6	7
Plants and animals exist primarily to be used by humans.						
1	2	3	4	5	6	7
Humans are as much a part of the ecosystem as other animals.						
1	2	3	4	5	6	7
What is best for humans is more important than what is best for nature.						
1	2	3	4	5	6	7

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
Humans are no more important in nature than other living things.						
Nature exists primarily for human use.						
Nature in all its forms and manifestations should be controlled by humans.						
I DO NOT believe humans were created or evolved to dominate the rest of nature.						
Everything is only best for humans if it is best for nature as well.						
Humans are no more important than any other species.						
The earth's value does not depend on people; it is valuable in itself.						
All living beings (micro-organisms, plants, animals, and humans) are interdependent with one another.						
The positive benefits of economic growth far outweigh any negative environmental consequences.						
Economic goals are more important than environmental goals.						
People worry too much about human progress harming the environment.						
Humans need not adapt to the natural environment because they can remake it to suit their needs.						
Using our own property as we choose is more important than protecting endangered species.						
It is all right for humans to use nature as a resource for economic purposes.						
Protecting peoples' jobs is more important than protecting the environment.						
Economic growth does as much environmental harm as good.						
Humans do NOT have the right to damage the environment just to get greater economic growth.						
People have been giving far too little attention to how human progress has been damaging the environment.						
Protecting the environment is more important than protecting economic growth.						
Property owners should not be allowed to use their property in a way that might harm any endangered species.						
We should no longer use nature as a resource for economic purposes.						
Property owners should have to protect any endangered species on their property.						
Protecting the environment is more important than protecting peoples' jobs.						
Economic growth harms the environment.						
We worry too much about the future of the environment and not enough about prices and jobs today.						
In order to protect the environment, we need economic growth.						
The question of the environment is secondary to economic growth.						
The benefits of modern consumer products are more important than the pollution that results from their production and use.						

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree					
To maintain a healthy environment we will have to develop a "steady-state" economy where industrial growth is controlled.					1	2	3	4	5	6	7
No wild place will be safe from us until we reconsider our belief that economic growth is always good.					1	2	3	4	5	6	7
The idea that nature is valuable for its own sake is naïve and wrong.					1	2	3	4	5	6	7
It makes me sad to see natural environments destroyed.					1	2	3	4	5	6	7
Nature is valuable for its own sake.					1	2	3	4	5	6	7
I prefer wildlife reserves to zoos.					1	2	3	4	5	6	7
One of the worst things about overpopulation is that many natural areas are getting destroyed.					1	2	3	4	5	6	7
I do not believe protecting the environment is an important issue.					1	2	3	4	5	6	7
Despite our special abilities humans are still subject to the laws of nature.					1	2	3	4	5	6	7
It makes me sad to see forests cleared for agriculture.					1	2	3	4	5	6	7
The so-called "ecological crisis" facing humankind has been greatly exaggerated.					1	2	3	4	5	6	7
We should do what we can to preserve nature.					1	2	3	4	5	6	7
It does NOT make me sad to see natural environments destroyed.					1	2	3	4	5	6	7
I do not believe nature is valuable for its own sake.					1	2	3	4	5	6	7
We shouldn't worry so much about preserving nature.					1	2	3	4	5	6	7
The idea that humans have to live in harmony with nature isn't really true at all.					1	2	3	4	5	6	7
I don't get upset at the idea of forests being cleared for agriculture.					1	2	3	4	5	6	7
Animals are probably much better off in zoos than in the wild.					1	2	3	4	5	6	7
Humans must live in harmony with nature in order for it to survive.					1	2	3	4	5	6	7
The idea that humans MUST live in harmony with nature is oversimplified and wrong.					1	2	3	4	5	6	7
We should strive for the goal of "zero population growth".					1	2	3	4	5	6	7
The idea that we should control the population growth is wrong.					1	2	3	4	5	6	7
Families should be encouraged to limit themselves to two children or less.					1	2	3	4	5	6	7
A married couple should have as many children as they wish, as long as they can adequately provide for them.					1	2	3	4	5	6	7
Our government should educate people concerning the importance of having two children or less.					1	2	3	4	5	6	7
We should never put limits on the number of children a couple can have.					1	2	3	4	5	6	7
People who say overpopulation is a problem are completely incorrect.					1	2	3	4	5	6	7
The world would be better off if the population stopped growing.					1	2	3	4	5	6	7
Government should attempt to persuade people to have more children for the benefit of our national defence.					1	2	3	4	5	6	7



1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
We would be better off if we dramatically reduced the number of people on the Earth.						1 2 3 4 5 6 7
The government has no right to require married couples to limit the number of children they can have.						1 2 3 4 5 6 7

**SECTION E:**

Use the following scale to indicate agreement or disagreement to the following statements of opinion about social and political issues:

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
All groups should be given an equal chance in life.						1 2 3 4 5 6 7
It's OK if some groups have more of a chance in life than others.						1 2 3 4 5 6 7
Inferior groups should stay in their place.						1 2 3 4 5 6 7
We should strive to make incomes as equal as possible.						1 2 3 4 5 6 7
If certain groups stayed in their place, we would have fewer problems.						1 2 3 4 5 6 7
It would be good if groups could be equal.						1 2 3 4 5 6 7
Our government should take active steps to control extreme left wing groups, even if this means they have fewer rights than other groups.						1 2 3 4 5 6 7
The best way to show our support for democracy is to allow even its enemies to full rights as citizens.						1 2 3 4 5 6 7
Democracy is for everyone equally, even for those who work against it.						1 2 3 4 5 6 7
No matter what people believe, they are entitled to the same democratic rights and legal protection as anyone else.						1 2 3 4 5 6 7
Society should have the right to protect itself against certain groups by repressing them and denying them normal, democratic freedoms.						1 2 3 4 5 6 7
The government should take active steps to control extreme right wing groups, even if this means they have fewer rights than other groups.						1 2 3 4 5 6 7
A "woman's place" should be whenever she wants to be. The days when women are submissive to their husbands and social conventions belongs strictly to the past.						1 2 3 4 5 6 7
What my country really needs is a strong determined leader who will crush evil, and take us back to our true path.						1 2 3 4 5 6 7
We should treat protestors and radicals with open arms and open minds, since new ideas are the lifeblood of progressive change.						1 2 3 4 5 6 7
The facts on crime, sexual immorality, and the recent public disorders all show we have to crack down harder on deviant groups and troublemakers, if we are going to save our moral standards and preserve law and order.						1 2 3 4 5 6 7
Obedience and respect for authority are the most important virtues children should learn.						1 2 3 4 5 6 7

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
It is wonderful that young people today have greater freedom to protest against things they don't like and to "do their own thing."						1 2 3 4 5 6 7

## Questionnaire used in Study 2a (Version B)

Version B of the questionnaire comprised all sections from Version A with the following differences: (1) the last seven items from Section D were not included; (2) Section E was replaced (see below); and (3) Section F was included (see below).

### SECTION E:

In this part of the questionnaire your task is to rate how important each value is for you as a guiding principle in your life. Use the rating scale below.

***AS A GUIDING PRINCIPLE IN MY LIFE, this value is:***

Opposed to my values -1	Not important		Important			Very important			Of supreme importance 7
	0	1	2	3	4	5	6		
EQUALITY (equal opportunity for all).	-1	0	1	2	3	4	5	6	7
AN EXCITING LIFE (stimulating experiences).	-1	0	1	2	3	4	5	6	7
WEALTH (material possessions, money).	-1	0	1	2	3	4	5	6	7
A WORLD AT PEACE (free of war and conflict).	-1	0	1	2	3	4	5	6	7
SELF-DISCIPLINE (self-restraint, resistance to temptation).	-1	0	1	2	3	4	5	6	7
FAMILY SECURITY (safety for loved ones).	-1	0	1	2	3	4	5	6	7
UNITY WITH NATURE (fitting into nature).	-1	0	1	2	3	4	5	6	7
A VARIED LIFE (filled with challenge, novelty, and change).	-1	0	1	2	3	4	5	6	7
AUTHORITY (the right to lead or command).	-1	0	1	2	3	4	5	6	7
SOCIAL JUSTICE (correcting injustice, care for the weak).	-1	0	1	2	3	4	5	6	7
PROTECTING THE ENVIRONMENT (preserving nature).	-1	0	1	2	3	4	5	6	7
INFLUENTIAL (having an impact on people and events).	-1	0	1	2	3	4	5	6	7
HONORING PARENTS AND ELDERERS (showing respect).	-1	0	1	2	3	4	5	6	7
CURIOUS (interested in everything, exploring).	-1	0	1	2	3	4	5	6	7
RESPECTING THE EARTH (harmony with other species).	-1	0	1	2	3	4	5	6	7

**SECTION F:**

People around the world are generally concerned about environment problems because of the consequences that result from harming nature. However, people differ in the consequences that concern them the most. Please rate each of the following items from 1 (**not important**) to 7 (**supreme importance**), by circling one of the set of numbers following each item, in responses to the question:

*I am concerned about environmental problems because of the consequences for \_\_\_\_.*

	Not important	1	2	3	4	5	6	7	Supreme importance
Plants		1	2	3	4	5	6	7	
Marine life		1	2	3	4	5	6	7	
Birds		1	2	3	4	5	6	7	
Animals		1	2	3	4	5	6	7	
Me		1	2	3	4	5	6	7	
My lifestyle		1	2	3	4	5	6	7	
My health		1	2	3	4	5	6	7	
My future		1	2	3	4	5	6	7	
People in my country		1	2	3	4	5	6	7	
All people		1	2	3	4	5	6	7	
Children		1	2	3	4	5	6	7	
Future generations		1	2	3	4	5	6	7	

**Questionnaire used in Study 2b (paper-and-pen version)**

**(Welcome! page)**

**Pesquisa sobre Atitudes Ambientais**

**Bem-Vindo!**

Esta é uma pesquisa conduzida por pesquisadores da Universidade Federal de Alagoas (UFAL) e da Universidade de Auckland, Nova Zelândia, como parte de uma pesquisa de Doutorado. O objetivo da pesquisa é investigar a estrutura das atitudes ambientais.

São necessários **menos de 20 minutos** para o preenchimento do questionário. Se você for maior de 18 anos e quer participar da pesquisa, por favor leia o termo de consentimento na próxima página e selecione "Eu concordo".

Muito obrigado pelo seu interesse!

Taciano L. Milfont e John Duckitt  
Universidade Federal de Alagoas (UFAL) e Universidade de Auckland, Nova Zelândia

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## (Participant Information page)

### Termo de Consentimento Livre e Esclarecido

**Por favor, leia este termo de consentimento antes de decidir participar da pesquisa.**

*Objetivos da Pesquisa:* Esta pesquisa envolve um questionário sobre opiniões, atitudes e comportamentos em uma variedade de questões ambientais. O objetivo da pesquisa é investigar a estrutura das atitudes ambientais, e compreende um estudo de Doutorado.

*Confidencialidade:* As suas respostas serão tratadas de maneira **confidencial**, não se permitindo a sua identificação.

*Participação Voluntária:* Sua participação é **totalmente voluntária**, e você pode desistir de participar em qualquer fase da pesquisa, sem penalização alguma.

*Para mais informações entre em contato com:*

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Esta pesquisa foi aprovada pelo Comitê de Ética da Universidade de Auckland, Nova Zelândia, sob a Referência no. 2003 / Q / 020.

*POR FAVOR, SINTA-SE À VONTADE PARA IMPRIMIR UMA CÓPIA DESTA PÁGINA PARA SEUS ARQUIVOS.*

#### **Consentimento. Você concorda em participar do estudo?**

1. EU CONCORDO
2. EU NÃO CONCORDO

## (Background Information page)

### Informações Sócio-Demográficas

Idade: _____.	Sexo: 1. Female      2. Male	Estado do Brasil em que se encontra? _____.					
Nível de Escolaridade:							
1. Primeiro grau incompleto	2. Primeiro grau completo						
3. Segundo grau incompleto	4. Segundo grau completo						
5. Universitário incompleto	6. Universitário incompleto						
7. Mestrado	8. Doutorado						
Com qual dessas orientações religiosas ou filosóficas você se identifica mais?							
1. Agnóstico	2. Ateu	3. Budista	4. Cristão				
5. Hindu	6. Judeo	7. Muçumano	8. Outra: _____				
9. Eu não me identifico com nenhuma orientação religiosa ou filosófica específica							
O quanto religioso(a) você é?							
Nem um pouco religioso(a)			Muito religioso(a)				
0	1	2	3	4	5	6	7
Qual das seguintes declarações melhor descreve suas convicções na Bíblia?							
4. A Bíblia é a palavra de Deus e deveria ser levada literalmente, palavra por palavra.							
5. A Bíblia é a palavra inspirada de Deus, mas foi escrita por homens e mulheres e contém alguns erros humanos.							
6. A Bíblia é um livro antigo de história e lendas; Deus não teve nada a ver com isto.							
Em geral, quando vem pra política, você se vê normalmente como...							
Extremamente liberal	Liberal	Um pouco liberal	Moderado	Um pouco conservador	Conservador	Extremamente conservador	
1	2	3	4	5	6	7	
Em comparação com as pessoas do Brasil, você diria que sua família é da:							
Classe Humilde			Classe média			Classe alta	
1	2	3	4	5	6	7	
O quanto preocupado(a) você está, em geral, com as questões ambientais?							
Nem um pouco preocupado(a)						Extremamente preocupado(a)	
1	2	3	4	5	6	7	
Onde você tomou conhecimento sobre esta pesquisa?							
1. Através de um amigo	2. Um email	3. Site da Internet					
4. Lista de discussão online	5. Outro						

## (Environmental Attitudes page)

### Atitudes Ambientais

Você encontrará nas próximas páginas uma série de afirmações relativas às questões ambientais.

Por favor, leia cada uma das afirmações e assinale a opção que melhor expressa seu nível de **acordo** ou **desacordo**.

1 Discordo totalmente	2 Discordo	3 Discordo um pouco	4 Neutro	5 Concordo um pouco	6 Concordo	7 Concordo totalmente	
Não sou do tipo de pessoa que gosta de passar o tempo em áreas selvagens, inexploradas pelo homem.	1	2	3	4	5	6	7
Eu gosto muito de viajar para áreas afastadas das grandes cidades, como por exemplo para florestas ou campos.	1	2	3	4	5	6	7
Acho muito chato visitar áreas selvagens, como matas e florestas.	1	2	3	4	5	6	7
Às vezes quando me sinto infeliz, eu encontro conforto na natureza.	1	2	3	4	5	6	7
Estar em contato direto com a natureza é um grande redutor de <i>stress</i> para mim.	1	2	3	4	5	6	7
Eu prefiro passar meu final de semana na cidade ao invés de ir para áreas selvagens.	1	2	3	4	5	6	7
osto de passar meu tempo em cenários naturais, só pelo fato de estar em contato direto com a natureza.	1	2	3	4	5	6	7
Tenho uma sensação de bem-estar no silêncio da natureza.	1	2	3	4	5	6	7
Eu acho mais interessante ir a um <i>shopping center</i> do que a uma floresta, para olhar árvores e pássaros.	1	2	3	4	5	6	7
É muito cansativo passar tempo em contato com a natureza.	1	2	3	4	5	6	7
As indústrias deveriam ser obrigadas a usar materiais reciclados, mesmo que isto custe mais do que fazer os mesmos produtos usando nova matéria prima.	1	2	3	4	5	6	7
O governo deveria controlar a quantidade de matérias primas utilizadas para garantir que possam durar o mais tempo possível.	1	2	3	4	5	6	7
Deveria haver um controle das indústrias para proteger o meio ambiente da poluição, mesmo que isto signifique aumento nos preços.	1	2	3	4	5	6	7
A população dos países desenvolvidos terão que adotar no futuro um estilo de vida mais voltado à preservação da natureza.	1	2	3	4	5	6	7
O governo deveria financiar pesquisas relacionadas ao desenvolvimento de fontes alternativas de energia, como a energia solar.	1	2	3	4	5	6	7
Não acredito que a população dos países desenvolvidos terão que adotar no futuro um estilo de vida mais voltado para a preservação da natureza.	1	2	3	4	5	6	7
As indústrias deveriam poder utilizar nova matéria prima ao invés de materiais reciclados se isto reduzir preços e custos, mesmo que signifique o esgotamento da matéria prima.	1	2	3	4	5	6	7
É errado que os governos obriguem empresas e indústrias a darem prioridade à preservação da natureza ao invés de priorizarem uma produção mais eficiente e eficaz.	1	2	3	4	5	6	7
Sou completamente contra medidas que obriguem as indústrias a usar materiais reciclados, se isto significar aumento no preço dos produtos.	1	2	3	4	5	6	7



1 Discordo totalmente	2 Discordo	3 Discordo um pouco	4 Neutro	5 Concordo um pouco	6 Concordo	7 Concordo totalmente
Sou contra os governos controlando e regulamentando a forma como as matérias primas são usadas no intuito de fazê-las durar mais.						
1	2	3	4	5	6	7
Eu nunca tentaria convencer os outros de que a proteção ambiental é importante.						
1	2	3	4	5	6	7
Eu frequentemente tento convencer os outros de que o meio ambiente é importante.						
1	2	3	4	5	6	7
Se por ventura recebesse algum dinheiro extra, eu doaria parte a uma organização ambientalista.						
1	2	3	4	5	6	7
Gostaria de ser membro e participar ativamente de um grupo ambientalista.						
1	2	3	4	5	6	7
Não acredito que poderia ajudar a arrecadar fundos para a proteção ambiental.						
1	2	3	4	5	6	7
Não me envolveria em uma organização ambientalista.						
1	2	3	4	5	6	7
A proteção do meio ambiente custa muito dinheiro. Estou disposto a ajudar numa campanha de arrecadação de fundos.						
1	2	3	4	5	6	7
Eu não doaria dinheiro para apoiar uma causa ambientalista.						
1	2	3	4	5	6	7
Eu não mudaria meus hábitos para ajudar as campanhas de reciclagem.						
1	2	3	4	5	6	7
Eu frequentemente tento convencer os outros de que o meio ambiente é importante.						
1	2	3	4	5	6	7
Gostaria de apoiar uma organização ambientalista.						
1	2	3	4	5	6	7
Eu nunca tentaria convencer os outros de que a proteção ambiental é importante.						
1	2	3	4	5	6	7
Uma das coisas mais importantes sobre a reciclagem é a economia de dinheiro.						
1	2	3	4	5	6	7
O pior da perda da floresta tropical é que isto limitará o desenvolvimento de novos medicamentos.						
1	2	3	4	5	6	7
Uma das razões mais importantes para manter os lagos e rios limpos é o fato de que as pessoas poderão ter um lugar para praticar esportes aquáticos.						
1	2	3	4	5	6	7
A natureza é importante porque contribui para o prazer e bem-estar dos seres humanos.						
1	2	3	4	5	6	7
O que mais me preocupa sobre a destruição das matas é que não existirá madeira suficiente para as futuras gerações.						
1	2	3	4	5	6	7
Devemos proteger o meio ambiente para o bem-estar das plantas e animais e não para o bem-estar dos seres humanos.						
1	2	3	4	5	6	7
A felicidade e a continuidade da espécie humana são menos importantes do que um planeta saudável.						
1	2	3	4	5	6	7
A preservação é importante mesmo que diminua o padrão de vida das pessoas.						
1	2	3	4	5	6	7
Precisamos manter os rios e lagos limpos visando a proteção do meio ambiente, e não pelo fato de que as pessoas poderão ter um lugar para praticar esportes aquáticos.						
1	2	3	4	5	6	7
Devemos proteger o meio ambiente, mesmo que o bem-estar das pessoas tenha algum prejuízo.						
1	2	3	4	5	6	7
A maioria dos problemas ambientais pode ser resolvida com a utilização de mais e melhor tecnologia.						
1	2	3	4	5	6	7

1 Discordo totalmente	2 Discordo	3 Discordo um pouco	4 Neutro	5 Concordo um pouco	6 Concordo	7 Concordo totalmente
A ciência e a tecnologia irão eventualmente resolver nossos problemas de poluição, superpopulação e escarssez dos recursos naturais.						
1	2	3	4	5	6	7
A ciência e a tecnologia tanto prejudicam quanto beneficiam o meio ambiente.						
1	2	3	4	5	6	7
A ciência moderna não será capaz de resolver nossos problemas ambientais.						
1	2	3	4	5	6	7
Não podemos contar com a ciência e a tecnologia para resolver nossos problemas ambientais.						
1	2	3	4	5	6	7
Os seres humanos irão eventualmente aprender como resolver todos os problemas ambientais.						
1	2	3	4	5	6	7
A crença de que os avanços científicos e tecnológicos podem resolver nossos problemas ambientais é completamente errada e tola.						
1	2	3	4	5	6	7
Os seres humanos irão eventualmente aprender o suficiente sobre como a natureza funciona para poder controlá-la.						
1	2	3	4	5	6	7
A ciência e a tecnologia não podem resolver as graves ameaças ao nosso meio ambiente.						
1	2	3	4	5	6	7
A ciência moderna irá resolver nossos problemas ambientais.						
1	2	3	4	5	6	7
Se as coisas continuarem como estão, viveremos em breve uma enorme catástrofe ecológica.						
1	2	3	4	5	6	7
A Terra é como uma nave espacial, com uma grande limitação de espaço e recursos.						
1	2	3	4	5	6	7
O equilíbrio da natureza é muito delicado e pode ser perturbado facilmente.						
1	2	3	4	5	6	7
Quando os seres humanos interferem na natureza isto freqüentemente produz conseqüências desastrosas.						
1	2	3	4	5	6	7
Os seres humanos estão maltratando severamente o meio ambiente.						
1	2	3	4	5	6	7
A idéia de que viveremos uma enorme catástrofe ecológica, caso as coisas continuem como estão, não passa de uma grande bobagem.						
1	2	3	4	5	6	7
Eu não consigo ver nenhum problema ambiental criado pelo rápido desenvolvimento econômico. O desenvolvimento econômico só traz benefícios.						
1	2	3	4	5	6	7
A idéia de que o equilíbrio da natureza é muito delicado e pode ser perturbado facilmente é muito pessimista.						
1	2	3	4	5	6	7
Não acredito que o meio ambiente venha sendo severamente maltratado pelos seres humanos.						
1	2	3	4	5	6	7
As pessoas que dizem que a exploração desmedida da natureza nos levou à beira de uma catástrofe ecológica estão erradas.						
1	2	3	4	5	6	7
As plantas e matos que crescem entre as pedras das calçadas podem ser desorganizados e bagunçados, mas são naturais e devem ser deixados em paz.						
1	2	3	4	5	6	7
A idéia de que as áreas naturais devem ser mantidas exatamente como estão é tola, sem sentido e errada.						
1	2	3	4	5	6	7
Eu preferiria um jardim selvagem e natural a um bem cuidado e organizado.						
1	2	3	4	5	6	7
Os seres humanos não deveriam modificar a natureza, mesmo quando a natureza é desconfortável e inconveniente para nós.						
1	2	3	4	5	6	7
A transformação de terras não utilizadas em áreas para o desenvolvimento do cultivo e da agricultura deveria ser impedida.						
1	2	3	4	5	6	7

1 Discordo totalmente	2 Discordo	3 Discordo um pouco	4 Neutro	5 Concordo um pouco	6 Concordo	7 Concordo totalmente
Eu preferiria um jardim bem cuidado e organizado a um selvagem e natural.	1	2	3	4	5	6 7
Quando a natureza é desconfortável e inconveniente para os seres humanos, nós temos todo o direito de mudá-la da forma mais adequada para nós.	1	2	3	4	5	6 7
A transformação de terras não utilizadas em áreas para o desenvolvimento do cultivo e da agricultura é positiva e deveria ser apoiada.	1	2	3	4	5	6 7
As plantas e matos que crescem entre as pedras das calçadas são realmente desorganizados e bagunçados.	1	2	3	4	5	6 7
Oponho-me a qualquer remoção das áreas selvagens, não importando o quanto o desenvolvimento destas áreas possa ser economicamente benévolo.	1	2	3	4	5	6 7
Não me importaria em economizar água ou outros recursos naturais.	1	2	3	4	5	6 7
Eu tento garantir que, durante o verão, o sistema de ar-condicionado do meu quarto não é ligado em sua potência máxima.	1	2	3	4	5	6 7
Em minha vida diária, não estou interessado em tentar conservar água e/ou energia.	1	2	3	4	5	6 7
Sempre que possível eu tomo um banho rápido para reduzir o consumo de água.	1	2	3	4	5	6 7
Eu sempre desligo as luzes quando não preciso mais utilizá-las.	1	2	3	4	5	6 7
Eu uso meu carro quando bem entender, mesmo que isto polua a atmosfera.	1	2	3	4	5	6 7
Em minha vida diária, tento encontrar formas para reduzir o consumo de água e energia.	1	2	3	4	5	6 7
Não sou o tipo de pessoa que faz esforços para conservar os recursos naturais.	1	2	3	4	5	6 7
Sempre que possível eu tento preservar os recursos naturais.	1	2	3	4	5	6 7
Mesmo que os transportes públicos fossem mais eficientes do que são, eu preferiria ir para os lugares de carro.	1	2	3	4	5	6 7
Os seres humanos foram feitos para reinar sobre o resto da natureza.	1	2	3	4	5	6 7
Os seres humanos foram criados ou evoluíram para dominar o resto da natureza.	1	2	3	4	5	6 7
As plantas e os animais têm tanto direito de existir quanto os seres humanos.	1	2	3	4	5	6 7
As plantas e os animais existem principalmente para serem usados pelos seres humanos.	1	2	3	4	5	6 7
Os seres humanos fazem tão parte do ecossistema quanto outros animais.	1	2	3	4	5	6 7
Os seres humanos não são mais importantes na natureza do que as outras formas de vida.	1	2	3	4	5	6 7
A natureza existe principalmente para o uso dos seres humanos.	1	2	3	4	5	6 7
A natureza, em todas as suas formas e manifestações, deve ser controlada pelos seres humanos.	1	2	3	4	5	6 7
Eu não acredito que os seres humanos foram criados ou evoluíram para dominar o resto da natureza.	1	2	3	4	5	6 7
Os seres humanos não são mais importantes do que nenhuma outra espécie.	1	2	3	4	5	6 7
É correto que os seres humanos utilizem a natureza como um recurso para propósitos econômicos.	1	2	3	4	5	6 7

1 Discordo totalmente	2 Discordo	3 Discordo um pouco	4 Neutro	5 Concordo um pouco	6 Concordo	7 Concordo totalmente
Proteger os empregos das pessoas é mais importante do que proteger o meio ambiente.						
1	2	3	4	5	6	7
Os seres humanos não têm o direito de danificar o meio ambiente apenas para adquirir maior crescimento econômico.						
1	2	3	4	5	6	7
As pessoas têm prestado muito pouca atenção no quanto o progresso humano tem danificado o meio ambiente.						
1	2	3	4	5	6	7
Proteger o meio ambiente é mais importante do que proteger o crescimento econômico.						
1	2	3	4	5	6	7
Não deveríamos mais utilizar a natureza como um recurso para propósitos econômicos.						
1	2	3	4	5	6	7
Proteger o meio ambiente é mais importante do que proteger o emprego das pessoas.						
1	2	3	4	5	6	7
Para proteger o meio ambiente, nós precisamos de crescimento econômico.						
1	2	3	4	5	6	7
Questões ambientais são secundárias ao crescimento econômico.						
1	2	3	4	5	6	7
Os benefícios dos modernos produtos de consumo são muito mais importantes do que a poluição resultante da sua produção e uso.						
1	2	3	4	5	6	7
A idéia de que a natureza é valiosa por ela mesma é ingênua e errada.						
1	2	3	4	5	6	7
Entristece-me ver a destruição dos ambientes naturais.						
1	2	3	4	5	6	7
A natureza é valiosa por ela mesma.						
1	2	3	4	5	6	7
Uma das piores coisas sobre superpopulação é que muitas áreas naturais estão sendo destruídas.						
1	2	3	4	5	6	7
Não acredito que proteger o meio ambiente seja um assunto importante.						
1	2	3	4	5	6	7
Apesar das nossas capacidades especiais, nós, seres humanos, ainda estamos sujeitos às leis da natureza.						
1	2	3	4	5	6	7
Entristece-me ver florestas desmatadas para a agricultura.						
1	2	3	4	5	6	7
Não fico triste ao ver ambientes naturais destruídos.						
1	2	3	4	5	6	7
Não acredito que a natureza seja valiosa por ela mesma.						
1	2	3	4	5	6	7
Não me chateio com o desmatamento de florestas para a agricultura.						
1	2	3	4	5	6	7
Deveríamos nos empenhar para atingir a meta de "crescimento populacional zero".						
1	2	3	4	5	6	7
É errada a idéia de que devemos controlar o crescimento populacional.						
1	2	3	4	5	6	7
As famílias deveriam ser incentivadas a terem no máximo dois filhos.						
1	2	3	4	5	6	7
Um casal deve ter tantos filhos quanto quiser, contanto que possam mantê-los adequadamente.						
1	2	3	4	5	6	7
Nosso governo deveria educar as pessoas com relação à importância de terem no máximo dois filhos.						
1	2	3	4	5	6	7
Nunca deveríamos pôr limites no número de filhos que um casal pode ter.						
1	2	3	4	5	6	7
As pessoas que dizem que a superpopulação é um problema estão completamente enganadas.						
1	2	3	4	5	6	7
O mundo seria melhor se a população parasse de crescer.						
1	2	3	4	5	6	7
Nós estaríamos em melhores condições se o número de pessoas na Terra fosse reduzido dramaticamente.						
1	2	3	4	5	6	7

1 Discordo totalmente	2 Discordo	3 Discordo um pouco	4 Neutro	5 Concordo um pouco	6 Concordo	7 Concordo totalmente
O governo não tem o direito de exigir que os casais limitem o número de filhos que podem ter.						1 2 3 4 5 6 7

(End of Survey page)

**Fim do Questionário**

**Muito obrigado por sua participação!**

Se você tiver interesse em saber mais sobre nossa pesquisa e o tópico das atitudes ambientais, por favor entre em contato com Taciano L. Milfont (t.milfont@auckland.ac.nz) ou acesse [www.milfont.com](http://www.milfont.com).

Você gostaria de participar em outro estudo? Por favor escreva seus contatos abaixo:

Nome: \_\_\_\_\_ Email: \_\_\_\_\_

**Questionnaire used in Study 2c (paper-and-pen version)**

**(Welcome! page)**

This is an online survey about environmental issues being conducted by researchers at the University of Auckland, New Zealand, as part of a PhD research. The study has the objective of investigating the structure of environmental attitudes.

This survey takes **less than 15 minutes** to complete. If you are 18 years of age or older and interested in participating, please read through the consent form on the following page and click on "I agree" to proceed.

Thank you for your interest!!

Taciano L. Milfont & John Duckitt  
University of Auckland

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## (Participant Information page)

Please read these information before you decide to participate in the study.

*Purpose of the research study:* This study consists of a survey questionnaire that asks about opinions, attitudes and behaviours on a variety of environmental issues. The study is for the purposes of PhD research and has the objective of investigating the structure of environmental attitudes.

*Time required:* This survey will require less than **15 minutes** to complete.

*Confidentiality:* The questionnaire is **totally anonymous** so no individual's responses can be identified.

*Voluntary participation:* Your participation in the study is **completely voluntary**, and you may withdraw at any time.

*Who to contact if you have questions:*

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E-mail: j.duckitt@auckland.ac.nz

For any queries regarding ethical concerns please contact:  
The Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Research Office - Office of the Vice Chancellor, Private Bag 92019, Auckland. Tel. +64 (9) 373-7999 ext. 87830

The University of Auckland Human Participants Ethics Committee has approved this study under Reference no. 2003/Q/020, on 13/10/2004 for a period of three years.  
PLEASE FEEL FREE TO PRINT A COPY OF THIS PAGE FOR YOUR RECORDS.

**Agreement. Do you agree to participate in the research study described above?**

1. I AGREE
2. I DO NOT AGREE

**(Components of Norm Activation and Self-Reported Behaviour page)**

In your community, how serious are each of the following environmental problems?

<b>1 Extremely</b>	<b>2 Moderately</b>	<b>3 Slightly</b>	<b>4 Not at all</b>			
Deforestation			1	2	3	4
Water pollution			1	2	3	4
Air pollution			1	2	3	4
Land pollution			1	2	3	4
Overpopulation			1	2	3	4
Global warming			1	2	3	4

How responsible do you feel for environmental problems in your community?

<b>1 Extremely responsible</b>	<b>2 Moderately responsible</b>	<b>3 Slightly responsible</b>	<b>4 Not at all responsible</b>
--	---	---------------------------------------	---

Worldwide, how serious are each of the following environmental problems?

<b>1 Extremely</b>	<b>2 Moderately</b>	<b>3 Slightly</b>	<b>4 Not at all</b>			
Deforestation			1	2	3	4
Water pollution			1	2	3	4
Air pollution			1	2	3	4
Land pollution			1	2	3	4
Overpopulation			1	2	3	4
Global warming			1	2	3	4

How responsible do you feel for environmental problems in your worldwide?

<b>1 Extremely responsible</b>	<b>2 Moderately responsible</b>	<b>3 Slightly responsible</b>	<b>4 Not at all responsible</b>
--	---	---------------------------------------	---



### (Components of Norm Activation and Self-Reported Behaviour page)

How often have you performed each of the following behaviours in the last year?  
Please use the following scale.

<b>1 Never</b>	<b>2 Rarely</b>	<b>3 Sometimes</b>	<b>4 Often</b>	<b>5 Very often</b>			
Looked for ways to reuse things.			1	2	3	4	5
Recycled newspapers.			1	2	3	4	5
Recycled cans or bottles.			1	2	3	4	5
Encouraged friends or family to recycle.			1	2	3	4	5
Purchased products in reusable or recyclable containers.			1	2	3	4	5
Picked up litter that was not your own.			1	2	3	4	5
Composted food scraps.			1	2	3	4	5
Conserved gasoline (petrol) by walking or bicycling.			1	2	3	4	5

### (Environmental Attitudes page)

In the next pages you will be presented with several statements about environmental issues.

Please indicate the extent to which you **agree** or **disagree** with each of the following statements.

<b>1 Strongly disagree</b>	<b>2 Disagree</b>	<b>3 Somewhat disagree</b>	<b>4 Unsure/ neutral</b>	<b>5 Somewhat agree</b>	<b>6 Agree</b>	<b>7 Strongly agree</b>					
I really like going on trips into the countryside, for example to forests or fields.					1	2	3	4	5	6	7
I find it very boring being out in wilderness areas.					1	2	3	4	5	6	7
Being out in nature is a great stress reducer for me.					1	2	3	4	5	6	7
I have a sense of well-being in the silence of nature.					1	2	3	4	5	6	7
I find it more interesting in a shopping mall than out in the forest looking at trees and birds.					1	2	3	4	5	6	7
I think spending time in nature is boring.					1	2	3	4	5	6	7
Governments should control the rate at which raw materials are used to ensure that they last as long as possible.					1	2	3	4	5	6	7
Controls should be placed on industry to protect the environment from pollution, even if it means things will cost more.					1	2	3	4	5	6	7
People in developed societies are going to have to adopt a more conserving life-style in the future.					1	2	3	4	5	6	7
Industries should be able to use raw materials rather than recycled ones if this leads to lower prices and costs, even if it means the raw materials will eventually be used up.					1	2	3	4	5	6	7

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
I don't think people in developed societies are going to have to adopt a more conserving life-style in the future.						
I am opposed to governments controlling and regulating the way raw materials are used in order to try and make them last longer.						
I would like to join and actively participate in an environmentalist group.						
I don't think I would help to raise funds for environmental protection.						
I would NOT get involved in an environmentalist organization.						
Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort.						
I would not want to donate money to support an environmentalist cause.						
I would like to support an environmental organization.						
One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy water sports.						
Nature is important because of what it can contribute to the pleasure and welfare of humans.						
The thing that concerns me most about deforestation is that there will not be enough lumber for future generations.						
Conservation is important even if it lowers peoples' standard of living.						
We need to keep rivers and lakes clean in order to protect the environment, and NOT as places for people to enjoy water sports.						
We should protect the environment even if it means peoples' welfare will suffer.						
Science and technology will eventually solve our problems with pollution, overpopulation, and diminishing resources.						
Modern science will NOT be able to solve our environmental problems.						
We cannot keep counting on science and technology to solve our environmental problems.						
Humans will eventually learn how to solve all environmental problems.						
The belief that advances in science and technology can solve our environmental problems is completely wrong and misguided.						
Modern science will solve our environmental problems.						
If things continue on their present course, we will soon experience a major ecological catastrophe.						
When humans interfere with nature it often produces disastrous consequences.						
Humans are severely abusing the environment.						
The idea that the balance of nature is terribly delicate and easily upset is much too pessimistic.						
I do not believe that the environment has been severely abused by humans.						
People who say that the unrelenting exploitation of nature has driven us to the brink of ecological collapse are wrong.						
I'd prefer a garden that is wild and natural to a well groomed and ordered one.						

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us.						
1	2	3	4	5	6	7
Turning new unused land over to cultivation and agricultural development should be stopped.						
1	2	3	4	5	6	7
I'd much prefer a garden that is well groomed and ordered to a wild and natural one.						
1	2	3	4	5	6	7
When nature is uncomfortable and inconvenient for humans we have every right to change and remake it to suit ourselves.						
1	2	3	4	5	6	7
Grass and weeds growing between pavement stones really looks untidy.						
1	2	3	4	5	6	7
I could not be bothered to save water or other natural resources.						
1	2	3	4	5	6	7
In my daily life I'm just not interested in trying to conserve water and/or power.						
1	2	3	4	5	6	7
I always switch the light off when I don't need it on any more.						
1	2	3	4	5	6	7
In my daily life I try to find ways to conserve water or power.						
1	2	3	4	5	6	7
I am NOT the kind of person who makes efforts to conserve natural resources.						
1	2	3	4	5	6	7
Whenever possible, I try to save natural resources.						
1	2	3	4	5	6	7
Humans were meant to rule over the rest of nature.						
1	2	3	4	5	6	7
Human beings were created or evolved to dominate the rest of nature.						
1	2	3	4	5	6	7
Plants and animals have as much right as humans to exist.						
1	2	3	4	5	6	7
Plants and animals exist primarily to be used by humans.						
1	2	3	4	5	6	7
I DO NOT believe humans were created or evolved to dominate the rest of nature.						
1	2	3	4	5	6	7
Humans are no more important than any other species.						
1	2	3	4	5	6	7
Protecting peoples' jobs is more important than protecting the environment.						
1	2	3	4	5	6	7
Humans do NOT have the right to damage the environment just to get greater economic growth.						
1	2	3	4	5	6	7
The benefits of modern consumer products are more important than the pollution that results from their production and use.						
1	2	3	4	5	6	7
Protecting the environment is more important than protecting peoples' jobs.						
1	2	3	4	5	6	7
The question of the environment is secondary to economic growth.						
1	2	3	4	5	6	7
Protecting the environment is more important than protecting economic growth.						
1	2	3	4	5	6	7
The idea that nature is valuable for its own sake is naïve and wrong.						
1	2	3	4	5	6	7
I do not believe protecting the environment is an important issue.						
1	2	3	4	5	6	7
It makes me sad to see forests cleared for agriculture.						
1	2	3	4	5	6	7
Despite our special abilities humans are still subject to the laws of nature.						
1	2	3	4	5	6	7
Nature is valuable for its own sake.						
1	2	3	4	5	6	7
It does NOT make me sad to see natural environments destroyed.						
1	2	3	4	5	6	7
Families should be encouraged to limit themselves to two children or less.						
1	2	3	4	5	6	7
A married couple should have as many children as they wish, as long as they can adequately provide for them.						
1	2	3	4	5	6	7

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
Our government should educate people concerning the importance of having two children or less.						
We should never put limits on the number of children a couple can have.						
We would be better off if we dramatically reduced the number of people on the Earth.						
The government has no right to require married couples to limit the number of children they can have.						

### (Big Five Mini-Markers page)

#### How Accurately Can You Describe Yourself?

Please use this list of common human traits to describe yourself as accurately as possible. Describe yourself as you see yourself at the present time, not as you wish to be in the future. Describe yourself as you are generally or typically, as compared with other persons you know of the same sex and of roughly your same age.

1 Extremely Inaccurate	2 Inaccurate	3 Somewhat Inaccurate	4 Unsure/ Neutral	5 Somewhat Accurate	6 Accurate	7 Extremely Accurate	
Talkative	1 2 3 4 5 6 7			Disorganized	1 2 3 4 5 6 7		
Extroverted	1 2 3 4 5 6 7			Sloppy	1 2 3 4 5 6 7		
Shy	1 2 3 4 5 6 7			Unevious	1 2 3 4 5 6 7		
Quiet	1 2 3 4 5 6 7			Relaxed	1 2 3 4 5 6 7		
Sympathetic	1 2 3 4 5 6 7			Moody	1 2 3 4 5 6 7		
Warm	1 2 3 4 5 6 7			Jealous	1 2 3 4 5 6 7		
Cold	1 2 3 4 5 6 7			Creative	1 2 3 4 5 6 7		
Unsympathetic	1 2 3 4 5 6 7			Imaginative	1 2 3 4 5 6 7		
Organized	1 2 3 4 5 6 7			Uncreative	1 2 3 4 5 6 7		
Efficient	1 2 3 4 5 6 7			Unintellectual	1 2 3 4 5 6 7		

**(Human Values page)**

AS A GUIDING PRINCIPLE IN MY LIFE, this value is:

<b>Opposed to my values</b> -1	<b>Not important</b> 0	1	2	<b>Important</b> 3	4	5	<b>Very important</b> 6	<b>Of supreme importance</b> 7	
EQUALITY (equal opportunity for all).	-1	0	1	2	3	4	5	6	7
AN EXCITING LIFE (stimulating experiences).	-1	0	1	2	3	4	5	6	7
WEALTH (material possessions, money).	-1	0	1	2	3	4	5	6	7
A WORLD AT PEACE (free of war and conflict).	-1	0	1	2	3	4	5	6	7
SELF-DISCIPLINE (self-restraint, resistance to temptation).	-1	0	1	2	3	4	5	6	7
FAMILY SECURITY (safety for loved ones).	-1	0	1	2	3	4	5	6	7
UNITY WITH NATURE (fitting into nature).	-1	0	1	2	3	4	5	6	7
A VARIED LIFE (filled with challenge, novelty, and change).	-1	0	1	2	3	4	5	6	7
AUTHORITY (the right to lead or command).	-1	0	1	2	3	4	5	6	7
SOCIAL JUSTICE (correcting injustice, care for the weak).	-1	0	1	2	3	4	5	6	7
PROTECTING THE ENVIRONMENT (preserving nature).	-1	0	1	2	3	4	5	6	7
INFLUENTIAL (having an impact on people and events).	-1	0	1	2	3	4	5	6	7
HONORING PARENTS AND ELDERS (showing respect).	-1	0	1	2	3	4	5	6	7
CURIOUS (interested in everything, exploring).	-1	0	1	2	3	4	5	6	7
RESPECTING THE EARTH (harmony with other species).	-1	0	1	2	3	4	5	6	7

**(Time Perspective page)**

How characteristic or true is this of you?

<b>1 Never</b>	<b>2 Rarely</b>	<b>3 Sometimes</b>	<b>4 Often</b>	<b>5 Very often</b>
I think about the bad things that have happened to me in the past.				1 2 3 4 5
Painful past experiences keep being replayed in my mind.				1 2 3 4 5
It's hard for me to forget unpleasant images of my youth.				1 2 3 4 5
I take risks to put excitement in my life.				1 2 3 4 5
Taking risks keeps my life from becoming boring.				1 2 3 4 5
It is important to put excitement in my life.				1 2 3 4 5
Meeting tomorrow's deadline and doing other necessary work comes before tonight's play.				1 2 3 4 5
I complete projects on time by making steady progress.				1 2 3 4 5
I am able to resist temptations when I know that there is work to be done.				1 2 3 4 5
It gives me pleasure to think about my past.				1 2 3 4 5
I get nostalgic about my childhood.				1 2 3 4 5
Happy memories of good times spring readily to mind.				1 2 3 4 5
My life path is controlled by forces I cannot influence.				1 2 3 4 5
It doesn't make sense to worry about the future, since there is nothing that I can do about it anyway.				1 2 3 4 5
Since whatever will be will be, it doesn't really matter what I do.				1 2 3 4 5

**(Background Information page)**

Age in years: _____.	Your gender: 1. Female      2. Male	In which country are you NOW? _____.																
In which country were you born? _____.	In which country did you spend most of your life? _____.																	
Level of education: <table style="width:100%; border:none;"> <tr> <td style="width:33%;">1. High School Incomplete</td> <td style="width:33%;">2. High School Complete</td> <td style="width:33%;">3. Technical School</td> </tr> <tr> <td>4. College Incomplete</td> <td>5. College Complete</td> <td>6. University Incomplete</td> </tr> <tr> <td>7. University Complete</td> <td>8. Masters</td> <td>9. Doctorate</td> </tr> </table>			1. High School Incomplete	2. High School Complete	3. Technical School	4. College Incomplete	5. College Complete	6. University Incomplete	7. University Complete	8. Masters	9. Doctorate							
1. High School Incomplete	2. High School Complete	3. Technical School																
4. College Incomplete	5. College Complete	6. University Incomplete																
7. University Complete	8. Masters	9. Doctorate																
With which religious or philosophical orientation do you most identify? (circle) <table style="width:100%; border:none;"> <tr> <td style="width:25%;">1. Agnostic</td> <td style="width:25%;">2. Atheistic</td> <td style="width:25%;">3. Buddhist</td> <td style="width:25%;">4. Christian</td> </tr> <tr> <td>5. Hindu</td> <td>6. Jewish</td> <td>7. Muslim</td> <td>8. Other: _____</td> </tr> <tr> <td colspan="4">9. I do not identify with any specific religious or philosophical orientation</td> </tr> </table>			1. Agnostic	2. Atheistic	3. Buddhist	4. Christian	5. Hindu	6. Jewish	7. Muslim	8. Other: _____	9. I do not identify with any specific religious or philosophical orientation							
1. Agnostic	2. Atheistic	3. Buddhist	4. Christian															
5. Hindu	6. Jewish	7. Muslim	8. Other: _____															
9. I do not identify with any specific religious or philosophical orientation																		
Which of the following statements best describes your beliefs in the Bible? (circle) <table style="width:100%; border:none;"> <tr> <td style="width:33%;">7. The Bible is the actual word of God and should be taken literally, word for word.</td> </tr> <tr> <td>8. The Bible is the inspired word of God, but it was written by men and women and contains some human errors.</td> </tr> <tr> <td>9. The Bible is an ancient book of history and legends; God had nothing to do with it.</td> </tr> </table>			7. The Bible is the actual word of God and should be taken literally, word for word.	8. The Bible is the inspired word of God, but it was written by men and women and contains some human errors.	9. The Bible is an ancient book of history and legends; God had nothing to do with it.													
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9. The Bible is an ancient book of history and legends; God had nothing to do with it.																		
How religious are you, if at all? (circle) <table style="width:100%; border:none;"> <tr> <td style="width:15%; text-align:center;">Not religious at all</td> <td style="width:15%;"></td> <td style="width:15%;"></td> <td style="width:15%;"></td> <td style="width:15%;"></td> <td style="width:15%;"></td> <td style="width:15%;"></td> <td style="width:15%; text-align:center;">Very religious</td> </tr> <tr> <td style="text-align:center;">0</td> <td style="text-align:center;">1</td> <td style="text-align:center;">2</td> <td style="text-align:center;">3</td> <td style="text-align:center;">4</td> <td style="text-align:center;">5</td> <td style="text-align:center;">6</td> <td style="text-align:center;">7</td> </tr> </table>			Not religious at all							Very religious	0	1	2	3	4	5	6	7
Not religious at all							Very religious											
0	1	2	3	4	5	6	7											
In general, when it comes to politics, do you usually think of yourself as... (circle) <table style="width:100%; border:none;"> <tr> <td style="width:12.5%;">Extremely liberal</td> <td style="width:12.5%;">Liberal</td> <td style="width:12.5%;">Slightly liberal</td> <td style="width:12.5%;">Moderate</td> <td style="width:12.5%;">Slightly conservative</td> <td style="width:12.5%;">Conservative</td> <td style="width:12.5%;">Extremely conservative</td> </tr> <tr> <td style="text-align:center;">1</td> <td style="text-align:center;">2</td> <td style="text-align:center;">3</td> <td style="text-align:center;">4</td> <td style="text-align:center;">5</td> <td style="text-align:center;">6</td> <td style="text-align:center;">7</td> </tr> </table>			Extremely liberal	Liberal	Slightly liberal	Moderate	Slightly conservative	Conservative	Extremely conservative	1	2	3	4	5	6	7		
Extremely liberal	Liberal	Slightly liberal	Moderate	Slightly conservative	Conservative	Extremely conservative												
1	2	3	4	5	6	7												
Where did you learn about our survey? <table style="width:100%; border:none;"> <tr> <td style="width:33%;">1. An email</td> <td style="width:33%;">2. Word of mouth</td> <td style="width:33%;">3. Psychology Research on the Net</td> </tr> <tr> <td>4. The Web Survey List</td> <td>5. Online forum</td> <td>6. Other</td> </tr> </table>			1. An email	2. Word of mouth	3. Psychology Research on the Net	4. The Web Survey List	5. Online forum	6. Other										
1. An email	2. Word of mouth	3. Psychology Research on the Net																
4. The Web Survey List	5. Online forum	6. Other																
If you would be interested in being contacted for another short study, please submit your contact information below. Name: _____ Email: _____																		

## (End of Survey page)

**Thank you for completing this survey!**

### **Debrief**

This study is being conducted by Taciano L. Milfont and John Duckitt, and has the objective of investigating the structure of environmental attitudes.

As a result of increasing interest in environmental issues, many questionnaires have been developed to measure environmental attitudes. These questionnaires, however, do not have a clear theoretical rationale to support them.

Today, attempts to develop such theoretical approaches have begun to use statistical analyses of items from many questionnaire measures. Using this strategy, Wiseman and Bogner (2003) developed a Model of Ecological Values (MEV). This model has two distinct dimensions, *Preservation* and *Utilization*. The former measures support for the conservation and protection of the environment, and the latter support for the utilization of natural resources.

This is what our questionnaire investigates. We will use statistical techniques to see if the items of the questionnaire do form two different dimensions. Second, the two different dimensions, if they really are distinct, should differentially predict people's pro-environmental behaviour (hence the questions about behavioural self description in the questionnaire), and be related to people's psychological traits (hence the values and personality traits section). The survey you have participated in should enable us to understand how environmental attitudes are structured, how they predict people's behaviour and how they are related with other psychological constructs.

We are very grateful for your help with the research. Please don't hesitate to approach us if you have any questions about it.

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**Questionnaire used in Study 2c (paper-and-pen version of the test-retest questionnaire)**

The test-retest version of the questionnaire comprised the environmental attitudes, human values and background information pages from the original version, plus the natural semantic network page (see below).

**(Natural Semantic Network page)**

<b>Please provide five (5) words that you associate with "ENVIRONMENTAL UTILISATION." Answer with the first words that come to mind.</b>	
1.	
2.	
3.	
4.	
5.	

<b>Please provide five (5) words that you associate with "ENVIRONMENTAL PRESERVATION." Answer with the first words that come to mind.</b>	
1.	
2.	
3.	
4.	
5.	

## Questionnaire used in Study 3 (Brazil)

### Você poderia nos dizer o que pensa?

O objetivo deste questionário é conhecer as atitudes e opiniões das pessoas em relação a vários assuntos de relevância social. Suas respostas fornecerão subsídios para um melhor entendimento de como estes assuntos são percebidos atualmente. Neste sentido, solicitamos sua colaboração para responder às perguntas que seguem.

Suas respostas são *confidenciais* e serão mantidas em *total anonimato*. Por favor, leia cada pergunta cuidadosamente e selecione a resposta que melhor reflete sua primeira reação à pergunta. Não há respostas certas ou erradas. Pedimos que **RESPONDA A TODAS AS PERGUNTAS**. Consulte o pesquisador se achar necessário. Agradecemos a sua colaboração.

### CARACTERIZAÇÃO SÓCIO-DEMOGRÁFICA

Qual a sua idade? _____anos.	Qual o seu sexo? 1. Feminino 2. Masculino	Você é membro de alguma organização ambiental (ex., Greenpeace) ? 1. Sim 2. Não
Com que orientação religiosa ou filosófica você mais se identifica? (circule)		
1. Agnóstico      2. Ateu      3. Budista      4. Cristão 5. Hindu      6. Judeu      7. Muçulmano      8. Outra:  9. Eu não me identifico com nenhuma orientação religiosa ou filosófica específica.		
O quanto religioso(a) você é? (circule)		
Nem um pouco religioso(a)      Muito religioso(a) 0      1      2      3      4      5      6      7      8		
Qual das seguintes declarações melhor descreve suas convicções na Bíblia? (circule)		
1. A Bíblia é a palavra atual de Deus e deveria ser seguida literalmente, palavra por palavra. 2. A Bíblia é a palavra inspirada de Deus, mas foi escrita por homens e mulheres e contém alguns erros humanos. 3. A Bíblia é um livro antigo de histórias e lendas; Deus não teve nada a ver com isto.		
Você se vê frequentemente como... (circule)		
Extremamente liberal      Liberal      Um pouco liberal      Moderado      Um pouco conservador      Conservador      Extremamente conservador 1      2      3      4      5      6      7		
Em comparação com as pessoas do Brasil, você diria que sua família é da (circule):		
Classe humilde      Classe média      Classe alta 1      2      3      4      5      6      7      8      9		
Por favor, circule a opção abaixo que melhor descreve sua relação com o ambiente natural. <i>Quão interconectado você está com a natureza?</i>		

## SESSÃO A:

Por favor, indique o quão ameaçadores são para você os seguintes problemas, circulando o número que melhor descreve sua posição de acordo com a escala abaixo.

1 Nenhuma ameaça	2 Mínima ameaça	3 Média ameaça	4 Moderada ameaça	5 Forte ameaça	6 Muito forte ameaça	7 Extrema ameaça
Poluição das águas		1 2 3 4 5 6 7		Radioatividade derivada de materiais construídos (ex., gás radônio)		1 2 3 4 5 6 7
Tempestades (ex., relâmpagos, furacões, tornados)		1 2 3 4 5 6 7		Mudanças na camada de ozônio causadas pela poluição		1 2 3 4 5 6 7
Poluição gerada pelos carros		1 2 3 4 5 6 7		Terremotos		1 2 3 4 5 6 7
Poluição gerada pelas fábricas		1 2 3 4 5 6 7		Erosão do solo		1 2 3 4 5 6 7
Poluição gerada pelas queimadas de lixo		1 2 3 4 5 6 7		Água impura para consumo		1 2 3 4 5 6 7
Fumaça de cigarro em edifícios públicos		1 2 3 4 5 6 7		Grandes incêndios		1 2 3 4 5 6 7
Chuva ácida		1 2 3 4 5 6 7		Inundações ou ressacas do mar		1 2 3 4 5 6 7
Poluição gerada por equipamento de escritório (ex., ozônio derivado de fotocopiadoras)		1 2 3 4 5 6 7		Germes ou micro-organismos		1 2 3 4 5 6 7
Número de pessoas (ex., aglomerados, explosão populacional)		1 2 3 4 5 6 7		Vazamentos radioativos		1 2 3 4 5 6 7
Iluminação fluorescente		1 2 3 4 5 6 7		Vapores ou fibras de materiais sintéticos (ex., tapetes, plásticos, amiantos)		1 2 3 4 5 6 7
Escassez de água (ex., seca, racionamentos de água)		1 2 3 4 5 6 7		Depósitos químicos		1 2 3 4 5 6 7
Barulho		1 2 3 4 5 6 7		Emissões derivadas de telas de vídeo		1 2 3 4 5 6 7
Poluição visual (ex., outdoors, edifícios feios, lixo)		1 2 3 4 5 6 7		Praguicidas e herbicidas		1 2 3 4 5 6 7

Considerando todos os riscos ambientais apresentados acima, por favor responda:

Como você calcularia a probabilidade de danos causados por estes riscos ambientais para a sua <u>comunidade</u> ?						
Nada provável						Muito provável
1	2	3	4	5	6	7
Como você calcularia a probabilidade de danos causados por estes riscos ambientais <u>para todo o mundo</u> ?						
Nada provável						Muito provável
1	2	3	4	5	6	7
Como você calcularia os possíveis danos em <u>sua</u> saúde causados por estes riscos ambientais?						
Nenhum risco						Extremo risco
1	2	3	4	5	6	7
<b>Comparado a outros estudantes da sua universidade – do mesmo sexo que você –</b>						
como você calcularia os possíveis danos em <u>sua</u> saúde causados por estes riscos ambientais?						
Muito abaixo da média						Muito acima da média
1	2	3	4	5	6	7

## SESSÃO B:

Você encontrará nas próximas páginas uma série de afirmações relativas às questões ambientais. Por favor, leia cada uma das afirmações e assinale a opção que melhor expressa seu nível de **acordo** ou **desacordo**, de acordo com a escala abaixo.

1 Discordo totalmente	2 Discordo	3 Discordo um pouco	4 Neutro	5 Concordo um pouco	6 Concordo	7 Concordo totalmente
Eu gosto muito de viajar para áreas afastadas das grandes cidades, como, por exemplo, para florestas ou campos.						
Acho muito chato visitar áreas selvagens, como matas e florestas.						
Estar em contato direto com a natureza é para mim um grande redutor de <i>stress</i> .						
Tenho uma sensação de bem-estar no silêncio da natureza.						
Eu acho mais interessante ir a um <i>shopping center</i> do que a uma floresta, para olhar árvores e pássaros.						
Acho muito chato passar o tempo em contato com a natureza.						
Os governos deveriam controlar a quantidade de matérias primas utilizadas para garantir que possam durar o maior tempo possível.						
Deveria haver um controle das indústrias a fim de proteger o meio ambiente da poluição, mesmo que isto signifique o aumento dos preços.						
As populações dos países desenvolvidos terão que adotar no futuro um estilo de vida mais voltado à preservação da natureza.						
Caso reduza preços e custos, as indústrias deveriam utilizar nova matéria prima ao invés de materiais reciclados, mesmo que isto signifique o esgotamento da matéria prima.						

1 Discordo totalmente	2 Discordo	3 Discordo um pouco	4 Neutro	5 Concordo um pouco	6 Concordo	7 Concordo totalmente
Não acredito que as populações dos países desenvolvidos terão que adotar no futuro um estilo de vida mais voltado para a preservação da natureza.						
1	2	3	4	5	6	7
Sou contra os governos controlando e regulamentando a forma como as matérias primas são utilizadas no intuito de fazê-las durar mais.						
1	2	3	4	5	6	7
Gostaria de ser membro e participar ativamente de um grupo ambientalista.						
1	2	3	4	5	6	7
Não acredito que poderia ajudar a arrecadar fundos para a proteção ambiental.						
1	2	3	4	5	6	7
Não me envolveria em uma organização ambientalista.						
1	2	3	4	5	6	7
A proteção do meio ambiente custa muito dinheiro. Estou disposto a ajudar numa campanha de arrecadação de fundos.						
1	2	3	4	5	6	7
Eu não doaria dinheiro para apoiar uma causa ambientalista.						
1	2	3	4	5	6	7
Gostaria de apoiar uma organização ambientalista.						
1	2	3	4	5	6	7
Uma das razões mais importantes para manter os lagos e os rios limpos é o fato de que as pessoas poderão ter um lugar para praticar esportes aquáticos.						
1	2	3	4	5	6	7
A natureza é importante porque contribui para o prazer e o bem-estar dos seres humanos.						
1	2	3	4	5	6	7
O que mais me preocupa sobre o desmatamento é que não haverá madeira suficiente para as futuras gerações.						
1	2	3	4	5	6	7
A preservação é importante mesmo que diminua o padrão de vida das pessoas.						
1	2	3	4	5	6	7
Precisamos manter os rios e os lagos limpos visando a proteção do meio ambiente, e não pelo fato de que as pessoas poderão ter um lugar para praticar esportes aquáticos.						
1	2	3	4	5	6	7
Devemos proteger o meio ambiente, mesmo que o bem-estar das pessoas tenha algum prejuízo.						
1	2	3	4	5	6	7
A ciência e a tecnologia irão eventualmente resolver nossos problemas de poluição, superpopulação e escassez dos recursos naturais.						
1	2	3	4	5	6	7
A ciência moderna não será capaz de resolver nossos problemas ambientais.						
1	2	3	4	5	6	7
Não podemos contar com a ciência e a tecnologia para resolver nossos problemas ambientais.						
1	2	3	4	5	6	7
Os seres humanos irão eventualmente aprender como resolver todos os problemas ambientais.						
1	2	3	4	5	6	7
A crença de que os avanços científicos e tecnológicos podem resolver nossos problemas ambientais é completamente errada e tola.						
1	2	3	4	5	6	7
A ciência moderna irá resolver nossos problemas ambientais.						
1	2	3	4	5	6	7
Se as coisas continuarem como estão, viveremos em breve uma enorme catástrofe ecológica.						
1	2	3	4	5	6	7
Quando os seres humanos interferem na natureza isto freqüentemente produz conseqüências desastrosas.						
1	2	3	4	5	6	7
Os seres humanos estão maltratando severamente o meio ambiente.						
1	2	3	4	5	6	7
A idéia de que o equilíbrio da natureza é muito delicado e pode ser perturbado facilmente é muito pessimista.						
1	2	3	4	5	6	7
Não acredito que o meio ambiente venha sendo severamente maltratado pelos seres humanos.						
1	2	3	4	5	6	7

1 Discordo totalmente	2 Discordo	3 Discordo um pouco	4 Neutro	5 Concordo um pouco	6 Concordo	7 Concordo totalmente
As pessoas que dizem que a exploração desmedida da natureza nos levou à beira de uma catástrofe ecológica estão erradas.						
1	2	3	4	5	6	7
Eu preferiria um jardim selvagem e natural a um bem cuidado e organizado.						
1	2	3	4	5	6	7
Os seres humanos não deveriam modificar a natureza, mesmo quando a natureza é desconfortável e inconveniente para nós.						
1	2	3	4	5	6	7
A transformação de terras não utilizadas em áreas para o desenvolvimento da agricultura deveria ser impedida.						
1	2	3	4	5	6	7
Eu preferiria um jardim bem cuidado e organizado a um selvagem e natural.						
1	2	3	4	5	6	7
Quando a natureza é desconfortável e inconveniente para os seres humanos, nós temos todo o direito de mudá-la da forma mais adequada para nós.						
1	2	3	4	5	6	7
As plantas e matos que crescem entre as pedras das calçadas são realmente bagunçados e desorganizados.						
1	2	3	4	5	6	7
Eu não gostaria de ser incomodado para economizar água ou outros recursos naturais.						
1	2	3	4	5	6	7
Em minha vida diária, eu simplesmente não estou interessado em tentar conservar água e/ou energia.						
1	2	3	4	5	6	7
Eu sempre desligo as luzes quando não preciso mais utilizá-las.						
1	2	3	4	5	6	7
Em minha vida diária, tento encontrar formas para reduzir o consumo de água e energia.						
1	2	3	4	5	6	7
Não sou o tipo de pessoa que faz esforços para conservar os recursos naturais.						
1	2	3	4	5	6	7
Sempre que possível, tento preservar os recursos naturais.						
1	2	3	4	5	6	7
Os seres humanos foram feitos para reinar sobre o resto da natureza.						
1	2	3	4	5	6	7
Os seres humanos foram criados ou evoluíram para dominar a natureza.						
1	2	3	4	5	6	7
As plantas e os animais têm tanto direito de existir quanto os seres humanos.						
1	2	3	4	5	6	7
As plantas e os animais existem principalmente para serem usados pelos seres humanos.						
1	2	3	4	5	6	7
Eu não acredito que os seres humanos foram criados ou evoluíram para dominar a natureza.						
1	2	3	4	5	6	7
Os seres humanos não são mais importantes do que nenhuma outra espécie.						
1	2	3	4	5	6	7
Proteger os empregos das pessoas é mais importante do que proteger o meio ambiente.						
1	2	3	4	5	6	7
Os seres humanos não têm o direito de danificar o meio ambiente apenas para adquirir maior crescimento econômico.						
1	2	3	4	5	6	7
Os benefícios gerados pelos modernos produtos de consumo são muito mais importantes do que a poluição resultante da sua produção e uso.						
1	2	3	4	5	6	7
Proteger o meio ambiente é mais importante do que proteger o emprego das pessoas.						
1	2	3	4	5	6	7
Questões ambientais são secundárias ao crescimento econômico.						
1	2	3	4	5	6	7
Proteger o meio ambiente é mais importante do que proteger o crescimento econômico.						
1	2	3	4	5	6	7
A idéia de que a natureza é valiosa por ela mesma é ingênua e errada.						
1	2	3	4	5	6	7
Não acredito que proteger o meio ambiente seja um assunto importante.						
1	2	3	4	5	6	7

1 Discordo totalmente	2 Discordo	3 Discordo um pouco	4 Neutro	5 Concordo um pouco	6 Concordo	7 Concordo totalmente
Entristece-me ver florestas desmatadas para a agricultura.						1 2 3 4 5 6 7
Apesar das nossas capacidades especiais, nós, seres humanos, ainda estamos sujeitos às leis da natureza.						1 2 3 4 5 6 7
A natureza é valiosa por ela mesma.						1 2 3 4 5 6 7
Não fico triste ao ver ambientes naturais destruídos.						1 2 3 4 5 6 7
As famílias deveriam ser incentivadas a terem no máximo dois filhos.						1 2 3 4 5 6 7
Um casal deve ter tantos filhos quanto quiser, contanto que possam mantê-los adequadamente.						1 2 3 4 5 6 7
Nosso governo deveria educar as pessoas com relação à importância de terem no máximo dois filhos.						1 2 3 4 5 6 7
Nunca deveríamos pôr limites no número de filhos que um casal pode ter.						1 2 3 4 5 6 7
Nós estaríamos em melhores condições se o número de pessoas na Terra fosse reduzido dramaticamente.						1 2 3 4 5 6 7
O governo não tem o direito de exigir que os casais limitem o número de filhos que podem ter.						1 2 3 4 5 6 7
No desenvolvimento da nossa sociedade, nós deveríamos nos esforçar para atender as necessidades do presente sem comprometer a possibilidade das gerações futuras atenderem às suas próprias necessidades.						1 2 3 4 5 6 7
Se a economia continuar a crescer, todos se beneficiam.						1 2 3 4 5 6 7
Comportamentos individuais deveriam ser determinados por interesses econômicos pessoais.						1 2 3 4 5 6 7
A melhor medida do progresso é o crescimento econômico.						1 2 3 4 5 6 7
É errado pensar que nós deveríamos esforçar-nos para atender as necessidades do presente sem comprometer a possibilidade das gerações futuras atenderem às suas próprias necessidades é errada.						1 2 3 4 5 6 7
Nós deveríamos tentar melhorar a qualidade de vida respeitando os limites da capacidade do ambiente.						1 2 3 4 5 6 7

### SESSÃO C:

Com que frequência você realizou cada um dos comportamentos listados abaixo no último ano? Por favor, utilize a seguinte escala de respostas.

1 Nunca	2 Raramente	3 Algumas vezes	4 Frequentemente	5 Muito frequentemente
Procurar formas para reutilizar coisas.			1 2 3 4 5	
Reciclar jornais.			1 2 3 4 5	
Reciclar latas e garrafas.			1 2 3 4 5	
Encorajar amigos ou familiares para reciclar.			1 2 3 4 5	
Comprar produtos em embalagens reutilizáveis ou recicláveis.			1 2 3 4 5	
Recolher lixo que não foi seu.			1 2 3 4 5	
Utilizar como adubo restos de alimentos.			1 2 3 4 5	
Conservar gasolina utilizando bicicleta ou caminhando.			1 2 3 4 5	

## SESSÃO D:

Nesta parte do questionário você deve indicar a importância dos valores listados abaixo como um princípio orientador em sua vida, conforme a escala abaixo.

**COMO UM PRINCÍPIO ORIENTADOR EM MINHA VIDA, esse valor é:**

Oposto aos meus valores -1	Nada importante		Importante			Muito importante			De extrema importância
	0	1	2	3	4	5	6	7	
IGUALDADE (oportunidades iguais para todos).	-1	0	1	2	3	4	5	6	7
UMA VIDA EXCITANTE (experiências estimulantes).	-1	0	1	2	3	4	5	6	7
RIQUEZA (posses materiais, dinheiro).	-1	0	1	2	3	4	5	6	7
UM MUNDO EM PAZ (livre de guerras e conflitos).	-1	0	1	2	3	4	5	6	7
AUTODISCIPLINA (auto-restrição, resistência à tentação).	-1	0	1	2	3	4	5	6	7
SEGURANÇA FAMILIAR (proteção para minha família).	-1	0	1	2	3	4	5	6	7
UNIÃO COM A NATUREZA (integração com a natureza).	-1	0	1	2	3	4	5	6	7
UMA VIDA VARIADA (cheia de desejos, novidades e mudanças).	-1	0	1	2	3	4	5	6	7
AUTORIDADE (direito de liderar ou de mandar).	-1	0	1	2	3	4	5	6	7
JUSTIÇA SOCIAL (correção da injustiça, cuidado para com os mais fracos).	-1	0	1	2	3	4	5	6	7
PROTETOR(A) DO AMBIENTE (preservar a natureza).	-1	0	1	2	3	4	5	6	7
INFLUENTE (exercer impacto sobre as pessoas e eventos).	-1	0	1	2	3	4	5	6	7
RESPEITOSO(A) PARA COM OS PAIS E IDOSOS (reverenciar pessoas mais velhas).	-1	0	1	2	3	4	5	6	7
CURIOSO(A) (ter interesse por tudo, espírito exploratório).	-1	0	1	2	3	4	5	6	7
RESPEITOSO(A) PARA COM A TERRA (viver em harmonia com outras espécies).	-1	0	1	2	3	4	5	6	7

**OBRIGADO POR SUA AJUDA NESTA PESQUISA**



## Questionnaire used in Study 3 (New Zealand)

### Could you please tell us what you think ...?

The purpose of this questionnaire is to investigate people's attitudes and opinions on environmental issues. The questionnaire is totally anonymous so no individual's responses can or will be identified. Please answer the following questions honestly and accurately. Read each question carefully, and select the response that best reflects your "gut reaction" to the question or item. There are no right or wrong answers; we are interested in your own personal opinions and perceptions, whatever they are. Please try to answer all the questions, as the success of the research depends on each questionnaire being as fully completed as possible.

#### BACKGROUND ITEMS

How old are you? _____ years.	What is your gender? (circle) 1. Female      2. Male	Are you member of any environmental organisation (e.g., Greenpeace)?    1. Yes      2. No																		
With which religious or philosophical orientation do you most identify? (circle)																				
1. Agnostic      2. Atheistic      3. Buddhist      4. Christian 5. Hindu      6. Jewish      7. Muslim      8. Other: _____ 9. I do not identify with any specific religious or philosophical orientation																				
How religious are you, if at all? (circle)																				
<table style="width:100%; text-align:center;"> <tr> <td>Not religious at all</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Very religious</td> </tr> <tr> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td></td> </tr> </table>			Not religious at all								Very religious	0	1	2	3	4	5	6	7	
Not religious at all								Very religious												
0	1	2	3	4	5	6	7													
Which of the following statements best describes your beliefs in the Bible? (circle)																				
10. The Bible is the actual word of God and should be taken literally, word for word. 11. The Bible is the inspired word of God, but it was written by men and women and contains some human errors. 12. The Bible is an ancient book of history and legends; God had nothing to do with it.																				
In general, when it comes to politics, do you usually think of yourself as... (circle)																				
<table style="width:100%; text-align:center;"> <tr> <td>Extremely liberal</td> <td>Liberal</td> <td>Slightly liberal</td> <td>Moderate</td> <td>Slightly conservative</td> <td>Conservative</td> <td>Extremely conservative</td> </tr> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> </table>			Extremely liberal	Liberal	Slightly liberal	Moderate	Slightly conservative	Conservative	Extremely conservative	1	2	3	4	5	6	7				
Extremely liberal	Liberal	Slightly liberal	Moderate	Slightly conservative	Conservative	Extremely conservative														
1	2	3	4	5	6	7														
What kind of income bracket would you see your family being in: (circle)																				
<table style="width:100%; text-align:center;"> <tr> <td>Lower</td> <td></td> <td></td> <td></td> <td>Middle</td> <td></td> <td></td> <td></td> <td>Upper</td> </tr> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> </tr> </table>			Lower				Middle				Upper	1	2	3	4	5	6	7	8	9
Lower				Middle				Upper												
1	2	3	4	5	6	7	8	9												
Please circle the picture below that best describes your relationship with the natural environment. <i>How interconnected are you with nature?</i>																				

**SECTION A:**

Please rate how threatening the following problems are to you by circling one of the set of numbers that best describes your position according to the following scale.

1 No threat	2 Minimal threat	3 Mild threat	4 Moderate threat	5 Strong threat	6 Very strong threat	7 Extreme threat
Water pollution	1 2 3 4 5 6 7	Radioactivity in building materials (e.g., radon gas)	1 2 3 4 5 6 7			
Storms (e.g., lightning, hurricanes, tornados, snow)	1 2 3 4 5 6 7	Change to the ozone layer caused by pollution	1 2 3 4 5 6 7			
Pollution from cars	1 2 3 4 5 6 7	Earthquakes	1 2 3 4 5 6 7			
Pollution from factories	1 2 3 4 5 6 7	Soil erosion	1 2 3 4 5 6 7			
Pollution from burning rubbish	1 2 3 4 5 6 7	Impure drinking water	1 2 3 4 5 6 7			
Smoking in public buildings	1 2 3 4 5 6 7	Large fires	1 2 3 4 5 6 7			
Acid rain	1 2 3 4 5 6 7	Floods or tidal waves	1 2 3 4 5 6 7			
Pollution from office equipment (e.g., ozone from photocopiers)	1 2 3 4 5 6 7	Germs or micro-organisms	1 2 3 4 5 6 7			
Number of people (e.g., crowding, population explosion)	1 2 3 4 5 6 7	Radioactive fallout	1 2 3 4 5 6 7			
Fluorescent lighting	1 2 3 4 5 6 7	Fumes or fibers from synthetic materials (e.g., asbestos, carpets, plastics)	1 2 3 4 5 6 7			
Water shortage (e.g., drought, water depletion)	1 2 3 4 5 6 7	Chemical dumps	1 2 3 4 5 6 7			
Noise	1 2 3 4 5 6 7	Video screen emissions	1 2 3 4 5 6 7			
Visual pollution (e.g., billboards, ugly buildings, litter)	1 2 3 4 5 6 7	Pesticides and herbicides	1 2 3 4 5 6 7			

Considering all environmental risks presented above please respond:

<p>How would you estimate the likelihood of harm from these environmental risks to your <u>community</u>?</p> <p>Not likely 1      2      3      4      5      6      7 Highly likely</p>
<p>How would you estimate the likelihood of harm from these environmental risks <u>worldwide</u>?</p> <p>Not likely 1      2      3      4      5      6      7 Highly likely</p>
<p>How would you estimate <u>your</u> risk of health damage caused by these environmental risks?</p> <p>No risk 1      2      3      4      5      6      7 Extreme risk</p>
<p><b>Compared to other students at your university – same gender as you –</b> how would you estimate your risk of health damage caused by these environmental risks?</p> <p>Much below average 1      2      3      4      5      6      7 Much above average</p>

## SECTION B:

Please indicate the extent to which you agree or disagree with each of the following statements by circling one of the set of numbers following each statement that best reflects your degree of agreement or disagreement according to the following scale.

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree					
I really like going on trips into the countryside, for example to forests or fields.					1	2	3	4	5	6	7
I find it very boring being out in wilderness areas.					1	2	3	4	5	6	7
Being out in nature is a great stress reducer for me.					1	2	3	4	5	6	7
I have a sense of well-being in the silence of nature.					1	2	3	4	5	6	7
I find it more interesting in a shopping mall than out in the forest looking at trees and birds.					1	2	3	4	5	6	7
I think spending time in nature is boring.					1	2	3	4	5	6	7
Governments should control the rate at which raw materials are used to ensure that they last as long as possible.					1	2	3	4	5	6	7
Controls should be placed on industry to protect the environment from pollution, even if it means things will cost more.					1	2	3	4	5	6	7
People in developed societies are going to have to adopt a more conserving life-style in the future.					1	2	3	4	5	6	7
Industries should be able to use raw materials rather than recycled ones if this leads to lower prices and costs, even if it means the raw materials will eventually be used up.					1	2	3	4	5	6	7
I don't think people in developed societies are going to have to adopt a more conserving life-style in the future.					1	2	3	4	5	6	7
I am opposed to governments controlling and regulating the way raw materials are used in order to try and make them last longer.					1	2	3	4	5	6	7
I would like to join and actively participate in an environmentalist group.					1	2	3	4	5	6	7
I don't think I would help to raise funds for environmental protection.					1	2	3	4	5	6	7
I would NOT get involved in an environmentalist organization.					1	2	3	4	5	6	7
Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort.					1	2	3	4	5	6	7
I would not want to donate money to support an environmentalist cause.					1	2	3	4	5	6	7
I would like to support an environmental organization.					1	2	3	4	5	6	7
One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy water sports.					1	2	3	4	5	6	7
Nature is important because of what it can contribute to the pleasure and welfare of humans.					1	2	3	4	5	6	7
The thing that concerns me most about deforestation is that there will not be enough lumber for future generations.					1	2	3	4	5	6	7
Conservation is important even if it lowers peoples' standard of living.					1	2	3	4	5	6	7
We need to keep rivers and lakes clean in order to protect the environment, and NOT as places for people to enjoy water sports.					1	2	3	4	5	6	7
We should protect the environment even if it means peoples' welfare will suffer.					1	2	3	4	5	6	7

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
Science and technology will eventually solve our problems with pollution, overpopulation, and diminishing resources.						
1	2	3	4	5	6	7
Modern science will NOT be able to solve our environmental problems.						
1	2	3	4	5	6	7
We cannot keep counting on science and technology to solve our environmental problems.						
1	2	3	4	5	6	7
Humans will eventually learn how to solve all environmental problems.						
1	2	3	4	5	6	7
The belief that advances in science and technology can solve our environmental problems is completely wrong and misguided.						
1	2	3	4	5	6	7
Modern science will solve our environmental problems.						
1	2	3	4	5	6	7
If things continue on their present course, we will soon experience a major ecological catastrophe.						
1	2	3	4	5	6	7
When humans interfere with nature it often produces disastrous consequences.						
1	2	3	4	5	6	7
Humans are severely abusing the environment.						
1	2	3	4	5	6	7
The idea that the balance of nature is terribly delicate and easily upset is much too pessimistic.						
1	2	3	4	5	6	7
I do not believe that the environment has been severely abused by humans.						
1	2	3	4	5	6	7
People who say that the unrelenting exploitation of nature has driven us to the brink of ecological collapse are wrong.						
1	2	3	4	5	6	7
I'd prefer a garden that is wild and natural to a well groomed and ordered one.						
1	2	3	4	5	6	7
Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us.						
1	2	3	4	5	6	7
Turning new unused land over to cultivation and agricultural development should be stopped.						
1	2	3	4	5	6	7
I'd much prefer a garden that is well groomed and ordered to a wild and natural one.						
1	2	3	4	5	6	7
When nature is uncomfortable and inconvenient for humans we have every right to change and remake it to suit ourselves.						
1	2	3	4	5	6	7
Grass and weeds growing between pavement stones really looks untidy.						
1	2	3	4	5	6	7
I could not be bothered to save water or other natural resources.						
1	2	3	4	5	6	7
In my daily life I'm just not interested in trying to conserve water and/or power.						
1	2	3	4	5	6	7
I always switch the light off when I don't need it on any more.						
1	2	3	4	5	6	7
In my daily life I try to find ways to conserve water or power.						
1	2	3	4	5	6	7
I am NOT the kind of person who makes efforts to conserve natural resources.						
1	2	3	4	5	6	7
Whenever possible, I try to save natural resources.						
1	2	3	4	5	6	7
Humans were meant to rule over the rest of nature.						
1	2	3	4	5	6	7
Human beings were created or evolved to dominate the rest of nature.						
1	2	3	4	5	6	7
Plants and animals have as much right as humans to exist.						
1	2	3	4	5	6	7
Plants and animals exist primarily to be used by humans.						
1	2	3	4	5	6	7

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Unsure/ neutral	5 Somewhat agree	6 Agree	7 Strongly agree
I DO NOT believe humans were created or evolved to dominate the rest of nature.						
1	2	3	4	5	6	7
Humans are no more important than any other species.						
1	2	3	4	5	6	7
Protecting peoples' jobs is more important than protecting the environment.						
1	2	3	4	5	6	7
Humans do NOT have the right to damage the environment just to get greater economic growth.						
1	2	3	4	5	6	7
The benefits of modern consumer products are more important than the pollution that results from their production and use.						
1	2	3	4	5	6	7
Protecting the environment is more important than protecting peoples' jobs.						
1	2	3	4	5	6	7
The question of the environment is secondary to economic growth.						
1	2	3	4	5	6	7
Protecting the environment is more important than protecting economic growth.						
1	2	3	4	5	6	7
The idea that nature is valuable for its own sake is naïve and wrong.						
1	2	3	4	5	6	7
I do not believe protecting the environment is an important issue.						
1	2	3	4	5	6	7
It makes me sad to see forests cleared for agriculture.						
1	2	3	4	5	6	7
Despite our special abilities humans are still subject to the laws of nature.						
1	2	3	4	5	6	7
Nature is valuable for its own sake.						
1	2	3	4	5	6	7
It does NOT make me sad to see natural environments destroyed.						
1	2	3	4	5	6	7
Families should be encouraged to limit themselves to two children or less.						
1	2	3	4	5	6	7
A married couple should have as many children as they wish, as long as they can adequately provide for them.						
1	2	3	4	5	6	7
Our government should educate people concerning the importance of having two children or less.						
1	2	3	4	5	6	7
We should never put limits on the number of children a couple can have.						
1	2	3	4	5	6	7
We would be better off if we dramatically reduced the number of people on the Earth.						
1	2	3	4	5	6	7
The government has no right to require married couples to limit the number of children they can have.						
1	2	3	4	5	6	7
In the development of our society we must strive to meet the needs of the present without compromising the ability of future generations to meet their own needs.						
1	2	3	4	5	6	7
If the economy continues to grow, everyone benefits.						
1	2	3	4	5	6	7
Individual behaviour should be determined by economic self-interest.						
1	2	3	4	5	6	7
The best measure of progress is economic.						
1	2	3	4	5	6	7
The idea that we should try to meet the needs of the current generation without undermining the ability of future generations to meet their own needs is wrong.						
1	2	3	4	5	6	7
We should try to improve the quality of life while living within the capacity of the environment.						
1	2	3	4	5	6	7

**SECTION C:**

How often have you performed each of the following behaviours in the last year? Please use the following scale.

<b>1 Never</b>	<b>2 Rarely</b>	<b>3 Sometimes</b>	<b>4 Often</b>	<b>5 Very often</b>	
Looked for ways to reuse things.	1	2	3	4	5
Recycled newspapers.	1	2	3	4	5
Recycled cans or bottles.	1	2	3	4	5
Encouraged friends or family to recycle.	1	2	3	4	5
Purchased products in reusable or recyclable containers.	1	2	3	4	5
Picked up litter that was not your own.	1	2	3	4	5
Composted food scraps.	1	2	3	4	5
Conserved gasoline (petrol) by walking or bicycling.	1	2	3	4	5

**SECTION D:**

In this part of the questionnaire your task is to rate how important each value is for you as a guiding principle in your life. Use the rating scale below.

***AS A GUIDING PRINCIPLE IN MY LIFE, this value is:***

<b>Opposed to my values -1</b>	<b>Not important 0</b>	<b>1</b>	<b>2</b>	<b>Important 3</b>	<b>4</b>	<b>5</b>	<b>Very important 6</b>	<b>Of supreme importance 7</b>	
EQUALITY (equal opportunity for all).	-1	0	1	2	3	4	5	6	7
AN EXCITING LIFE (stimulating experiences).	-1	0	1	2	3	4	5	6	7
WEALTH (material possessions, money).	-1	0	1	2	3	4	5	6	7
A WORLD AT PEACE (free of war and conflict).	-1	0	1	2	3	4	5	6	7
SELF-DISCIPLINE (self-restraint, resistance to temptation).	-1	0	1	2	3	4	5	6	7
FAMILY SECURITY (safety for loved ones).	-1	0	1	2	3	4	5	6	7
UNITY WITH NATURE (fitting into nature).	-1	0	1	2	3	4	5	6	7
A VARIED LIFE (filled with challenge, novelty, and change).	-1	0	1	2	3	4	5	6	7
AUTHORITY (the right to lead or command).	-1	0	1	2	3	4	5	6	7
SOCIAL JUSTICE (correcting injustice, care for the weak).	-1	0	1	2	3	4	5	6	7
PROTECTING THE ENVIRONMENT (preserving nature).	-1	0	1	2	3	4	5	6	7
INFLUENTIAL (having an impact on people and events).	-1	0	1	2	3	4	5	6	7
HONORING PARENTS AND ELDERS (showing respect).	-1	0	1	2	3	4	5	6	7
CURIOUS (interested in everything, exploring).	-1	0	1	2	3	4	5	6	7
RESPECTING THE EARTH (harmony with other species).	-1	0	1	2	3	4	5	6	7

**THANK YOU FOR HELPING WITH THIS RESEARCH**

### Questionnaire used in Study 3 (South Africa)

The English version of the questionnaire administered in South Africa is the same as the version used in New Zealand. The Afrikaans version of the questionnaire is presented below.

#### Sê asseblief vir ons wat u dink...?

Die doel van hierdie vraelys is om mense se houdings en opinies oor omgewingskwessies te ondersoek. Hierdie vraelys word totaal anoniem ingevul sodat geen individu se response geïdentifiseer kan of sal word nie. Beantwoord asseblief die vrae eerlik en noukeurig. Lees elke vraag versigtig en selekteer die respons wat u eerste reaksie op die vraag of item die beste weergee. Daar is geen regte of verkeerde antwoorde nie; ons stel belang in u persoonlike opinies en persepsies, wat dit ook al mag wees. Probeer asseblief om al die vrae te beantwoord aangesien die sukses van die navorsing afhang van die volledige beantwoording van elke vraelys.

#### AGTERGRONDITEMS

Hoe oud is u?  _____ jaar.	U geslag? Omkring asb.  1. Manlik      2. Vroulik	Is u 'n lid van enige omgewingsorganisasie (bv Greenpeace)? 1. Ja      2. Nee										
Hoe sou u u etniese affiliasie of primêre etniese identifikasie klassifiseer? (Omkring)												
1. Swart      2. Chinees      3. Kleurling      4. Indiër 5. Blanke Afrikaanssprekende      6. Blanke Engelssprekende 7. Nie een van bogenoemde nie: Indien hierdie antwoord van toepassing is dui asseblief aan in die gegewe spasie aan watter groep u volgens u behoort .....												
Met watter religieuse of filosofiese oriëntasie identifiseer u die meeste (omkring)												
1. Agnosties      2. Ateis      3. Boeddhis      4. Christen 5. Hindoe      6. Joods      7. Moslem      8. Ander 9. Ek identifiseer nie met enige spesifieke religieuse of filosofiese oriëntasie nie												
Indien u godsdienstig is, hoe godsdienstig is u? (omkring)												
<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">Glad nie godsdienstig nie</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> <td style="text-align: center;">7</td> <td style="text-align: center;">Baie godsdienstig</td> </tr> </table>			Glad nie godsdienstig nie	0	1	2	3	4	5	6	7	Baie godsdienstig
Glad nie godsdienstig nie	0	1	2	3	4	5	6	7	Baie godsdienstig			
Watter een van die volgende bewerings beskryf u oortuigings oor die Bybel die beste? (omkring)												
1. Die Bybel is die wesenlike woord van God en behoort word vir woord letterlik geneem te word. 2. Die Bybel is die geïnspireerde woord van God, maar dit is deur mans en vroue geskryf en bevat menslike foute. 3. Die Bybel is die antieke boek van geskiedenis en legendes; God het niks daarmee te doen nie.												

Oor die algemeen beskou, hoe sien u uself met betrekking tot die politiek? (omkring)

Baie liberaal 1	Liberaal 2	Ietwat liberaal 3	Matig 4	Ietwat konserwatief 5	Konserwatief 6	Baie konserwatief 7
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In watter inkomstekategorie sou u u familie plaas (omkring)

Laag 1	2	3	4	Middel 5	6	7	8	Hoog 9
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Omkring asseblief die prentjie hieronder wat u verhouding met die natuurlike omgewing die beste beskryf.

### AFDELING A:

Beoordeel asseblief hoe bedreigend die volgende probleme vir u is deur die nommer wat u posisie op die skaal hieronder die beste beskryf, te omkring.

1 Geen bedreiging	2 Minimale bedreiging	3 Ietwat bedreigend	4 Matig bedreigend	5 Sterk bedreigend	6 Baie sterk bedreigend	7 Uiters bedreigend	
Waterbesoedeling	1 2 3 4 5 6 7	Radioaktiwiteit in boumateriale (bv radongas)	1 2 3 4 5 6 7	Storms (bv weerlig, orkane, tornado's, sneeu)	1 2 3 4 5 6 7	Veranderinge in die osoonlaag veroorsaak deur besoedeling	1 2 3 4 5 6 7
Besoedeling veroorsaak deur motors	1 2 3 4 5 6 7	Aardbewings	1 2 3 4 5 6 7	Besoedeling veroorsaak deur fabrieke	1 2 3 4 5 6 7	Gronderosie	1 2 3 4 5 6 7
Besoedeling veroorsaak deur brandende rommel	1 2 3 4 5 6 7	Onsuiwer drinkwater	1 2 3 4 5 6 7	Mense wat in openbare geboue rook	1 2 3 4 5 6 7	Groot vure	1 2 3 4 5 6 7
Suurreën	1 2 3 4 5 6 7	Vloede of getygolwe	1 2 3 4 5 6 7	Besoedeling veroorsaak deur kantoortoerusting (bv osoon van fotokopieermasjiene)	1 2 3 4 5 6 7	Kieme of mikro-organismes	1 2 3 4 5 6 7
Aantal mense (bv die massas, bevolkingsontploffing)	1 2 3 4 5 6 7	Radioaktiewe neerslag	1 2 3 4 5 6 7	Fluoorverligting	1 2 3 4 5 6 7	Dampe of vesels van sintetiese materiale (bv asbes, tapyte, plastiek)	1 2 3 4 5 6 7
Watertekort (bv droogte, watertafeluitputting)	1 2 3 4 5 6 7	Chemiese storting	1 2 3 4 5 6 7	Geraas	1 2 3 4 5 6 7	Videoskermuitstraling	1 2 3 4 5 6 7
Visuele besoedeling (bv advertensieborde, lelike geboue, rommel).	1 2 3 4 5 6 7	Plaaagdoders en onkruidmiddels	1 2 3 4 5 6 7				1 2 3 4 5 6 7



Reageer asseblief op die volgende met inagneming van al die bogenoemde omgewingsrisiko's:

Hoe waarskynlik is dit volgens u dat hierdie omgewingsrisiko's skade aan u <u>gemeenskap</u> kan aanrig? Onwaarskynlik 1      2      3      4      5      6      7 Hoogs waarskynlik
Hoe waarskynlik is dit volgens u dat hierdie omgewingsrisiko's <u>wêreldwyd</u> skade kan aanrig? Onwaarskynlik 1      2      3      4      5      6      7 Hoogs waarskynlik
Hoe waarskynlik is dit volgens u dat hierdie omgewingsrisiko's u <u>eie</u> gesondheid kan benadeel? Geen risiko 1      2      3      4      5      6      7 Uiterste risiko
<b>Wanneer u uself met ander studente van dieselfde geslag by u universiteit vergelyk</b> – hoe groot reken u is die risiko van skade aan u gesondheid deur hierdie omgewingsrisiko's? Ver onder die gemiddeld 1      2      3      4      5      6      7 Ver bo die gemiddeld

### ADELING B:

Dui asseblief aan of u saamstem of nie saamstem nie met elk van die volgende bewerings. Dui u keuse aan deur een van die nommers agter elke bewering wat die beste aandui in watter mate u saamstem of nie saamstem nie, volgens die skale hieronder te omkring.

1 Verskil sterk	2 Verskil	3 Verskil ietwat	4 Onseker/ neutraal	5 Stem ietwat saam	6 Stem saam	7 Stem volmondig saam					
Ek hou werklik daarvan om op uitstappies in die platteland te gaan, bv na woude of oop veld.					1	2	3	4	5	6	7
Ek vind dit baie vervelig in die ongerepte natuur.					1	2	3	4	5	6	7
Om in die natuur te verkeer verminder my spanning/stres.					1	2	3	4	5	6	7
Ek ervaar 'n gevoel van welsyn in die stilte van die natuur.					1	2	3	4	5	6	7
Ek vind dit meer interessant om in 'n winkelsentrum te wees as om in 'n woud na bome en voëls te kyk.					1	2	3	4	5	6	7
Ek dink dit is vervelig om tyd in die natuur deur te bring.					1	2	3	4	5	6	7
Regerings behoort die tempo te beheer waarteen rou materiale gebruik word om te verseker dat dit so lank moontlik kan hou.					1	2	3	4	5	6	7
Beheermaatreëls behoort op die industrie toegepas te word om die omgewing van besoedeling te beskerm, selfs indien dit beteken dat produkte duurder is.					1	2	3	4	5	6	7
Mense in ontwikkelde samelewings sal in die toekoms 'n meer konserverende lewenswyse moet handhaaf.					1	2	3	4	5	6	7
Industrieë behoort eerder rou materiale as herwinde materiale te gebruik indien dit tot laer pryse en koste sal lei, al beteken dit dat rou materiale uiteindelik opgebruik sal word.					1	2	3	4	5	6	7
Ek dink nie dat mense in ontwikkelde samelewings in die toekoms 'n meer konserverende lewenstyl hoef te handhaaf nie.					1	2	3	4	5	6	7

1 Verskil sterk	2 Verskil	3 Verskil ietwat	4 Onseker/ neutraal	5 Stem ietwat saam	6 Stem saam	7 Stem volmondig saam					
Ek is gekant daarteen dat regerings die manier waarop rou materiale gebruik en beheer word reguleer om te probeer om dit langer te laat hou.					1	2	3	4	5	6	7
Ek sou graag by 'n omgewingsbewussynsgroep wou aansluit en aktief deelneem.					1	2	3	4	5	6	7
Ek dink nie dat ek sal help om fondse vir omgewingsbewaring in te samel nie.					1	2	3	4	5	6	7
Ek sal NIE by 'n omgewingsbewussynsorganisasie betrokke raak NIE.					1	2	3	4	5	6	7
Omgewingsbewaring kos baie geld. Ek is gewillig om met 'n fondsinsamelingspoging vir hierdie doel te help.					1	2	3	4	5	6	7
Ek sal nie geld wil skenk om 'n omgewingsbewaringsaak te ondersteun nie.					1	2	3	4	5	6	7
Ek sal graag 'n omgewingsbewussynsorganisasie wil ondersteun.					1	2	3	4	5	6	7
Een van die belangrikste redes om mere en riviere skoon te hou is sodat mense 'n plek het om watersport te geniet.					1	2	3	4	5	6	7
Die natuur is belangrik omdat dit tot die plesier en welsyn van mense kan bydra.					1	2	3	4	5	6	7
Wat my die meeste van ontbossing kwel, is dat daar nie genoeg timmerhout vir toekomstige geslagte sal wees nie.					1	2	3	4	5	6	7
Bewaring van die omgewing is belangrik selfs indien dit tot 'n verlaging van die lewenstandaard van mense kan lei.					1	2	3	4	5	6	7
Ons moet riviere en mere skoon hou om die omgewing te beskerm en NIE net as plekke vir mense om watersport te geniet beskou NIE.					1	2	3	4	5	6	7
Ons moet die omgewing beskerm selfs al is dit tot nadeel van mense se welsyn.					1	2	3	4	5	6	7
Wetenskap en tegnologie sal uiteindelik ons probleme met besoedeling, oorbevolking en kwynende hulpbronne oplos.					1	2	3	4	5	6	7
Die moderne wetenskap sal NIE ons omgewingsprobleme kan oplos NIE.					1	2	3	4	5	6	7
Ons kan nie aanhou om op wetenskap en tegnologie staat te maak om ons omgewingsprobleme op te los nie.					1	2	3	4	5	6	7
Die mensdom sal uiteindelik leer om alle omgewingsprobleme op te los.					1	2	3	4	5	6	7
Die mening dat vooruitgang in wetenskap en tegnologie ons omgewingsprobleme kan oplos is heeltemal verkeerd en misleidend.					1	2	3	4	5	6	7
Die moderne wetenskap sal ons omgewingsprobleme oplos.					1	2	3	4	5	6	7
Indien dinge soos tot op hede aangaan, sal ons binnekort 'n groot ekologiese katastrofe ervaar.					1	2	3	4	5	6	7
Wanneer die mensdom met die natuur inmeng het dit dikwels rampspoedige gevolge.					1	2	3	4	5	6	7
Die mensdom misbruik en doen die omgewing geweldig skade aan.					1	2	3	4	5	6	7
Die opvatting dat die balans van die natuur baie delikaat is en dat die ewewig maklik versteur kan word, is te pessimisties.					1	2	3	4	5	6	7
Ek glo nie dat die omgewing erg deur die mensdom misbruik en beskadig word nie.					1	2	3	4	5	6	7
Mense wat sê dat die meedoënlose uitbuiting van die natuur ons tot op die rand van ekologiese ineenstorting gedryf het, is verkeerd.					1	2	3	4	5	6	7

1 Verskil sterk	2 Verskil	3 Verskil ietwat	4 Onseker/ neutraal	5 Stem ietwat saam	6 Stem saam	7 Stem volmondig saam					
Ek verkies 'n ongerepte en natuurlike tuin eerder as 'n goed versorgde en geordende een.					1	2	3	4	5	6	7
Die mensdom behoort nie met die natuur te peuter nie, selfs al ervaar ons die natuur as ongemaklik of ongerieflik.					1	2	3	4	5	6	7
Bewerking en landboukundige ontwikkeling van nuwe ongebruikte grond behoort gestop te word.					1	2	3	4	5	6	7
Ek sal 'n tuin wat goed versorg en geordend is ver bo 'n ongerepte en natuurlike een verkies.					1	2	3	4	5	6	7
Wanneer die natuur ongemaklik en ongerieflik vir mense is behoort ons die reg te hê om dit te verander om ons te pas.					1	2	3	4	5	6	7
Gras en onkruid tussen die sypaadjestene lyk werklik onnet.					1	2	3	4	5	6	7
Ek stel nie daarin belang om water of ander natuurlike hulpbronne te bespaar nie					1	2	3	4	5	6	7
In my daaglikse lewe is ek net nie daarin geïnteresseerd om water of krag te bespaar nie.					1	2	3	4	5	6	7
Ek skakel altyd die lig af wanneer ek dit nie meer nodig het nie.					1	2	3	4	5	6	7
In my daaglikse lewe probeer ek maniere vind om water of krag te bespaar.					1	2	3	4	5	6	7
Ek is NIE die tipe mens wat pogings aanwend om natuurlike hulpbronne te bewaar NIE.					1	2	3	4	5	6	7
Wanneer dit ook al moontlik is, probeer ek natuurlike hulpbronne bewaar.					1	2	3	4	5	6	7
Die mensdom was veronderstel om oor die res van die natuur te heers.					1	2	3	4	5	6	7
Die mensdom is geskep en het ontwikkel om die res van die natuur te domineer.					1	2	3	4	5	6	7
Plante en diere het net soveel bestaansreg as mense.					1	2	3	4	5	6	7
Plante en diere bestaan primêr om deur mense gebruik te word.					1	2	3	4	5	6	7
Ek glo NIE dat mense geskep is, of ontwikkel het, om die res van die natuur te domineer NIE.					1	2	3	4	5	6	7
Die mensdom is hoegenaamd nie belangriker as enige ander spesie nie.					1	2	3	4	5	6	7
Beskerming van mense se werksgeleenthede is belangriker as die bewaring van die natuur.					1	2	3	4	5	6	7
Mense het NIE die reg om die omgewing te misbruik vir beter ekonomiese groei NIE.					1	2	3	4	5	6	7
Die voordele van moderne verbruikersprodukte is belangriker as die besoedeling wat volg op hul produksie en gebruik.					1	2	3	4	5	6	7
Bewaring van die omgewing is belangriker as die beskerming van mense se werksgeleenthede.					1	2	3	4	5	6	7
Die vraagstuk oor die omgewing is sekondêr tot ekonomiese groei.					1	2	3	4	5	6	7
Bewaring van die omgewing is belangriker as die beskerming van ekonomiese groei.					1	2	3	4	5	6	7
Die idee dat die natuur op sigself waardevol is, is naïef en verkeerd.					1	2	3	4	5	6	7
Ek glo nie dat die bewaring van die omgewing 'n belangrike kwessie is nie.					1	2	3	4	5	6	7
Dit maak my ongelukkig om te sien hoe die woude vir landboudoeleindes uitgeroei word.					1	2	3	4	5	6	7
Ongeag ons spesiale vermoëns is mense steeds onderworpe aan die wette van die natuur.					1	2	3	4	5	6	7
Die natuur is op sigself waardevol.					1	2	3	4	5	6	7

1 Verskil sterk	2 Verskil	3 Verskil ietwat	4 Onseker/ neutraal	5 Stem ietwat saam	6 Stem saam	7 Stem volmondig saam					
Dit maak my NIE ongelukkig om te sien hoe die natuurlike omgewing vernietig word NIE.					1	2	3	4	5	6	7
Gesinne behoort aangemoedig te word om twee of minder kinders te hê.					1	2	3	4	5	6	7
'n Getroude paartjie behoort soveel kinders te hê as wat hul wil, solank hul voldoende vir hulle kan voorsien.					1	2	3	4	5	6	7
Ons regering behoort mense op te voed oor die noodsaaklikheid daarvan om net twee of minder kinders te hê.					1	2	3	4	5	6	7
Ons behoort nooit beperkings te stel op die aantal kinders wat 'n paartjie kan hê nie.					1	2	3	4	5	6	7
Ons sal beter daaraan toe wees indien ons die aantal mense op aarde dramaties verminder.					1	2	3	4	5	6	7
Die regering het geen reg om van getroude paartjies te vereis om die aantal kinders wat hulle kan hê, te beperk nie.					1	2	3	4	5	6	7
In die ontwikkeling van ons samelewing moet ons daarna streef om die behoeftes van die huidige geslag te vervul sonder om die vermoë van toekomstige geslagte om in hul eie behoeftes te voorsien in die wiede te ry.					1	2	3	4	5	6	7
Indien die ekonomie steeds aanhou groei behoort almal daarby baat te vind.					1	2	3	4	5	6	7
Individuele gedrag behoort deur ekonomiese selfbelang bepaal te word.					1	2	3	4	5	6	7
Die beste maatstaf waaraan vooruitgang gemeet kan word is die ekonomie.					1	2	3	4	5	6	7
Die opvatting dat ons moet probeer om die behoeftes van die huidige geslag te vervul sonder om die vermoë van die toekomstige geslagte om hul eie behoeftes te vervul in die wiede te ry, is verkeerd.					1	2	3	4	5	6	7
Ons behoort die kwaliteit van lewe te verbeter terwyl ons binne die kapasiteit van die omgewing leef.					1	2	3	4	5	6	7

### AFDELING C:

Hoe dikwels het u in die afgelope jaar een van die volgende gedragswyses geopenbaar?

1 Nooit	2 Selde	3 Soms	4 Dikwels	5 Baie dikwels			
Kyk na maniere om dinge te hergebruik.			1	2	3	4	5
Herwin koerante vir gebruik.			1	2	3	4	5
Herwin blikke of bottels vir gebruik.			1	2	3	4	5
Moedig vriende en familie aan om produkte te herwin en te hergebruik.			1	2	3	4	5
Koop produkte in houers wat weer gebruik kan word.			1	2	3	4	5
Tel rommel op wat nie aan jou behoort nie.			1	2	3	4	5
Maak kompos van oorskietkos			1	2	3	4	5
Bewaar brandstof deur te loop of fiets te ry.			1	2	3	4	5

## AFDELING D:

In hierdie deel van die vraelys moet u asseblief die waarde vir elke leidende beginsel in u lewe aandui. Gebruik die skaal hieronder.

***AS 'N LEIDENDE BEGINSEL IN MY LEWE, is hierdie waarde:***

Teen my waardes -1	Nie belangrik nie 0	1	Belangrik 2	3	4	Baie belangrik 5	6	Van uiterste belang 7	
GELYKHEID (gelyke geleenthede vir almal).	-1	0	1	2	3	4	5	6	7
'N OPWINDENDE LEWE (stimulerende ervaringe).	-1	0	1	2	3	4	5	6	7
WELGESTELDHEID (materiële besittings, geld).	-1	0	1	2	3	4	5	6	7
'N VREEDSAME WÊRELD (vry van oorlog en konflik).	-1	0	1	2	3	4	5	6	7
SELFDISCIPLINE (selfbeheersing, weerstand teen versoeking).	-1	0	1	2	3	4	5	6	7
FAMILIESEKURITEIT (veiligheid van geliefdes).	-1	0	1	2	3	4	5	6	7
EENHEID MET DIE NATUUR (inpas by die natuur).	-1	0	1	2	3	4	5	6	7
'N RYK GESKAKEERDE LEWE (gevol met uitdagings, nuwighede en verandering).	-1	0	1	2	3	4	5	6	7
GESAG/OUTORITEIT (die reg om te lei of in bevel te wees).	-1	0	1	2	3	4	5	6	7
SOSIALE REGVERDIGHEID ('n onreg regstel, omsien na swakkeres).	-1	0	1	2	3	4	5	6	7
BESKERMING VAN DIE OMGEWING (bewaring van die natuur).	-1	0	1	2	3	4	5	6	7
INVLOEDRYK (' impak hê op ander mense se lewens en gebeurtenisse).	-1	0	1	2	3	4	5	6	7
EER BETOON AAN OUERS EN OUDSTES VAN DIE STAM (respek betoon).	-1	0	1	2	3	4	5	6	7
NUUSKIERIG (geïnteresseerd in alles, ondersoekend).	-1	0	1	2	3	4	5	6	7
RESPEKTEER DIE AARDE (in harmonie met ander spesies).	-1	0	1	2	3	4	5	6	7

*DANKIE VIR U HULP MET HIERDIE NAVORSING*