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ENVIRONMENTAL VALUES AND LANDSCAPE ARCHITECTURE:  
A NEW ECOLOGICAL PARADIGM STUDY

by

Emmet J. Pruss

A thesis submitted in partial fulfillment  
of the requirements for the degree

of

MASTER OF SCIENCE

in

Bioregional Planning

Approved:

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UTAH STATE UNIVERSITY  
Logan, Utah

2017

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## ABSTRACT

Environmental Values and Landscape Architecture:

A New Ecological Paradigm Study

by

Emmet J. Pruss, Master of Science

Utah State University, 2017

Major Professor: Dr. Barty Warren-Kretzschmar  
Department: Landscape Architecture and Environmental Planning

In recent decades, landscape design theory has been affected by an increase in pro-environmental values. Currently, concepts of ‘sustainability’ and ‘ecosystem services’ exert a strong influence. These concepts involve sustaining current human behaviors within the constraints of ecological limits and maintaining or enhancing the goods and services that humans receive from ecosystems, respectively. In this way, they are most characteristic of anthropocentric environmental worldviews with high degrees of concern for the instrumental values of ecosystems, which are indicative of shallow ecology.

Previous researchers have advanced theoretical characterizations of the environmental values of landscape architects in terms of environmental ethics. However, as of yet, no statistics-based model has been developed for this purpose. In order to advance such a model, and in the effort to further characterize the environmental values

of landscape architects, two studies were performed. Both utilized data collected with the New Ecological Paradigm (revised-NEP) survey.

In the first study, a Shallow v. Deep Worldview model was used to characterize revised-NEP survey responses of landscape architecture students and alumni practitioners from Utah State University (USU) in terms of shallow or deep ecology. The results indicate that the groups exhibited essentially anthropocentric environmental values, which were characteristic of shallow ecology worldviews.

In the second study, the revised-NEP survey was used to assess the environmental worldviews of general education and landscape architecture students at USU. The results indicate that the landscape architecture students exhibited greater pro-environmental worldviews, which were correlated to differences in political orientation between the groups.

Overall, the results of the two studies support the notions that the study or practice of landscape architecture is correlated to greater pro-environmental values than are common for general higher education students, and that, in general, current landscape architecture students and practitioners exhibit environmental values that are characteristic of ecologically-concerned, yet essentially anthropocentric, shallow ecology worldviews.

(89 pages)

## PUBLIC ABSTRACT

Environmental Values and Landscape Architecture:

A New Ecological Paradigm Study

Emmet J. Pruss

In recent decades, landscape design theory has been affected by an increase in pro-environmental values. Largely, this trend has been associated with notions of ‘sustainability’ and ‘ecosystem services.’ These notions involve sustaining current human behaviors within the constraints of ecological limits and maximizing the benefits that humans receive from ecosystems, respectively. In this way, they involve high evaluations of the instrumental values of ecosystems, yet remain predominantly anthropocentric. As such, they are characteristic of shallow ecology worldview.

In order to assess whether the pro-environmental, yet essentially anthropocentric values involved with modern landscape architecture theory are reflected in the environmental worldviews of landscape architecture students and practitioners, two studies were performed using the New Ecological Paradigm survey. In the first study, the responses of landscape architecture students and practitioners were examined for indications of anthropocentric or nonanthropocentric environmental values. In the second study, the responses of landscape architecture students were compared to those of general education students. The results of the two studies support the theories that landscape architecture students and practitioners exhibit predominately anthropocentric worldviews,

which are distinctly more pro-environmental than those of the general American population.

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I would also like to thank my family for their consistent support of my past and present academic endeavors and interests.

Emmet J. Pruss



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## CHAPTER 1

### INTRODUCTION

Landscape architecture is a profession in which practitioners intervene in the environment “for a variety of social, aesthetic and environmental motives” (Thompson, 1998, p. 175). The manner in which landscape architects intervene in the environment is influenced by their environmental values (Swaffield, 2002). Environmental values, in turn, make up an individual’s environmental worldview. Environmental values may also be categorized into two classes of environmental ethics: anthropocentric and nonanthropocentric (Callicott, 1989; Merchant, 1992; Naess, 1986/2011).

The distinction between the anthropocentric and nonanthropocentric categories of environmental ethics is characterized by the ascription of instrumental and intrinsic value to components of the environment (Callicott, 1989). Intrinsic value refers to the inherent right of a component of the environment to exist in a state of minimal intentional interference from other entities (Merchant, 1992; Naess, 1986/2011). Instrumental values include the commodities and services provided by components of the environment. (Callicott, 1989; Thompson, 1998)

Anthropocentric ethics ascribe intrinsic value to humans only (Callicott, 1989; Merchant, 1992; Naess, 1986/2011). In other words, according to anthropocentric ethics, humans are the only components of the environment that have the inherent right to exist in a state of minimal interference from outside entities. All other components of the environment possess value only in as much as they can provide a commodity or service.

In contrast, nonanthropocentric ethics ascribe intrinsic value not only to humans, but also to other members of the biotic community and/or non-living components of the environment, such as rivers, watersheds and ecosystems (Callicott, 1989; Naess, 1986/2011). In this way, according to nonanthropocentric ethics, many components of the environment possess the inherent right to exist in a state of minimal interference from outside entities. As such, humans should actively control their behaviors in order to respect the intrinsic values of other components of the environment, which possess intrinsic value that is equal to their own.

In terms of environmental worldview, the difference between the anthropocentric and nonanthropocentric ethics classes relates to the difference between shallow and deep ecology worldviews (Lundmark, 2007; Merchant, 1992; Naess, 1973/2005, 1986/2011; Thompson, 2007). Shallow ecology worldviews are characterized by anthropocentric ethics. As such, they aim to sustain current human behaviors within the constraints of ecological limits, especially via input and/or technological intervention (Lundmark, 2007; Naess, 1973/2005; Thompson, 1998). Deep ecology worldviews, on the other hand, are characterized by nonanthropocentric ethics, and aim to avoid ecological limits altogether, especially by radical changes in current behavioral systems (Devall, 1980; Merchant, 1992; Naess, 1973/2005, 1986/2011).

In regard to landscape design, the difference between the two worldviews may be seen in proposed alternative renovations to City Creek Park in downtown Salt Lake City, UT. This area was, indeed, renovated during the 1990's to daylight a stretch of the stream, which formerly flowed into a storm drain, after heavy flooding in 1983 (Corbett,

2006). Corbett (2006) describes the renovation, as it was actually installed during this period, as communicating an anthropocentric worldview:

...the tracks of birds and small mammals were pressed into concrete and identified. Rocks were glued into streambanks that would never shift or accommodate, lined with exotic plants and Kentucky bluegrass. A water-wheel churns peacefully in the summer, dumping its load without a true purpose but evoking some sort of enterprising pioneer spirit. (p. 2)

In terms of environmental ethics, this renovation is typical of highly anthropocentric environmental values. It was necessitated by a failure of a human system (i.e., the flooding sewer). As a result, it was brought back to the surface, primarily to avoid further harm to this and other human systems. In doing so, non-native plants and engineered decorations were installed in a fashion that was highly restrictive to the self-determination of the stream ecosystem.

In contrast to this strongly anthropocentric intervention, Corbett (2006) proposes two alternatives. The first describes a visibly more pro-environmental approach:

On each side of the creek could be a public greenbelt used by walkers, joggers, rollerbladers, and bird watchers. Students could take field trips to learn about the water quality, hydrology, and the native vegetation lining the creek. A few picnic tables could sit on small patches of native grass, but otherwise the park would have a wilder feel. (p. 3)

This intervention communicates aspects of both anthropocentric and nonanthropocentric ethics. In the design, deference is given to native vegetation, which may indicate nonanthropocentric concern. However, the native elements of the design are included expressly for their aesthetic, educational and recreational value, which are all

instrumental values. In other words, this intervention is characteristic of a shallow ecology approach, in which the instrumental values of the ecosystem are held in high regard, but the intrinsic values of the ecosystem remain secondary to the benefits that humans receive.

Finally, Corbett (2006) proposes an alternative that communicates nonanthropocentric ethics that are characteristic of a deep ecology approach:

City Creek could run the same natural course it had for centuries. Along the creek, native vegetation would grow thick and tangled. The creek occasionally would flood in spring and the volume year-round would be much greater because the majority of the water had been left in the creek for nonhuman use. In a few spots, water pools would be large enough to support fish populations, aided by the works of beavers and muskrats. People would hike and visit the creek on rough trails. (p. 3)

In this intervention, the stream is rich in instrumental values (e.g., water supply, habitat and food supply). However, the site is valuable not only for its resources, but also because it is imbued with the inherent right to exist in that condition. As such, humans restrict their harvesting of the instrumental values of the site, in order to pay deference to what they perceive as its inherent right to exist in a state of minimal human interference.

Ultimately, the shallow and deep ecology worldviews entail fundamentally different environmental values. These values affect the manner in which individuals, including landscape architects, intervene in the environment.

American landscape design theory, at least until the second half of the twentieth century, was characteristic of firmly anthropocentric worldviews (Thompson, 1998, 2007). However, during the second half of the twentieth century, the landscape design



professions were affected by a pro-environmental shift within the general American culture, which was characterized by increasing ecological concern, as well as some nonanthropocentric priorities (e.g., Carson, 1962; Hardin, 1968/2001; Leopold, 1949/1989; McHarg, 1971/1969). Most recently, this shift has manifested in the strong influence of concepts relating to ‘sustainability’ and ‘ecosystem services’ (e.g., American Society of Landscape Architects, 2014; Lovell & Johnston, 2009; Wu, 2013). Corbett’s (2006, p. 3) first proposed alternative to the City Creek Park renovation is representative of anthropocentric sustainable design: it seeks to minimize maintenance inputs while simultaneously maximizing the instrumental ecosystem values of the site.

In this fashion, the designs of landscape architects are influenced by their environmental values, which may be characterized in terms of environmental ethics. Previous researchers have written about these relations in a theoretical capacity (e.g., Corbett, 2006; Merchant, 1992; Thompson, 1998, 2007). However, as of yet, no researcher has provided statistical context for the relations as they relate to landscape architecture.

The New Ecological Paradigm (revised-NEP) scale is a measure of environmental worldview. Specifically, the revised-NEP scale was designed to measure divergence from the dominant, anthropocentric worldview that existed in pre-1970’s America toward the more pro-environmental, revised-NEP worldview (Dunlap, 2008; Dunlap & Van Liere, 1978/2008; Dunlap, Van Liere, Mertig, & Jones, 2000).

However, the pro-environmental trend within American culture, which has affected landscape architecture theory, has not been exhibited unanimously throughout

the population. On the contrary, statistical evidence shows that environmental concern has actually decreased overall in America during recent decades, especially among individuals who identify as politically conservative (Brulle, Carmichael, & Jenkins, 2012; Dunlap, 2008; Franzen & Vogl, 2013).

These polarized, simultaneous shifts in environmental worldview within American culture has made it so that the revised-NEP scale is an efficient measure for identifying groups with pro-environmental values relative to the general American population (Dunlap, 2008; Dunlap & Van Liere, 1978/2008; Dunlap et al., 2000).

In this way, in order to provide statistical context for the assertions that landscape design theory has been affected by a pro-environmental trend in recent decades, which has resulted in students and practitioners of landscape architecture exhibiting shallow ecology worldviews with high degrees of concern for the instrumental values of ecosystems, two studies were performed using the revised-NEP survey.

Chapter 2 of this thesis presents the first study, in which the revised-NEP scale is used to characterize the environmental worldviews of landscape architecture students and alumni from Utah State University (USU), especially as these worldviews relate to shallow ecology. Chapter 3 of this thesis presents the second study, in which responses to the revised-NEP survey by USU landscape architecture students are analyzed in comparison to the responses of general education students, in order to identify significant differences in the environmental worldviews of these groups. Chapters 2 and 3 were both prepared as article submissions for academic journals. The results of this research provide

statistical evidence for the characterization of the environmental values of landscape architecture students and practitioners.

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CHAPTER 2  
SHALLOW OR DEEP? THE ENVIRONMENTAL VALUES OF AMERICAN  
LANDSCAPE ARCHITECTS<sup>1</sup>

**Abstract**

An individual's environmental worldview is determined by their environmental values, and may be characterized according to categories of environmental ethics. The two broadest categories of environmental ethics are anthropocentric and nonanthropocentric, which are characterized by shallow and deep ecology worldviews, respectively. The differences between these worldviews, in relation to landscape architecture, embody fundamentally different strategies of landscape design. In this study, the environmental values of landscape architects are characterized by sampling two groups of students and one group of alumni from the Landscape Architecture and Environmental Planning (LAEP) department at Utah State University (USU) using the New Ecological Paradigm (revised-NEP) survey. It is found that, overall, their responses are characteristic of anthropocentric, shallow ecology worldviews.

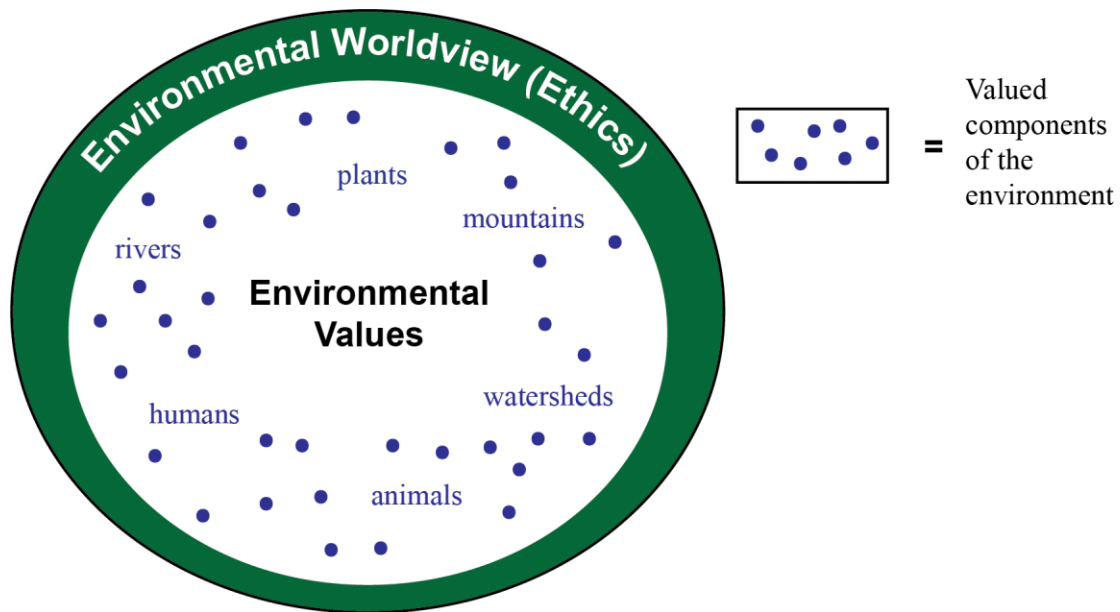
**Introduction**

An individual's environmental worldview is determined by their perception of value in the environment (e.g., Dunlap & Van Liere, 1978/2008; Naess, 1973/2005; White, 1967). The different capacities in which individuals identify value are described in terms of environmental ethics (e.g., Callicott, 1989; Leopold, 1949/1989; Merchant,

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<sup>1</sup> Coauthors: Warren-Kretzschmar, B. & Anderson, D.T.

1992). Thus, environmental worldview is determined by environmental values, and may be described in terms of environmental ethics (see Figure 2-1).



**Figure 2-1.** Environmental worldview is determined by environmental values and described in terms of environmental ethics.

An environmental ethic is “a limitation on freedom of action in the struggle for existence” (Leopold, 1949/1989, p. 202). In the broadest sense, environmental ethics may be *anthropocentric* or *nonanthropocentric* (Merchant, 1992; Naess, 1986/2011). An anthropocentric worldview perceives humans as “conquerors” and other components of the environment as “commodities” (Leopold, 1949/1989, pp. 204-205). A nonanthropocentric worldview perceives humans as “biotic citizens” and non-human components of the environment as part of a broader “ecological consciousness” (Leopold, 1949/1989, pp. 203 -207). As such, nonanthropocentric worldviews entail greater

restrictions on personal freedoms, which are exercised in deference to non-human components of the environment (Naess, 1986/2011).

In recent years, the landscape architecture and planning professions, which also include environmental planning on city, watershed and regional scales, have been highly influenced by concepts of ‘sustainability’ and ‘ecosystem services’ (Lovell & Johnston, 2009; Reid et al., 2005; Thompson, 1998, 2000; Wu, 2013). Generally, ‘sustainability’ refers to maintaining current human behaviors within the constraints of ecological limits (Wu, 2013). Similarly, ‘ecosystem services’ refers to the goods and services that people obtain from the environment (Reid et al., 2005). As such, although these notions involve high appreciations of the *instrumental* values of ecosystems, they are essentially anthropocentric (Thompson, 1998; Wu, 2013).

*Instrumental* value is the value that an object has relative to a purpose. For example, the instrumental values of a river include: water supply, hydropower and habitat. In contrast, *intrinsic* value refers to the inherent right to exist in a state of minimal interference, except for in cases of “vital need” (Naess, 1986/2011, p. 404). *Instrumental* and *intrinsic* values are the two general types of value that determine environmental worldview (Callicott, 1989).

The ascription of intrinsic value to non-human components of the environment is the essential difference between anthropocentric and nonanthropocentric worldviews (Callicott, 1989). Specifically, nonanthropocentric worldviews do involve this ascription, whereas anthropocentric worldviews do not.



With respect to landscape design theory, anthropocentric and nonanthropocentric ethics correspond to *shallow* and *deep* ecology worldviews, respectively (Merchant, 1992; Naess, 1973/2005; Thompson, 2007). Carried to a global extreme of landscape design, these worldviews could entail fundamentally different landscape forms. Taken to this extreme, a shallow ecology future may be conceptualized as a “garden scenario,” wherein all landscapes are carefully regulated to the limit of human innovation, in order to produce the maximum amount of goods and services for human benefit (Nash, 2014, pp. 379-385). Alternatively, a deep ecology future may entail an “island civilization” scenario, wherein human ecological impacts are contained within relatively untrammelled landscapes via radical changes in human behavior and consumptive technologies (Nash, 2014, pp. 379-385).

“Garden scenario” and “island civilization” are two hypothetical, extreme scenarios (Nash, 2014, pp. 379-385). However, they illustrate the designs that landscape architects and planners may prefer based on their environmental values. That is, designs that are truly characteristic of shallow ecology should be intended to maximize the instrumental values of landscapes for human benefit, while only being constrained by moral concerns relating to the intrinsic values of other humans. Alternatively, designs that are truly characteristic of deep ecology should be intended to minimize human impacts beyond what is necessary to satisfy the “vital needs” of the population (Naess, 1986/2011, p. 404). In modern practice, the landscape designs created by individuals with deep ecology worldviews may differ little, if at all, from those with shallow ecology worldviews, due to circumstantial constraints such as land-use law, zoning, client

preference, etc. (Thompson, 2000). However, identifying the dominant worldviews of landscape architects and planners should indicate the direction towards which their attitudes are most sympathetic: a garden state or a contained-civilization state.

Thompson (1998, 2000, 2007) performed literature and interview based analyses of the environmental ethics of landscape architects. However, as of yet, no published study has included a statistical analysis of the environmental worldviews of landscape architects.

In this study, two groups of students and one group of alumni from Utah State University (USU) are surveyed using the New Ecological Paradigm (revised-NEP) scale. One of the student groups consisted of students with a declared major of study in the Landscape Architecture and Environmental Planning department (LAEP). The other student group consisted of general education students enrolled in an *Introduction to Landscape Architecture* (LAEP 1030) course. Finally, the alumni consisted of graduates from the USU LAEP department with at least two years' experience as practicing landscape architects.

The revised-NEP scale is a survey instrument that measures environmental worldview (Dunlap, Van Liere, Mertig, & Jones, 2000). In measuring environmental worldview, the revised-NEP scale assesses environmental values that span the gambit of environmental ethics categories (Lundmark, 2007; Noblet, Anderson & Teisl, 2013). In this way, the scale is a sufficient measure for both anthropocentric and nonanthropocentric ethics, and may be used to relate the responses of survey participants to shallow or deep ecology worldviews.

Based on of the modern influence of concepts relating to ‘sustainability’ and ‘ecosystem services’ (e.g., American Society of Landscape Architects, 2014; Lovell & Johnston, 2009; Thompson, 2007; Wu, 2013), it is hypothesized that the responses of the landscape architecture students and alumni practitioners should be characteristic of anthropocentric, shallow ecology worldviews that are distinctly more pro-environmental than those of the general education students.

## **Literature Review**

### *The New Ecological Paradigm survey*

The New Ecological Paradigm (revised-NEP) survey is a measure of environmental worldview that has been used with at least 58,200 participants in at least 69 published studies from 36 countries (Hawcroft & Milfont, 2010, p. 143), making it one of the most prolific measures of environmental worldview in published circulation (Anderson, 2012).

The survey is a modified version of the New Environmental Paradigm (NEP) survey, which was originally published by Dunlap and Van Liere (1978/2008). These surveys were designed to measure a shift in environmental worldview from the “Dominant Social Paradigm” (DSP) that was predominant in pre-1970’s American culture to the “New Environmental (or Ecological) Paradigm” that began to emerge in 1960’s American culture (Dunlap & Van Liere, 1978/2008; Dunlap et al., 2000).

A DSP is “the prominent world view, model, or frame of reference through which individuals or collectively, a society, interpret the meaning of the world around them”

(Pirages & Ehrlich, 1974, p. 47). In Dunlap and Van Liere's (1978/2008) adoption of the term, they assumed that such worldview is inextricably linked to the way that individuals' perceive their environment. Beginning with the spread of European settlers across the continent (Merchant, 1992), the pre-1970's American DSP was characterized by, "belief in abundance and progress," "devotion to growth and prosperity," "faith in science and technology" and "commitment to a laissez-faire economy, limited government planning and private property rights" (Dunlap & Van Liere, 1978/2008, p. 19). As such, it represents a "profoundly unecological," anthropocentric worldview (Catton & Dunlap, 1980, p. 23).

In contrast to the pre-1970's American DSP, and largely as a result of increasing awareness about the negative effects of environmental degradation, a new paradigm, the revised-NEP, began to emerge in America during the 1960's (Dunlap & Van Liere, 1978/2008; Dunlap et al., 2000). The revised-NEP worldview is characterized by the acceptance of, "the reality of limits to growth," "antanthropocentrism," "the fragility of nature's balance," the rejection of human exemptionalism and "the possibility of an ecocrisis" (Dunlap et al., 2000, p. 432). As such, it is characteristic of a nonanthropocentric worldview (Lundmark, 2007; Noblet et al., 2013).

The revised-NEP survey contains 15 statements, to which respondents indicate agreement on a 5-point Likert scale (see Table 2-1). The eight odd-numbered statements are worded in a pro-revised-NEP fashion and scored from 1: "Strongly Disagree" to 5: "Strongly Agree." The seven even-numbered statements are worded in an anti-revised-NEP fashion and scored from 1: "Strongly Agree" to 5: "Strongly Disagree."

**Table 2-1.** The New Ecological Paradigm survey

<i>Please indicate the extent* to which you agree or disagree that:</i>
1. We are approaching the limit of the number of people the earth can support
2. Humans have the right to modify the natural environment to suit their needs**
3. When humans interfere with nature it often produces disastrous consequences
4. Human ingenuity will ensure that we do NOT make the earth unlivable**
5. Humans are severely abusing the environment
6. The earth has plenty of resources if we just learn how to develop them**
7. Plants and animals have as much right as humans to exist
8. The balance of nature is strong enough to cope with impacts of modern industrial nations**
9. Despite our special abilities humans are still subject to the laws of nature
10. The so-called “ecological crisis” facing humankind has been greatly exaggerated**
11. The earth is like a spaceship with very limited room and resources
12. Humans were meant to rule over the rest of nature**
13. The balance of nature is very delicate and easily upset
14. Humans will eventually learn enough about how nature works to be able to control it**
15. If things continue on their present course, we will soon experience a major ecological catastrophe

\*Agreement is indicated on 5-point scale including: Strongly Agree, Mildly Agree, Unsure, Mildly Disagree and Strongly Disagree

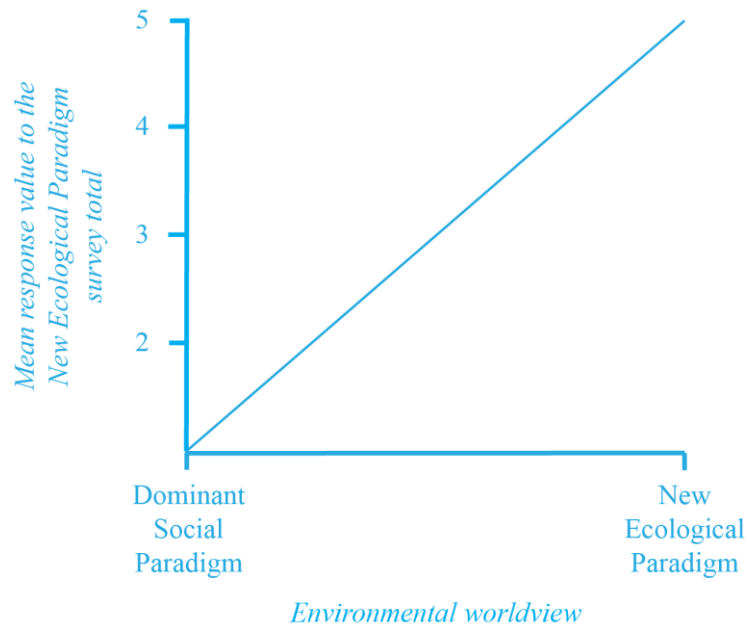
\*\*The seven odd-numbered statements are worded in an anti-New Ecological Paradigm fashion

Disagreement with the revised-NEP worldview is meant to indicate agreement with the pre-1970’s American DSP (Dunlap & Van Liere, 1978/2008). However, the effectiveness of the survey to measure environmental worldview on a polarized spectrum with the DSP

and NEP at opposite, extreme ends, also depends on the *internal consistency* of the survey results for each individual group.

The internal consistency of a survey indicates whether or not it measures one, unidimensional concept, or multiple, distinct concepts (Zeller & Carmines, 1980). In regard to the revised-NEP survey, unidimensional results indicate that it measures a single, comprehensive worldview. In contrast, clearly multi-dimensional results indicate that the survey measures a worldview that is composed of multiple, distinct dimensions. For example, a survey that is meant to assess opinions on gun control may prove to measure a single, unidimensional concept. However, if questions assessing favorite breakfast foods are interspersed in that survey, the survey would then likely produce multiple dimensions. If internal consistency measures indicate that those dimensions are clearly composed of the questions regarding gun control and the questions regarding breakfast foods, then these two sets of questions should be treated as two distinct surveys.

Although some researchers have found the revised-NEP survey to produce ambiguous internal consistency measures (e.g., Noblet et al., 2013), the survey was designed to be unidimensional (Dunlap et al., 2000), and the majority of previous researchers have utilized the scale in a unidimensional capacity (Hawcroft & Milfont, 2010). As a unidimensional measure, the overall response value to the survey is meant to indicate environmental worldview on a scale from 1: consistent with the anthropocentric DSP of pre-1970's America to 5: consistent with nonanthropocentric revised-NEP. This relation may be depicted as a linear correlation between the revised-NEP survey total and pro-environmental worldview, as seen in Figure 2-2.



**Figure 2-2.** As mean response values to the New Ecological Paradigm survey increase, so does pro-environmental worldview.

Finally, the use of the revised-NEP scale since the 1980's has identified bipolar shifts in environmental worldview within the general American population (Dunlap, 2008; Hawcroft & Milfont, 2010). That is, while certain segments of the population have experienced a values shift towards the revised-NEP, other segments have experienced a values shift away from the revised-NEP. The disparities in these shifts have been correlated to predictor characteristics, including: political orientation, age, gender and education level (Corbett, 2006; Dunlap, 2008; Schultz & Zelezny, 1998; Scott & Willits, 1994).

The bipolar shifts in modern American culture make the revised-NEP survey an effective instrument for identifying differences in overall environmental worldview between interest groups (e.g., members of an environmental organization) and the general

American population (Dunlap, 2008; Dunlap et al., 1978/2008). Thus, if the landscape architecture students and alumni practitioners in this study do exhibit greater pro-environmental values than those of general Americans with similar education levels, then this difference should present as higher responses to the revised-NEP survey by the landscape architecture students and practitioners, in comparison to the general education students.

### *Environmental ethics and intrinsic value*

Nonanthropocentric worldviews differ from anthropocentric worldviews in that they ascribe intrinsic value to non-human components of the environment (Callicott, 1989). Two subcategories of environmental ethics exist within both the anthropocentric and nonanthropocentric classes (Merchant, 1992; Thompson, 1998). Within the anthropocentric class, these categories include *egocentric* and *homocentric*. Within the nonanthropocentric class, these categories include *biocentric* and *ecocentric*. As with the broader classes, each subcategory is characterized by its unique ascription of intrinsic value to components of the environment (see Table 2-2).

According to the egocentric ethic, the individual (i.e., the self) is the only entity that possesses intrinsic value. In other words, there are no moral constraints that fetter individuals from freely harvesting the instrumental values of all other components of the environment. The homocentric ethic differs from the egocentric in that it extends intrinsic value beyond the self to include other humans. Anthropocentric ethics rose to dominance in Anglo-American culture during the 17<sup>th</sup> century (Hardin, 1968/2001; Merchant, 1992;



**Table 2-2.** Environmental ethics categories

	<i>Anthropocentric</i>		<i>Nonanthropocentric</i>	
	Egocentric	Homocentric	Biocentric	Ecocentric
<i>Intrinsic value</i>	Self	Self Other humans	Self Other humans Other biota	Self Other humans Other biota Non-living entities
<i>Instrumental value</i>	Self Other humans Other biota Non-living entities	Self Other humans Other biota Non-living entities	Self Other humans Other biota Non-living entities	Self Other humans Other biota Non-living entities

*Note:* Table based on Merchant (1992) and Thompson (1998, 2007)

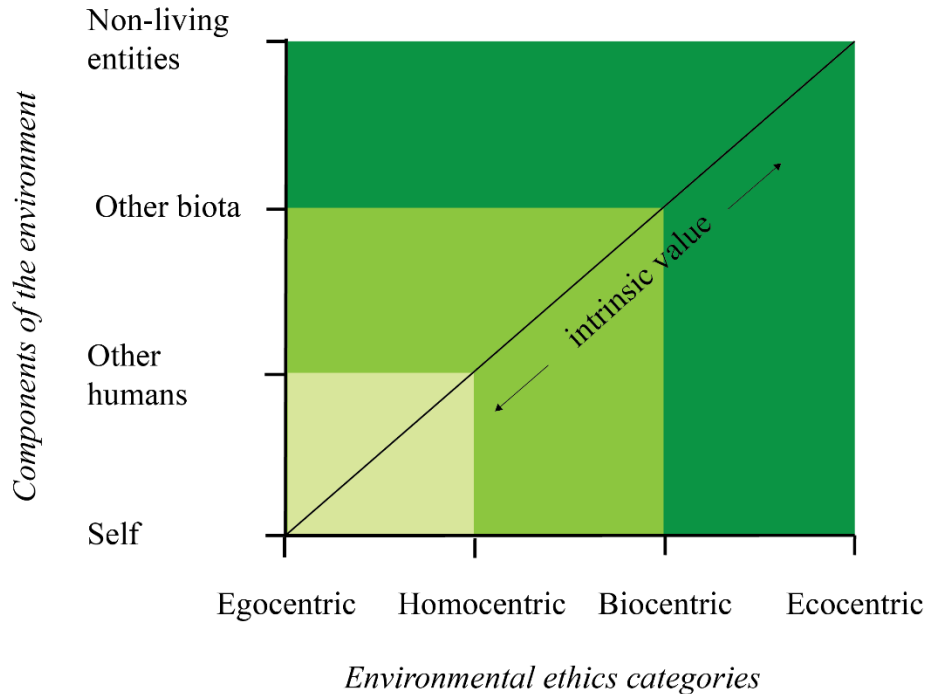
White, 1967). In this capacity, they formed the moral foundation for the pre-1970's American Dominant Social Paradigm (DSP) (Dunlap, 2008; Dunlap & Van Liere, 1978).

The nonanthropocentric categories of environmental ethics, on the other hand, ascribe intrinsic value not only to other humans, but also to non-human components of the environment. The biocentric ethic assess the intrinsic value of the environment by the sum of its humans, plants, animals and other living entities. The ecocentric ethic goes even further, ascribing intrinsic value to non-living components of the environment, such as watersheds, landscapes and ecosystems (Naess, 1986/2011, p. 405).

Regarded as essentially different modes of interpreting intrinsic value in the environment, the four categories of environmental ethics form a linear correlation with the *egocentric* and *ecocentric* categories as opposing extremes on a polar scale of intrinsic value, as seen in Figure 2-3. In this conceptual model, each x-axis ethics category is meant to reflect the extension of intrinsic value to *all* the components included in its corresponding y-axis variable.

*Environmental ethics, the New Ecological Paradigm and shallow vs. deep ecology*

The shift towards the New Ecological Paradigm (revised-NEP) that occurred in America during the second half of the 20<sup>th</sup> century was largely driven by concerns over the negative environmental effects of industrialization vis-à-vis human health and happiness (e.g., Carson, 1962; Hardin, 1968/2001; McHarg, 1969/1971). These concerns were primarily characterized by reasoned arguments based on scientific principles, and manifested in major federal legislations such as the Clean Air Act (1963), National Environmental Policy Act (1969) and Clean Water Act (1972). Other iconic texts published during this period also contributed to the environmental values shift, but did so primarily by suggesting a moral imperative for change (e.g., Leopold, 1949/1989; White, 1967). The fundamental difference between these rationales for change, i.e., utilitarian benefits vs. moral imperative, is the defining difference between shallow and deep ecology worldviews (Devall, 1980; Merchant, 1992; Naess, 1973/2005).



**Figure 2-3.** The environmental ethics categories correlate to the ascription of intrinsic value to components of the environment.

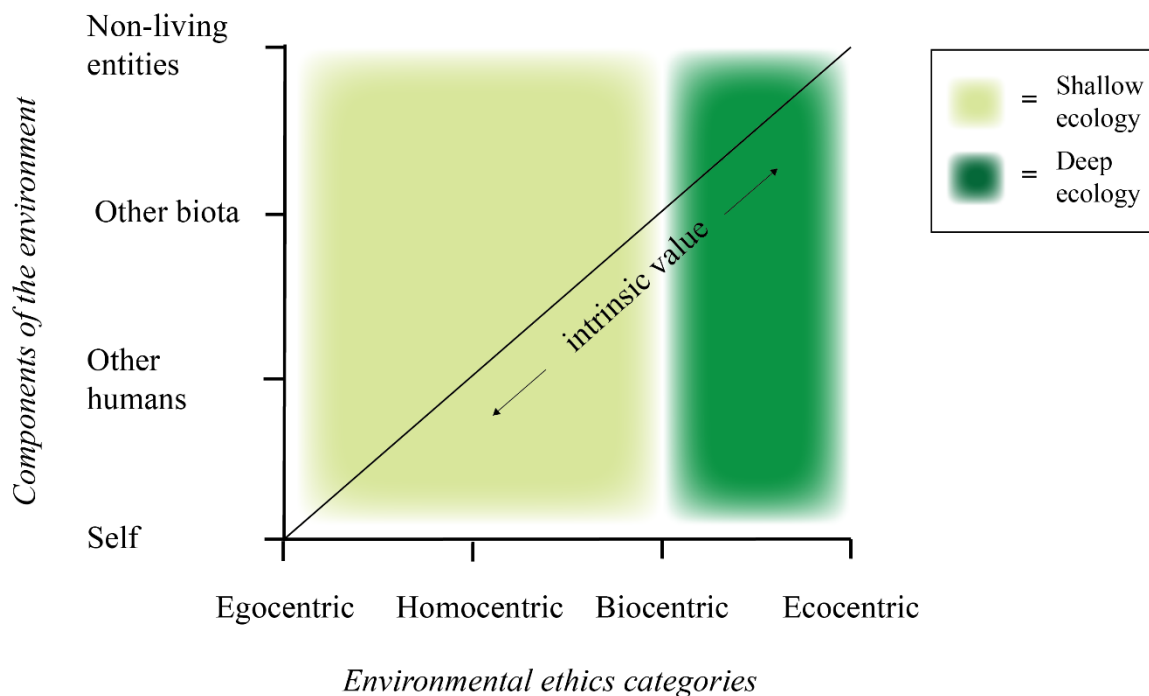
This distinction is especially relevant for this study, because the two worldviews entail fundamentally different strategies for addressing ecological limits in the design of the built environment. Specifically, shallow ecology aims to address the *symptoms* of environmental degradation, and is motivated by concerns for human health and happiness. The deep ecology movement, on the other hand, aims to address the behavioral *causes* of environmental degradation, and is motivated by the belief that ecosystems have an inherent right to exist with minimal interference from human activities, except what is necessary to satisfy “vital needs” (Naess, 1986/2011, p. 404).

The distinction between the two worldviews is illustrated by opposing solutions to the negative effects of motor vehicle emissions in an urban area. In this example, vehicles

are the *cause* of the emissions. As such, a deep ecology solution would entail a change in the design of cities and how the residents live. This could be accomplished by developing communities that locate opportunities for work, shopping and residence all within walking or biking distance from one another. Furthermore, if this solution was truly driven by deep ecology worldviews, the residents of the area would feel obliged to walk or bike based on the inherent right of their ecosystem to exist in a state of minimal anthropogenic emissions. In this way, deep ecology is essentially nonanthropocentric, and advocates containing and minimizing the impacts of human civilization based on moral imperative.

A shallow ecology solution, on the other hand, would focus on the *symptoms* of the problem, i.e., the negative effects of the emissions. According to this worldview, there is nothing inherently wrong with producing emissions; they only become a problem when their negative effects to human health and happiness become obtrusive. As such, a shallow ecology solution could be to transition the vehicle fleet to one with higher emissions control standards. In this way, the behavior (i.e., motorized vehicle use) is not affected, but the negative consequences of the behavior are altered via technological intervention to mitigate their undesirable impacts to human health and happiness. In this way, shallow ecology is essentially anthropocentric, and advocates sustaining current human behaviors within the constraints of ecological limits.

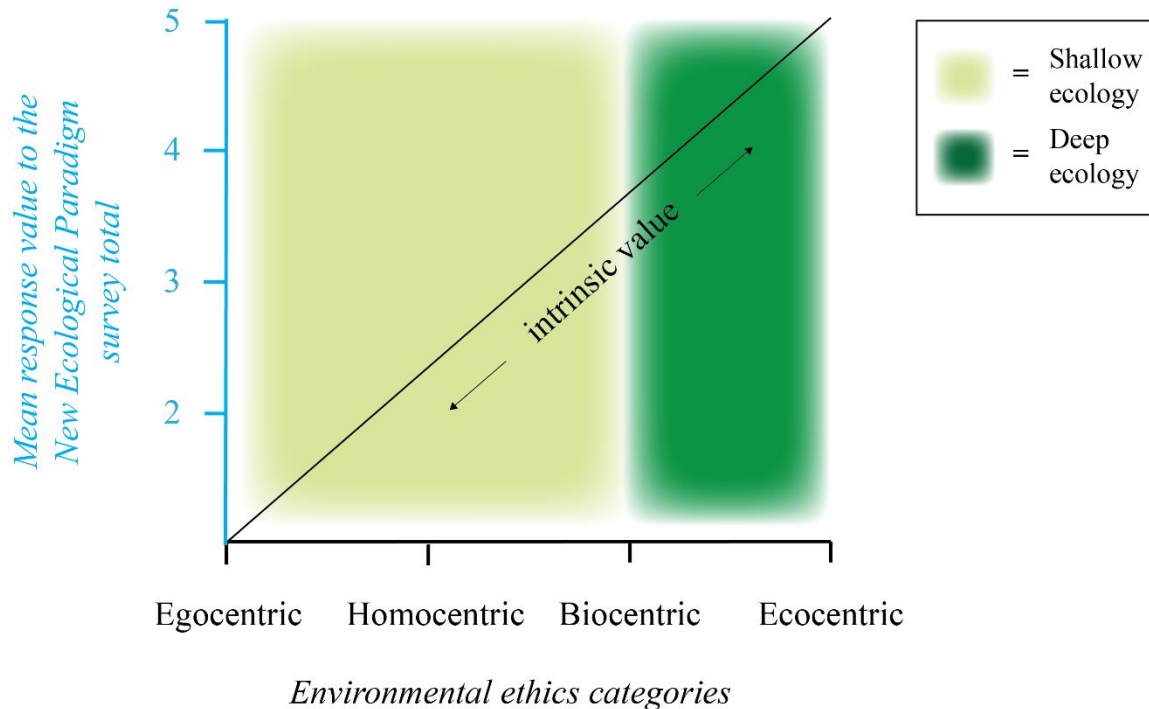
Since deep ecology worldviews are characteristic of nonanthropocentric ethics, it follows that deep ecology would align with the biocentric or greater extensions of intrinsic value in the linear environmental ethics model (i.e., Figure 2-3). On the other



**Figure 2-4.** Deep ecology corresponds to the ascription of intrinsic value to other biota and at least some non-living components of the environment. Shallow ecology involves ascriptions of intrinsic value to less than all other biota.

hand, since shallow ecology worldviews are characteristic of anthropocentric ethics, it follows that they would align with intrinsic values that are less than the extension of the biocentric category. The conceptual relation between the two worldview categories and the linear environmental ethics model (Figure 2-3) is shown in Figure 2-4.

Additionally, results from the revised-NEP survey may be related to shallow or deep ecology via the survey's relation to the environmental ethics categories. A statistical basis for relating the revised-NEP survey to the environmental ethics categories was established in Lundmark (2007) and Noblet et al. (2013). Lundmark (2007) performed a literature based assessment of the survey and found it to have "strong merits" for assessing the anthropocentric and biocentric categories (p. 343). Noblet et al. (2013)



**Figure 2-5.** New Ecological Paradigm survey scores are related to either shallow or deep ecology worldview in the Shallow v. Deep Worldview model.

added an ecocentric item to the survey and found that it increased the survey's overall internal consistency, thus indicating the original survey's capability to assess ecocentric ethics. These results support the conceptual basis for the scale, i.e., that low responses are characteristic of the anthropocentric Dominant Social Paradigm (DSP), and that high responses are characteristic of the nonanthropocentric revised-NEP. As such, responses to the revised-NEP scale may be related to shallow and deep ecology worldviews in a Shallow v. Deep Worldview model, as depicted in Figure 2-5. This model is conceptual: it is not meant to determine the *exact* value where revised-NEP responses shift from representing shallow or deep ecology worldviews. Rather, it is meant to provide an approximation, by which responses may be characterized in these terms.

*Shallow or deep? Modern landscape design theory*

The American Society of Landscape Architects has established a Code of Environmental Ethics (2006), which is based on the following four tenets:

1. The health and well-being of biological systems and their integrity are essential to *sustain human well-being\**
2. Future generations have a right to the same *environmental assets and ecological aesthetics\**
3. Long-term *economic survival\** has a dependence upon the natural environment
4. Environmental stewardship is essential to maintain a healthy environment and a *quality of life for the earth\**

\*Emphasis added.

Among these tenets, only the fourth includes a nonanthropocentric emphasis. As such, this code is predominantly anthropocentric, but demonstrates some (minority) nonanthropocentric concern. In this way, it is largely representative of the state of landscape design theory since the second half of the 20<sup>th</sup> century.

To suggest that modern landscape design theory is predominantly anthropocentric does not implicate a lack of concern for the instrumental values of ecosystems. Rather, modern theory appears to be highly affected by instrumental value concerns.

The alternative society of Naturalists described in Ian McHarg's *Design With Nature*, a foundational text in the canon of modern landscape design theory, is demonstrative of this concept. McHarg (1969/1971, pp. 117-125) describes a scenario in which humans actively manage the biosphere to achieve the greatest amount of ecological complexity that is compatible with their civilization. The Naturalists are driven to this strategy by the realization that the state of greatest ecological complexity is also

the state in which their potential for health and happiness reaches its greatest extent. While this scenario entails an extremely high regard for the instrumental values of ecosystems, its moral imperative is still for humans to dominate the landscape to enhance ecological complexity. Enhancing ecological complexity and exerting minimal interference are not necessarily interchangeable concepts. Rather, in this scenario, they are diametrically opposed.

Ecosystem service theory further illustrates this point. Ecosystems services include four categories: “provisioning services,” “regulating services,” “cultural services” and “supporting services” (Reid et al., 2005). All of these services refer to the goods and services that ecosystems provide humans. Maximizing these services may create ecological complexity. However, if the criterion for what ecosystem aspects are ‘good’ is their capacity to produce goods and services for human consumption, then designs based on this concept remain “evidently anthropocentric” (Wu, 2013, p. 1005).

In a contemporary scope and on a site-by-site basis, the ethics motivating landscape design may seem a trifle—that is, as long as ecosystem complexity is being enhanced from what has been previously predominant, progress towards a more ecologically-integrated future is being made. However, in the long term, when the intrinsic values of ecosystems are regarded as inferior to the instrumental values that they produce, this may lead to the “garden scenario” described by Nash (2014, pp. 379-385), i.e., a state in which self-determination in the landscape is restricted to those instances when it is the most conducive for human pleasure.



As demonstrated in the fourth tenet of the American Society of Landscape Architects' code, however, there are glimmers of nonanthropocentric theory within the predominantly anthropocentric landscape architecture and planning professions. These include the 'sense of place' and 'watershed consciousness' concepts of the bioregional planning movement. The former concept involves incorporating the "inherent and unique qualities" of the landscape into human designs (Azizul, Knight-Lenihan, & van Roon, 2016; Relph, 1996, p. 909). The latter concept involves containing human impacts within watershed borders at a capacity that also allows for sustaining healthy populations of the native flora and fauna (Merchant, 1992). The "closed-systems" approach to sustainability described by Dunnet and Clayden (2007) provides a third example, which is an early contribution to the movement to associate "minimizing ecological footprint" with notions of urban sustainability (Wu, 2013, p. 1012). Taken together, these concepts may lead to a substantively different future, e.g., the "island civilization" scenario described by Nash (2014, pp. 379-385).

Thompson (2000) provided a field based assessment of the environmental values of landscape designers by interviewing 26 practicing landscape architects in the UK. Among them, only one articulated aspects of an ecocentric worldview (p. 277). Similarly, Thompson (1998, 2007) concluded that concerns relating to sustainability within the profession are predominately anthropocentric. However, as of yet, no researcher has provided a statistical analysis of the environmental values of landscape architects.

## Methods

This study utilizes New Ecological Paradigm (revised-NEP) survey data from two groups of Utah State University (USU) students and one group of alumni from the USU Landscape Architecture and Environmental Planning (LAEP) department. USU is a land-grant institution located in northern Utah. As such, its mission is to provide the general population with a practical liberal education (Association of Public and Land-grant Universities, 2012).

The first survey group was composed of general education students enrolled in a USU undergraduate *Introduction to Landscape Architecture* course (LAEP 1030) during the Fall 2016 semester. The survey was administered via Qualtrics.com to 336 participants in the context of course extra credit, 320 of whom completed it and agreed to participate in the study, for a useable response rate of 95%. This group is referred to as the General Education Students (GES). The GES consisted of 123 females and 197 males, of whom 161 self-identified as politically conservative, 126 as moderate and 33 as liberal.

The second survey group consisted of USU students with a declared landscape architecture major. The survey was administered by email to this group in the Fall 2016 semester via Qualtrics.com with one round of reminders. The survey reached 126 potential participants, 49 of whom completed it and agreed to participate in the study, for a useable response rate of 38%. This group is referred to as the Landscape Architecture Students (LAS). The LAS consisted of 25 females and 24 males, of whom 14 self-identified as politically conservative, 23 as moderate and 12 as liberal.

The final survey group consisted of alumni from the USU LAEP department. The survey was administered to this group by email during the Fall 2016 semester via Qualtrics.com with one round of reminders. The survey was sent to 621 potential participants; 115 responded, of whom 86 had at least two years' experience as a practicing landscape architect (six identified academia as their primary role in this capacity) and agreed to participate in the survey, for a useable response rate of 14%. This group is referred to as the Alumni Practitioners (AP). The AP consisted of 16 females and 70 males; of whom 24 self-identified as politically conservative, 40 as moderate and 22 as liberal.

The primary analysis in this study consisted of characterizing the revised-NEP survey total (i.e., the mean value for the responses to all 15 statements) according to the Shallow v. Deep Worldview model (Figure 2-5). Beyond this analysis, other procedures were performed to assess differences between and within the groups, including: one-way analyses of variance (ANOVA), linear regressions (Pearson's  $r$ ) and internal consistency measures (Cronbach's  $\alpha$  and primary components analyses [PCA]).

The ANOVAs were performed to identify any significant differences between the overall environmental worldviews of the groups. That is, the ANOVAs identified whether differences in the response values of the groups represented aspects of distinct worldview, or could be accounted to random chance. ANOVAs were performed for each scale item (i.e., survey statement) as well as the survey total. In each case, the independent variable was the group (i.e., GES, LAS and AP). The dependent variables were the revised-NEP items and survey total. Additionally, any groups exhibiting

significant differences were identified via Tukey's HSD post-hoc test, and effect sizes of significant differences were determined as  $\eta^2$  values. Next, linear regressions were performed to assess differences in the predictor characteristics of revised-NEP endorsement within the groups. Predictor characteristic categories included: age, gender and political orientation (Corbett, 2006; Schultz & Zelezny, 1998; Scott & Willits, 1994). Lastly, Cronbach's *alpha* values were calculated and PCAs were performed for each group to determine the dimensionality of the scale. Primary factors from the PCAs were determined by Cattell's *Scree test* (1966).

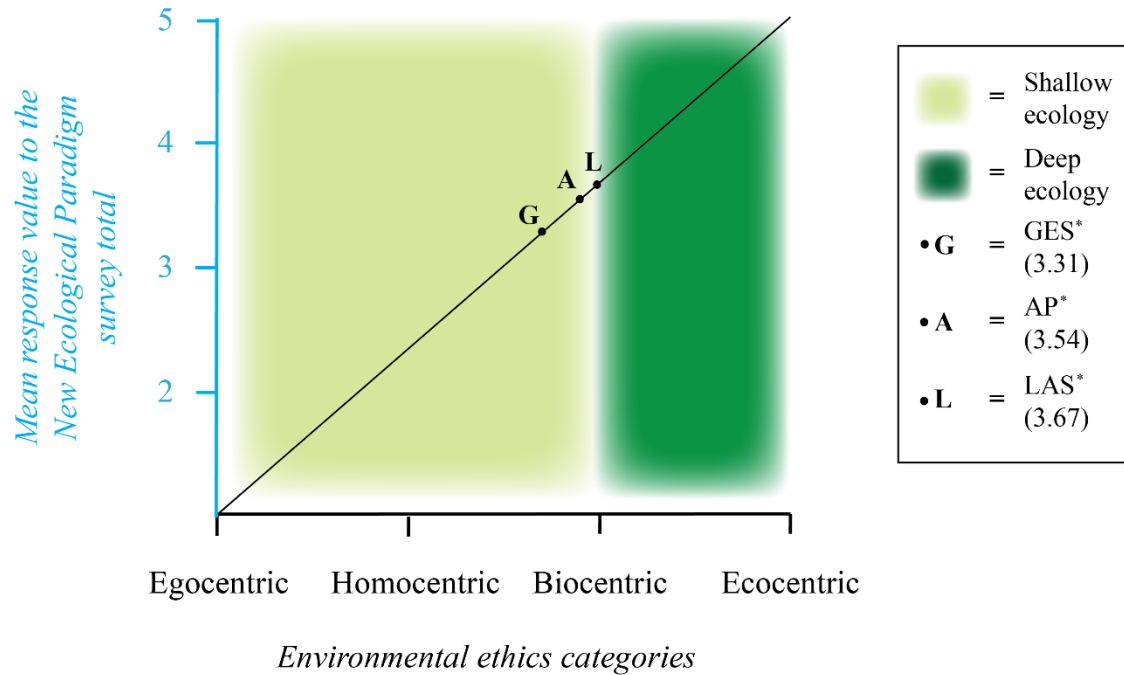
## **Results**

### *Survey results according to the Shallow v. Deep Worldview model*

According to the Shallow v. Deep Worldview model, the survey total response values of the survey groups indicate environmental worldviews that were most characteristic of shallow ecology (see Figure 2-6). The Landscape Architecture Students (LAS), however, exhibited responses that straddled the conceptual border between the two worldview categories.

### *Differences in environmental worldview between the groups*

The response frequencies to each of the New Ecological Paradigm (revised-NEP) survey statements, as well as the survey total, are displayed in Table 2-3. The "Revised-NEP scale total" (see item 16) shows that the General Education Students (GES) were significantly different from the Landscape Architecture Students (LAS) and



\*GES = General Education Students, AP = Alumni Practicioners and LAS = Landscape Architecture Students

**Figure 2-6.** The mean values of the survey group responses are most characteristic of shallow ecology worldviews.

the Alumni Practicioners (AP) in terms of their overall environmental worldview, but the LAS and AP did not differ significantly in this respect. While the difference between the GES and the LAS/AP was significant, the effect size of the group ID on revised-NEP scale total was small ( $\eta^2 = .045$ ). This indicates the GES and LAS/AP exhibited worldviews that were distinct from one another, but which were not radically different in terms of the total range of worldview that the scale is capable of assessing.

**Table 2-3.** Frequency distributions for General Education Students (GES), Landscape Architecture Students (LAS) and Alumni Practitioners (AP) to the New Ecological Paradigm scale with means, standard deviations (S.D.), *F* statistic and partial eta squared<sup>†</sup>.

Do you agree or disagree that:		SA <sup>#</sup>	MA	U	MD	SD	Mean <sup>†</sup> (S.D.)	<i>F</i>	$\eta^2$
1. We are approaching the limit of the number of people the earth can support	GSS	13.44%	25.49%	24.06%	24.06%	12.50%	3.04 (1.24)	1.554	.007
	DSS	20.41%	36.73%	12.24%	20.41%	10.20%	3.37 (1.30)		
	APS	23.26%	19.77%	8.14%	30.23%	18.60%	2.99 (1.48)		
2. Humans have the right to modify the natural environment to suit their needs	GSS <sup>a</sup>	6.56%	50.00%	13.13%	25.31%	5.00%	2.72 (1.07)	4.718	.020
	DSS	2.04%	42.86%	10.20%	38.78%	6.12%	3.04 (1.08)		
	APS <sup>a</sup>	12.79%	36.05%	1.16%	27.91%	22.09%	3.10 (1.43)		
3. When humans interfere with nature it often produces disastrous consequences	GSS	15.94%	51.25%	12.81%	17.81%	2.19%	3.61 (1.02)	3.206	.014
	DSS <sup>a</sup>	20.41%	65.31%	8.16%	4.08%	2.04%	3.98 (.83)		
	APS <sup>a</sup>	29.07%	32.56%	5.81%	25.58%	6.98%	3.51 (1.36)		
4. Human ingenuity will insure that we do NOT make the earth unlivable	GSS <sup>a</sup>	10.00%	29.38%	40.31%	16.56%	3.75%	2.75 (.97)	3.849	.017
	DSS	8.16%	26.53%	28.57%	28.57%	8.16%	3.02 (1.11)		
	APS <sup>a</sup>	8.14%	32.56%	23.26%	17.44%	18.60%	3.06 (1.26)		
5. Humans are severely abusing the environment	GSS <sup>a</sup>	29.69%	45.63%	8.75%	15.00%	0.94%	3.88 (1.03)	7.138	.031
	DSS <sup>ab</sup>	55.10%	32.65%	10.20%	2.04%	0.00%	4.41 (.77)		
	APS <sup>b</sup>	36.05%	31.40%	5.81%	19.77%	6.98%	3.70 (1.33)		
6. The earth has plenty of natural resources if we just learn how to develop them	GSS <sup>a</sup>	29.38%	42.19%	17.81%	8.44%	2.19%	2.12 (1.00)	13.780	.057
	DSS <sup>b</sup>	30.61%	38.78%	12.24%	10.20%	8.16%	2.27 (1.24)		
	APS <sup>ab</sup>	20.93%	29.07%	10.47%	25.58%	13.95%	2.83 (1.40)		
7. Plants and animals have as much right as humans to exist	GSS	49.69%	32.50%	6.56%	8.44%	2.81%	4.18 (1.06)	.538	.057
	DSS	53.06%	32.65%	10.20%	4.08%	0.00%	4.35 (.83)		
	APS	56.98%	25.58%	1.16%	11.63%	4.65%	4.19 (1.20)		
8. The balance of nature is strong enough to cope with impacts of modern industrial nations	GSS <sup>ab</sup>	3.75%	18.44%	23.75%	41.25%	12.81%	3.41 (1.05)	8.423	.036
	DSS <sup>a</sup>	0.00%	14.29%	16.33%	36.73%	32.65%	3.88 (1.03)		
	APS <sup>b</sup>	6.98%	10.47%	11.63%	31.40%	39.53%	3.86 (1.25)		
9. Despite our special abilities humans are still subject to the laws of nature	GSS <sup>ab</sup>	51.56%	40.00%	6.56%	1.88%	0.00%	4.41 (.70)	8.771	.037
	DSS <sup>a</sup>	73.47%	26.53%	0.00%	0.00%	0.00%	4.73 (.45)		
	APS <sup>b</sup>	81.40%	13.95%	0.00%	2.33%	2.33%	4.70 (.80)		
10. The so-called "ecological crisis" facing humankind has been greatly exaggerated	GSS <sup>a</sup>	5.31%	23.44%	31.56%	26.56%	13.13%	3.19 (1.10)	10.953	.046
	DSS <sup>ab</sup>	2.04%	6.12%	16.33%	42.86%	32.65%	3.98 (.97)		
	APS <sup>b</sup>	11.63%	19.77%	11.63%	22.09%	34.88%	3.49 (1.44)		

Table Continues

Do you agree or disagree that:		SA <sup>#</sup>	MA	U	MD	SD	Mean <sup>‡</sup> (S.D.)	<i>F</i>	$\eta^2$
11. The earth is like a spaceship with very limited room and resources	GSS	10.94%	31.88%	22.81%	27.19%	7.19%	3.12 (1.14)	2.118	.009
	DSS	10.20%	55.10%	14.29%	14.29%	6.12%	3.49 (1.06)		
	APS	17.44%	32.56%	6.98%	34.88%	8.14%	3.16 (1.30)		
12. Humans were meant to rule over the rest of nature	GSS <sup>ab</sup>	22.81%	24.69%	15.31%	21.56%	15.63%	2.83 (1.41)	14.470	.060
	DSS <sup>a</sup>	8.16%	28.57%	16.33%	8.16%	38.78%	3.41 (1.46)		
	APS <sup>b</sup>	8.14%	17.44%	13.95%	18.60%	41.86%	3.69 (1.39)		
13. The balance of nature is very delicate and easily upset	GSS	19.38%	41.56%	16.56%	22.19%	0.31%	3.58 (1.05)	.138	.001
	DSS	20.41%	42.86%	20.41%	14.29%	2.04%	3.65 (1.03)		
	APS	31.40%	29.07%	11.63%	25.58%	2.33%	3.62 (1.24)		
14. Humans will eventually learn enough about how nature works to be able to control it	GSS <sup>a</sup>	5.31%	25.63%	27.50%	27.81%	13.75%	3.19 (1.24)	9.290	.039
	DSS	10.20%	18.37%	22.45%	24.49%	24.49%	3.35 (1.32)		
	APS <sup>a</sup>	3.49%	10.47%	23.26%	29.07%	33.72%	3.79 (1.13)		
15. If things continue on their present course, we will soon experience a major ecological catastrophe	GSS <sup>a</sup>	21.25%	34.69%	28.44%	12.50%	3.13%	3.58 (1.05)	7.799	.033
	DSS <sup>ab</sup>	42.86%	36.73%	18.37%	2.04%	0.00%	4.20 (.82)		
	APS <sup>b</sup>	27.91%	31.40%	11.63%	19.77%	9.30%	3.49 (1.34)		
16. NEP item total	GSS <sup>ab</sup>						3.31 (.58)	10.733	.045
	DSS <sup>a</sup>						3.67 (.52)		
	APS <sup>b</sup>						3.54 (.79)		

<sup>†</sup> N = 320 for GSS, N = 49 for DSS and N = 86 for APS

<sup>#</sup> SA = Strongly Agree, MA = Mildly Agree, U = Unsure, MD = Mildly Disagree and SD = Strongly Disagree

<sup>‡</sup> Means were computed after reverse scoring for items 2, 4, 6, 8, 10, 12 and 14

<sup>ab</sup> Group names with matching superscripts are significantly different at  $p < .05$  based on Tukey's HSD test

### *Significance of differences in predictor characteristics within the groups*

The responses for the three survey groups were positively, significantly correlated to liberal political orientation ( $r = .54, p < .001$ ), female gender ( $r = .22, p < .001$ ) and age ( $r = .17, p < .001$ ). These results indicate that some of the response variance of the individuals within the groups could be correlated to differences in these characteristics. However, differences in the consistencies of the groups based on these characteristics did not account for the total difference in worldview between the groups. For example, a Pearson's correlation coefficient ( $r$ ) value of 1 for the political orientation characteristic

would indicate a perfect correlation between political orientation and environmental worldview. This is not the case. Rather, the  $r$  value for political orientation indicates that differences in this characteristic within each group correlated to a moderate amount of the overall variance in environmental worldview (Evans, 1996). Similarly, the  $r$  values of the gender and age characteristics indicate that these factors correlated to a small amount of variance in the worldviews of the groups.

#### *Internal consistency of the survey responses*

Cronbach's  $\alpha$  values and Primary Components Analyses (PCA) were determined for each group's survey responses. The results of the PCAs are displayed in Table 2-4.

The Cronbach's  $\alpha$  values for each group support the unidimensionality of the scale: GES = .826, LAS = .788 and AP = .877. However, for each group, the subtraction of items 9 and 14 increased the  $\alpha$  value of the survey. Specifically, the subtraction of item 9 produced group  $\alpha$  values of: GES = .828, LAS = .792 and AP = .877, and the subtraction of item 14 produced  $\alpha$  values of: GES = .833, LAS = .809 and AP = .882. Generally, the addition of an item to a unidimensional survey should increase its  $\alpha$  value (e.g., Noblet et al., 2013). As such, the increase in  $\alpha$  value resultant from the subtraction of items 9 and 14 indicates that, for all three groups, these items actually slightly decreased the internal consistency of the survey.

Similarly, items 9 and 14 were missing from the predominant primary factor for each survey group (see Table 2-4). The absence of these items from the predominant primary factor of the PCAs, in combination with their lowering of the overall  $\alpha$  value



**Table 2-4.** Rotated component pattern of New Ecological Paradigm scale items for General Education Students (GES), Landscape Architecture Students (LAS) and Alumni Practitioners (AP)

GES	Factor 1	Factor 2	LAS	Factor 1	Factor 2	Factor 3	AP	Factor 1	Factor 2
<i>Limits to growth</i>			<i>Limits to growth</i>				<i>Limits to growth</i>		
Item 1	<b>.700</b>	.215	Item 1	<b>.579</b>	<b>-.564</b>	-.144	Item 1	<b>.812</b>	-.029
Item 6	<b>.363</b>	.170	Item 6	<b>.613</b>	-.187	.162	Item 6	<b>.558</b>	<b>.350</b>
Item 11	<b>.779</b>	.059	Item 11	<b>.738</b>	<b>-.376</b>	-.074	Item 11	<b>.750</b>	.178
<i>Antianthropocentrism</i>			<i>Antianthropocentrism</i>				<i>Antianthropocentrism</i>		
Item 2	.220	<b>.622</b>	Item 2	<b>.692</b>	-.004	<b>.334</b>	Item 2	<b>.446</b>	<b>.599</b>
Item 7	.174	<b>.674</b>	Item 7	<b>.394</b>	<b>.391</b>	-.010	Item 7	.100	<b>.736</b>
Item 12	.201	<b>.750</b>	Item 12	<b>.790</b>	-.028	.278	Item 12	<b>.605</b>	<b>.342</b>
<i>Nature's balance</i>			<i>Nature's balance</i>				<i>Nature's balance</i>		
Item 3	<b>.315</b>	.215	Item 3	<b>.422</b>	-.101	<b>-.454</b>	Item 3	-.022	.251
Item 8	<b>.336</b>	.170	Item 8	<b>.492</b>	-.066	.017	Item 8	<b>.451</b>	.253
Item 13	<b>.692</b>	.111	Item 13	<b>.335</b>	-.010	<b>-.438</b>	Item 13	.114	<b>.806</b>
<i>Exemptionalism</i>			<i>Exemptionalism</i>				<i>Exemptionalism</i>		
Item 4	.015	<b>.577</b>	Item 4	.183	<b>-.675</b>	<b>.358</b>	Item 4	<b>.540</b>	.288
Item 9	.152	-.087	Item 9	<b>.081</b>	<b>.509</b>	<b>.362</b>	Item 9	.076	.076
Item 14	-.120	.176	Item 14	.062	-.044	<b>.790</b>	Item 14	-.008	-.001
<i>Ecocrisis</i>			<i>Ecocrisis</i>				<i>Ecocrisis</i>		
Item 5	<b>.582</b>	<b>.355</b>	Item 5	<b>.519</b>	<b>.658</b>	.154	Item 5	.262	.035
Item 10	<b>.393</b>	<b>.451</b>	Item 10	<b>.676</b>	.255	-.241	Item 10	<b>.557</b>	.252
Item 15	<b>.615</b>	<b>.476</b>	Item 15	<b>.724</b>	<b>.329</b>	-.191	Item 15	<b>.544</b>	<b>.465</b>
Eigenvalue	4.6	1.4	Eigenvalue	4.3	2.0	1.6	Eigenvalue	5.7	1.5
% of variance	30.8	9.6	% of variance	28.9	13.2	10.9	% of variance	38.2	9.6

Note: Items were rotated in varimax rotation to create orthogonal dimensions. Items loading  $> .3$  are in bold. Major factors were determined by Cattell's *Scree test* (Cattell, 1966). Items 9 and 14 (in gray) do not appear in the primary factors explaining the greatest percent of variance for any of the survey groups at loadings  $> .3$ . The sample sizes for the groups are  $n = 320$  for the GES,  $n = 49$  for the LAS and  $n = 86$  for the AP. The Kaiser-Meyer-Olkin (KMO) values for the samples are (GES) .85, (LAS) .59 and (AP) .81.

of the surveys for each group, indicates that these items may have produced one or multiple additional dimensions for the survey.

However, the results of the two internal consistency measures, overall, are contradictory and inconclusive. Although the subtraction of items 9 and 14 slightly increased the *alpha* values for each group, the internal consistency of the survey with these items included still well exceeds the .70 threshold recommended by Nunnally (1978) to determine reliable consistency. Additionally, while these items were indeed missing from the predominant primary factors of each survey group's PCA, the items did not form primary factors for the three groups that explained similar proportions of variance to the predominant factor. If this were the case, and/or if the *alpha* values of the surveys were less than .70 with the inclusion of items 9 and 14, it would be a clear indication that these items produced multi-dimensionality. However, the internal consistency measures for the three groups did not produce a clear indication of this nature.

## **Discussion**

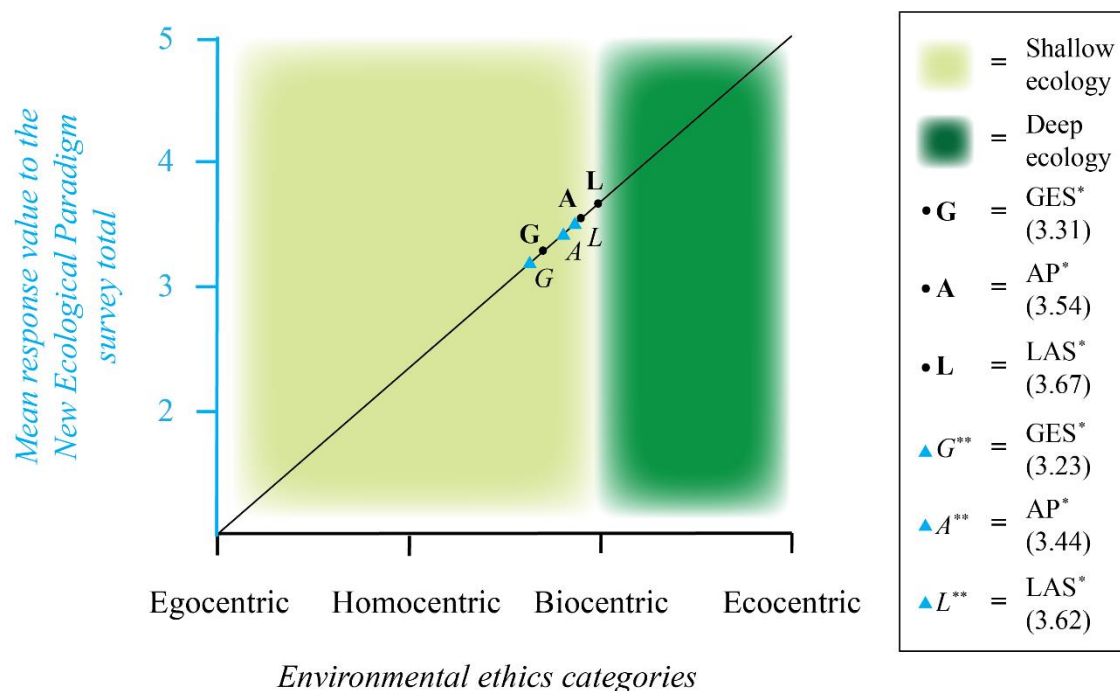
### *Survey results according to Shallow v. Deep Worldview model and internal consistency measures*

While the internal consistency measures of the survey groups produced some ambiguity, items 9 and 14 did not produce clearly distinct dimensions. As such, it is not clear that either or both of these items assessed a dimension of environmental worldview

that was distinct from the rest of the New Ecological Paradigm (revised-NEP) survey. However, the removal of these items, vis-à-vis the Shallow v. Deep Worldview model, does place all of three of the groups more firmly within the shallow ecology camp (see Figure 2-7). This change is especially notable for the Landscape Architecture Students (LAS), who otherwise straddled the conceptual border between the shallow and deep ecology categories.

An assessment of the individual survey statements provided further insight into the effects of items 9 and 14 towards the overall worldviews of the groups. Specifically, all three of the groups exhibited their highest endorsement of the revised-NEP as it regarded item 9. Item 9 states that “Despite our special abilities humans are still subject to the laws of nature.” In this capacity, this item refers to instrumental values, i.e., it states that, despite humanity’s unique capability for innovation in manipulation of the environment, humans are still constrained by ecological limits. The strong agreement of the survey groups with this item indicates that they have a high degree of concern for the instrumental values of ecosystems, i.e., the benefits that humans receive from them. However, it does not necessarily indicate that they perceive intrinsic value in ecosystems.

In contrast, the groups exhibited uncertainty or only mild revised-NEP endorsement in regard to item 14, i.e. “Humans will eventually learn enough about how nature works to be able to control it.” Quantitatively, the mild endorsement of item 14, in contrast to the strong agreement with item 9, indicates that the removal of item 9 is responsible for the majority of difference in the environmental worldviews of the survey participants vis-à-vis the Shallow v. Deep Worldview model. As such, since item 9 does



\* GES = General Education Students, AP = Alumni Practitioners and LAS = Landscape Architecture Students

\*\* ▲ Indicates change in group survey total after removal of items 9 and 14

**Figure 2-7.** The removal of items 9 and 14 from the survey results in the responses of all three groups being more firmly within the shallow ecology worldview category.

not address intrinsic value concerns, and since the inclusion of this item dictates whether or not the LAS group straddles the border of the deep ecology worldview category, their responses ultimately are characteristic of a shallow ecology worldview, rather than one that straddles the conceptual border of deep ecology. However, their high endorsement of item 9 indicates that, within their shallow ecology worldview, they demonstrate a high degree of concern for the instrumental values of ecosystems.

A shallow ecology worldview with a high degree of concern for the instrumental values of ecosystems is characteristic of the worldview of McHarg's Naturalists

(1969/1971, pp. 117-125). In a passage that was also quoted by Thompson (1998, p. 184),

McHarg (1969/1971) provides a summation of this worldview:

If one can view the biosphere as a single superorganism, then the Naturalist considers that man is an enzyme capable of its regulation, and conscious of it. He is of the system and entirely dependent upon it, but has the responsibility for management, derived from his apperception. This is his role—steward of the biosphere and its consciousness. (p. 124)

While this passage admits that humans are “entirely dependent” on the instrumental values of ecosystems, it also expresses strong anthropocentric sentiment in suggesting that humans not only have the right, but the responsibility to exert their influence across ecosystems. This sentiment fundamentally contradicts the deep ecology worldview, which is distinguished by its moral imperative for humans to exert minimal ecosystem interference.

Similarly, all three survey groups exhibited uncertainty or mild disagreement with the revised-NEP on items that addressed the capability or inherent right of humans to control nature (items 1, 2, 4 and 6). These attitudes are ostensibly contradicted by the overall mild agreement of the groups with the statements that address the intrinsic value of non-human components of the environment (items 5 and 7). However, these items only address whether or not non-human components of the environment have a right to *exist*, not whether or not non-human components have a right to exist in a state of *minimal interference*. Based on the precedent set by Noblet et al. (2013), in which the researchers added an ecocentric item to the scale, and strong agreement with the overall scale, including this item, was indicative of nonanthropocentric worldview, the overall

only mild agreement of the study groups with items 5 and 7 does not clearly indicate nonanthropocentric worldview. Rather, it indicates that the groups believed that non-human components of the environment have the right to exist in an undefined capacity. Such belief is still compatible with shallow ecology worldviews.

*Differences in environmental worldview  
between the groups*

Overall, the survey groups demonstrated shallow ecology worldviews with high degrees of concern for the instrumental values of ecosystems. However, across the spectrum of New Ecological Paradigm (revised-NEP) statements, the General Education Students (GES) exhibited a less pro-environmental worldview than the Landscape Architecture Students (LAS) and Alumni Practitioners (AP). Since the variance in overall worldview between the GES and LAS/AP could not be correlated entirely to differences of predictor characteristics within the groups (i.e. political orientation, gender and age), these results indicate that, in general, the group association of studying or practicing landscape architecture may be correlated to greater pro-environmental values than are common for general Americans with at least some higher education experience. In turn, these results support the notion that landscape architecture students and practitioners exhibit evidence of a pro-environmental values shift that has occurred in recent years, in contrast to the general American population, which has experienced bipolar shifts.

However, while the results *support* this notion, *conclusions* of this nature are limited by the data. That is, the results do indicate that there is a general correlation between landscape architecture experience and pro-environmental worldview. However,

it would be necessary to reference the results of this study with longitudinal or cross-sectional data to form any conclusions about them being representative of a larger trend, in which the environmental worldview of landscape architects has followed a trajectory similar to the emergence of the New Ecological Paradigm (revised-NEP). At the time of the study, such data was not available.

*Differences in predictor characteristics within the groups*

The correlations between political orientation and gender characteristics in this study were similar to those reported by other researchers (e.g., Corbett, 2006; Schultz & Zelezny, 1998; Scott & Willits, 1994). Specifically, pro-environmental worldview was positively correlated with liberal political orientation and female gender. However, the positive correlation to age contradicted the previous research, which suggests that age should be negatively correlated to revised-NEP endorsement. As it were, the positive correlation to age in this study was primarily a result of the political orientation of the General Education Students (GES), who were younger overall than the Alumni Practitioners (AP) and more conservative. This represents another limitation that was endemic to the data in this study, i.e., unequal sample sizes.

**Limitations**

In addition to unequal sample sizes, regional factors may have affected the environmental worldviews of the survey groups, which were not assessed in this study. These include overall regional political orientation and religious affiliation. Specifically, the majority of the survey participants were raised in Utah or Idaho, where residents

voted for the traditionally conservative Republican Party in every presidential election since 1968 (270towin.com, 2017). As such, it is possible that similar studies conducted in more moderate or liberal regions could produce results that are more characteristic of deep ecology worldviews. Additionally, Utah and Idaho are the two states with the highest proportions of members of the Church of Jesus Christ of Latter Day Saints (Jones, 2004). Religious affiliation is theoretically related to environmental worldview (Hardin, 1968/2001; Merchant, 1992; Naess, 1986/2011; White, 1967). As such, it is possible that the unique religious characteristic of the region affected the response patterns of the survey participants.

Finally, the individuals in the General Education Students (GES) group had already chosen to enroll in an *Introduction to Landscape Architecture* (LAEP 1030) course. If the landscape design professions are, indeed, correlated to environmental values that are distinct from the general American population, it is possible that the individuals in the GES were drawn to the class by pre-existing affinities for these values. If this were the case, the differences between the groups may have been smaller than they would have been if compared to a truly random sample of general education students.

### **Future Research**

This study found that individuals involved with landscape architecture exhibited shallow ecology worldviews that were more pro-environmental than those of general Americans with similar education levels. Parallel studies conducted in other regions could establish whether these findings are indicative of the landscape design professions in general, or influenced by regional factors. Additionally, longitudinal or cross sectional



data could determine if the difference in worldview between the groups was indicative of a pro-environmental trend within the landscape architecture and planning professions. Evidence of such a trend could indicate that involvement with landscape design could eventually be correlated primarily to deep ecology worldviews.

Finally, if the Shallow v. Deep Worldview model could be used to identify a group of landscape architects and planners that exhibit deep ecology worldviews, then an analysis of their designs could indicate how they differ from practitioners who exhibit shallow ecology worldviews.

## **Conclusion**

Currently, “garden scenario” and “island civilization” (Nash, 2014, pp. 379-385) are futures that are alien enough to appear implausible in scope. However, with the world population expected to reach 9.7 billion by the year 2050 (United Nations Department of Economic and Social Affairs, 2015) and global natural resource consumption already occurring at 1.7 times the rate of the Earth’s capability to sustain it (Lu, 2017), it is not impossible to imagine a future when all that is wild, i.e., self-determination in the landscape, is all but extinguished. The ambition to sustain or enhance the current instrumental values that humans glean from ecosystems, i.e., shallow ecology, may not be sufficient to avoid this future. On the contrary, it could accelerate its fruition.

Avoiding this future may very well necessitate a global values shift towards predominantly nonanthropocentric worldviews, wherein the intrinsic values of ecosystems are held in similar esteem to the instrumental values they produce. Such a future would entail a moral imperative, i.e., a voluntary “restriction on freedom in the

struggle for existence” (Leopold, 1949/1989, p. 202), to minimize human impacts beyond what is essential to satisfy “vital need” (Naess, 1986/2011, p. 404).

According to the results of this study, American landscape architects exhibit primarily anthropocentric, shallow ecology worldviews, albeit bordering deep ecology. More research is required to determine if these results are indicative of worldviews within the landscape architecture and planning professions in general, and/or if they are indicative of a trend that may eventually lead to predominantly deep ecology worldviews. Regardless of the dominant worldviews of today, landscape designers will continue to be influential in determining the land-use impacts that humans create in the future. In this capacity, they have a unique opportunity to exercise their ethics in the landscape. Whether or not these ethics will increasingly consider the intrinsic values of ecosystems, remains to be seen. The results of this study indicate that such values are not currently mainstream in the landscape architecture and planning professions, but may be within reach.

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CHAPTER 3

THE NEW ECOLOGICAL PARADIGM SCALE: IDENTIFYING THE  
ENVIRONMENTAL WORLDVIEWS OF LANDSCAPE ARCHITECTURE  
STUDENTS<sup>2</sup>

**Abstract**

The environmental values of landscape architects determine their environmental worldview. Pro-environmental values have gained endorsement in America since the second half of the twentieth century, including in landscape architecture theory (Lovell & Johnston, 2009; Thompson, 2007; Wu, 2013). However, pro-environmental values have not increased across the entire span of the American population. Rather, this shift has occurred among select groups of the population (Brulle, Carmichael, & Jenkins, 2012; Dunlap, 2008; Dunlap, Van Liere, Mertig, & Jones; 2000; Franzen & Vogl, 2013). The New Ecological Paradigm (revised-NEP) scale is a survey instrument that identifies differences in environmental worldview between population groups. This study utilizes the revised-NEP scale to assess the environmental worldviews of landscape architecture students in contrast to general education students at Utah State University. The results indicate that the landscape architecture students exhibit greater pro-environmental worldviews than the general education students. These results are consistent with the theory that the study of landscape architecture is correlated to greater pro-environmental values than are associated with the general higher education population.

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## **Introduction**

Landscape architecture is a profession in which practitioners “embody and embed... ideas [and] values in their works” (Meyer, 1992/2002, p. 21). According to the American Society of Landscape Architect’s (ASLA) Code of Environmental Ethics (2006), these values should be consistent with the mission to “enhance, respect, and restore the life-sustaining integrity of the landscape for all living things.” In recent decades, notions of ‘sustainability’ and ‘ecosystem services’ have become prominent topics within landscape architecture theory (e.g., ASLA, 2014; Lovell & Johnston, 2009; Wu, 2013). These topics have followed a broader pro-environmental values shift among the American population, which has occurred since the second half of the twentieth century (Catton & Dunlap, 1980; Dunlap, 2008; Merchant, 1992; Thompson, 1998, 2007). This broader values shift may be conceptualized as the emergence of a New Ecological Paradigm (revised-NEP) from the Dominant Social Paradigm (DSP) of America prior to the mid-20<sup>th</sup> century (Dunlap & Van Liere, 1978/2008; Dunlap et al., 2000).

However, the values shift within the general American population has not been unanimous. On the contrary, environmental concern has decreased among politically conservative Americans in recent decades (Dunlap, 2008; Franzen & Vogl, 2013). Similarly, revised-NEP endorsement is negatively correlated with male gender, rural childhood environment and age, and positively correlated with education level (Corbett, 2006; Dunlap & Van Liere, 1978/2008; Shultz & Zelezny, 1998; Scott & Willits, 1994). The decline in pro-environmental values among some segments of the American

population, coupled with the increase in pro-environmental values among other segments of the population, has produced a diversity of distinct environmental worldviews in American culture (Dunlap & Van Liere, 1978/2008; Dunlap et al. 2000). The New Ecological Paradigm (revised-NEP) scale is a statistical instrument that identifies such differences in environmental worldview between survey groups.

### **Literature Review**

The pro-environmental values shift within American culture that has taken place since the second half of the twentieth century has been characterized by the increasing acceptance of the instrumental and intrinsic values of ecosystems (Callicott, 1989; Devall, 1980; Naess, 1973/2005). Intrinsic value refers to the inherent right to exist. In contrast, instrumental values refer to the goods and services that humans receive from ecosystems. The instrumental values of a river, for example, include water supply, hydropower and habitat. The intrinsic value of a river, on the other hand, involves its inherent right not to be drained, channelized, diverted or otherwise trammelled by the deliberate actions of other entities, except for as required to satisfy “vital need” (Naess, 1986/2011, p. 404).

Various commentators attribute the intrinsic “land ethic” described by Aldo Leopold (1949/1989) as marking the beginning of this shift in environmental values (e.g., Callicott, 1989; Merchant, 1992; Thompson, 1998). The shift was later catalyzed by increasing concerns regarding the negative environmental effects of industrialization vis-à-vis human health and happiness (e.g., Carson, 1962; Hardin, 1968/2001; McHarg, 1969/1971). Ultimately, these concerns manifested in a spate of major federal

environmental legislations, including the Clean Air Act (1963), National Environmental Policy Act (1969) and Clean Water Act (1972).

The New Ecological Paradigm (revised-NEP) survey was developed to assess the shift in environmental values that occurred during and after this period (Dunlap et al., 2000). According to its authors, the survey measures departure from the Dominant Social Paradigm (DSP) of pre-1970's America towards the revised-NEP. The DSP is characterized by, "belief in abundance and progress," "devotion to growth and prosperity," "faith in science and technology" and "commitment to a laissez-faire economy, limited government planning and private property rights" (Dunlap & Van Liere, 1978/2008, p. 19). In contrast, the revised-NEP is characterized by the acceptance of, "the reality of limits to growth," "antianthropocentrism," "the fragility of nature's balance," the rejection of human exemptionalism and "the possibility of an ecocrisis" (Dunlap et al., 2000, p. 432). The survey consists of 15 statements, to which respondents indicate agreement on a scale from 1 to 5. The eight odd-numbered statements are worded in a pro-revised-NEP fashion and scored from 1: "Strongly Disagree" to 5: "Strongly Agree." The seven even-numbered statements are worded in an anti-revised-NEP fashion and scored from 1: "Strongly Agree" to 5: "Strongly Disagree." (see Table 3-1).

However, in recent years, researchers have found that the shift towards the revised-NEP worldview has slowed or even declined among certain segments of the American population, while simultaneously increasing among other segments of the population (e.g., Brulle et al., 2012; Dunlap, 2008; Franzen & Vogl, 2013; Hawcroft &

**Table 3-1.** The New Ecological Paradigm survey

<i>Please indicate the extent* to which you agree or disagree that:</i>
1. We are approaching the limit of the number of people the earth can support
2. Humans have the right to modify the natural environment to suit their needs**
3. When humans interfere with nature it often produces disastrous consequences
4. Human ingenuity will ensure that we do NOT make the earth unlivable**
5. Humans are severely abusing the environment
6. The earth has plenty of resources if we just learn how to develop them**
7. Plants and animals have as much right as humans to exist
8. The balance of nature is strong enough to cope with impacts of modern industrial nations**
9. Despite our special abilities humans are still subject to the laws of nature
10. The so-called “ecological crisis” facing humankind has been greatly exaggerated**
11. The earth is like a spaceship with very limited room and resources
12. Humans were meant to rule over the rest of nature**
13. The balance of nature is very delicate and easily upset
14. Humans will eventually learn enough about how nature works to be able to control it**
15. If things continue on their present course, we will soon experience a major ecological catastrophe

\*Agreement is indicated on 5-point scale including: Strongly Agree, Mildly Agree, Unsure, Mildly Disagree and Strongly Disagree

\*\*The seven odd-numbered statements are worded in an anti-New Ecological Paradigm fashion

Milfont, 2010). These bipolar shifts within the overall American population have been strongly correlated to differences in political orientation. Specifically, liberal political orientation has been correlated to increasingly pro-environmental worldviews, whereas

conservative political orientation has been correlated to declining pro-environmental worldviews (Brulle et al., 2012; Dunlap, 2008; Franzen & Vogl, 2013). Riley E. Dunlap (2008), one of the creators of the revised-NEP survey, traced the beginning of this divergence to the early 1980's:

Whereas in the late 1970's, Jimmy Carter had acknowledged the reality of limits and instituted effective energy conservation programs, Ronald Regan came into office vowing to make American great again. Reagan dismissed the idea of limits by adopting the views... that human ingenuity was the ultimate resource and that environmental and resource problems could be easily dealt with via science and technology. (p. 14)

However, differences in political orientation do not explain all of the variance in environmental worldview within the general American population. Gender, childhood environment, education level and age have also all been correlated to differences in endorsement of the pro-environmental, revised-NEP worldview (Corbett, 2006; Dunlap & Van Liere, 1978/2008; Shultz & Zelezny, 1998; Scott & Willits, 1994). Additionally, the revised-NEP survey has been proven to be effective for identifying pro-environmental values that are based on group association (e.g., membership in an environmental organization) (Dunlap & Van Liere, 1978/2008; Dunlap et al., 2000). As such, if the group association of having declared a landscape architecture major is correlated to pro-environmental values that are greater than those associated with the general American population, then this difference should be reflected in the groups' overall endorsement of the revised-NEP worldview, in addition to differences in predictor characteristics within the groups.

The recent influence of concepts of ‘sustainability’ and ‘ecosystem services’ on landscape architecture theory provides a theoretical basis for expecting a correlation between pro-environmental values and the choice to elect landscape architecture as a major. That is, these theories involve a high degree of concern for the instrumental values of ecosystems, as well as some concern for their intrinsic value. ‘Sustainability’ refers to an array of concepts that have affected landscape architecture theory since the 1980’s (Thompson, 1998, 2007; Wu, 2013). Largely, these concepts involve sustaining or enhancing the instrumental values of ecosystems for human benefit (e.g., United Nations World Commission on Environment and Development, 1987; Daly, 1995). Although, related concepts have incorporated some concerns for the intrinsic values of ecosystems, e.g., the ‘watershed consciousness’ and ‘sense of place’ concepts of the bioregional planning movement (Azizul, Knight-Lenihan, & van Roon, 2016; Merchant, 1992). Most recently, ‘sustainability’ concerns have been closely tied to the notions of ‘ecosystem services’ (e.g., ALSA, 2014; Lovell & Johnston, 2009; Wu, 2013), which involve sustaining or enhancing the provisioning, regulating, cultural and supporting services provided by ecosystems to humans (Reid et al., 2005).

Thus, if the pursuit of landscape architecture as a major of study is, in fact, correlated to greater pro-environmental worldviews than are common among the general American population, than landscape architecture students should exhibit greater pro-environmental worldviews than general higher education students, i.e., general Americans with a similar education level. Additionally, this difference should be larger than what may be correlated to differences within the groups in terms of the other

relevant predictor characteristics, i.e., political orientation, gender and childhood environment.

To test these expectations, one group of landscape architecture students and two groups of general education students from Utah State University (USU) were surveyed using the revised-NEP scale. Specifically, the analysis of their responses was intended to provide answers to the following questions:

Question 1: Do the landscape architect students exhibit significantly more pro-environmental worldviews than the general education students?

Question 2: Can differences in worldview between the groups be correlated to differences in political orientation, gender and childhood environment?

## **Methods**

All of the surveys in this study were conducted among students enrolled at Utah State University (USU) during the Fall 2016 to Spring 2017 academic year.

The first survey group consisted of general education students enrolled in an *Introduction to Landscape Architecture* (LAEP 1030) course during the Fall 2016 semester. The survey was administered via Qualtrics.com to 336 potential study participants in the context of course extra credit, of whom 295 completed the survey and agreed to participate in the study, for a usable response rate of 87.8%. This group is referred to as the General Students Group 1.

The second survey group consisted of general education students enrolled in the LAEP 1030 course during the Spring 2017 semester. The survey was administered via Qualtrics.com to 251 potential study participants in the context of course extra credit, of

whom 223 completed the survey and agreed to participate in the study, for a usable response rate of 88.8%. This group is referred to as the General Students Group 2.

The final survey group consisted of students with a declared landscape architecture major. The survey was administered by email to this group via Qulatricks.com, with one round of reminders. It reached 126 potential study participants, of whom 47 completed the survey and agreed to participate in the study, for a usable response rate of 37.3%. This group is referred to as the Landscape Architecture Students.

To examine question 1, differences between the groups in terms of overall environmental worldview were assessed via one-way analysis of variance (ANOVA). The independent variable in this analysis was the sample groups (i.e., General Students Sample 1, General Students Sample 2 and Landscape Architecture Students). The dependent variable was the New Ecological Paradigm (revised-NEP) scale total. Revised-NEP scale total value was determined for each group by dividing the sum of the mean response value for each question and by 15 (i.e., the total number of statements in the revised-NEP scale). Groups exhibiting significant differences in this ANOVA were identified via Tukey's HSD post-hoc test. The effect sizes of significant differences were determined by  $\eta^2$  values.

To examine question 2, the survey groups were analyzed for significant correlations between predictor characteristics (i.e., political orientation, gender and childhood environment) and revised-NEP scale responses. The results of previous studies indicate that liberal political orientation, female gender and urban childhood environment should be significantly positively correlated to revised-NEP response values (Corbett,



2006; Dunlap & Van Liere, 1978/2008; Shultz & Zelezny, 1998; Scott & Willits, 1994).

Correlations were determined by linear regression analyses as Pearson's correlation coefficients ( $r$ ). The makeup of each group relative to its predictor characteristics is shown in Table 3-2.

Finally, the composition of the groups, relative to their significant predictor characteristics, were analyzed for significant differences via one-way ANOVAs, in which the dependent variables were the predictor characteristics and the independent variables were the groups. Significant differences in this analysis were determined by Tukey's HSD post-hoc tests. Effect sizes of significant differences were determined by  $\eta^2$  values.

**Table 3-2.** Predictor characteristics of each survey group

	General Students Group1	General Students Group 2	Landscape Architecture Students
Sample Size	295	223	45
Female	110	87	22
Male	185	136	23
Urban	36	31	3
Suburban	168	117	25
Rural	91	75	17
Liberal	28	21	9
Moderate	115	92	22
Conservative	152	110	14

## Results

*Do the landscape architect students exhibit significantly more pro-environmental worldviews than the general education students?*

According to the analysis, the landscape architect students do exhibit, overall, a significantly more pro-environmental worldview than the general education students. The analysis of variance (ANOVA) for the New Ecological Paradigm (revised-NEP) scale total between the groups was significant,  $F(2, 560) = 10.627, p < .001$ . Tukey's HSD post-hoc test revealed that the significant difference existed between the landscape architecture students and the general education groups, and that no significant difference existed between the two general education groups. Although the difference between the general education students and the landscape architecture students was significant, the effect size of this difference was small,  $\eta^2 = .037$ . The small effect size indicates that, while the worldviews of the landscape architecture students and general education students were distinct from one another, the overall difference between them was small, in comparison to the complete range of worldview that is capable of being assessed by the revised-NEP survey.

The descriptive statistics for the revised-NEP scale totals of the groups are displayed in Table 3-3.

**Table 3-3.** Mean response values of the groups to the New Ecological Paradigm scale

Group ID	Sample Size	Mean	Standard Deviation
General Students Group 1	295	3.29	.582
General Students Group 2	223	3.22	.577
Landscape Architecture Students*	45	3.65	.535

\* The landscape architecture students sample is significantly different from the other samples at  $p < .001$

*Can the significant difference in worldview between the groups be correlated to differences of political orientation, gender and childhood environment within the groups?*

The New Ecological Paradigm (revised-NEP) endorsement of the survey groups is positively, significantly correlated to liberal political orientation, female gender and being raised in an urban environment. These results are displayed as a correlation matrix in Table 3-4. The Pearson's correlation coefficients ( $r$ ) values indicate on a scale from -1 to 1 the amount of variance in environmental worldview within the groups that can be correlated to differences in the predictor characteristics. For example, if the  $r$  value for the political orientation characteristic was 1, then this would represent a perfect correlation between political orientation and environmental worldview. This is not the case. Rather, the  $r$  value of .465 for political orientation indicates that a moderate amount of the variance in environmental worldview within the groups can be correlated to differences in political orientation (Evans, 1996). The significance of the gender and childhood environment characteristics indicate that differences in the consistencies of the groups based on these characteristics can also be correlated to differences in

environmental worldview. However, the smaller  $r$  values for these characteristics indicate that less variance in environmental worldview between the groups can be correlated to these characteristics than can be done for the political orientation characteristic.

**Table 3-4.** Pearson's correlation coefficient matrix of scale total responses to predictor characteristics

	1	2	3	4
1. Revised-NEP Scale Total	1.000			
2. Political Orientation	.465**	1.000		
3. Gender	.293**	.110*	1.000	
4. Childhood Environment	.124*	.118*	.024*	1.000

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

However, while all of the predictor characteristics were determined to be significant in their correlation to worldview variance, only the political orientation characteristic proved to be significant upon group ANOVAs for these characteristics,  $F(2, 560) = 4.312, p < .01$ . These results indicate that differences within the groups in terms of overall consistency of gender and childhood environments could be accounted to random chance, rather than significant patterns. Conversely, the significance of the group ANOVA in regard to political orientation indicates that a difference existed between the groups in regard to their political orientations that could not be explained by random chance. Rather, this difference constituted a significant pattern. As with the ANOVA for the revised-NEP scale totals, Tukey's HSD post-hoc test indicated that the significant

difference in overall political orientation existed between the landscape architecture student group and the general education student groups, but not between the general education student groups. However, as with the ANOVA for the revised-NEP scale totals, the effect size of this difference was small,  $\eta^2 = .015$ . This indicates that, while the landscape architecture group was distinct from the general education groups in terms of exhibiting a more liberal political orientation, the overall magnitude of this difference within the total range of possible political orientations (i.e., liberal, moderate and conservative) was small.

## **Discussion**

The results of the analysis support the notion that students who elect landscape architecture as a major of study are likely to exhibit greater pro-environmental worldviews than are associated with general higher education students. Additionally, the results show that, while differences in gender and childhood environment could be correlated to a small amount of variance in the overall environmental worldviews of the groups, political orientation was the strongest predictor in this capacity. Indeed, among these categories, consistency of political orientation proved to be the only significant difference in regard to the overall makeup of the groups. As such, the results of this study suggest that, in addition to exhibiting greater pro-environmental worldviews, landscape architecture students are also likely to be less politically conservative than general higher education students.

However, while the differences between the landscape architecture students and the general education students were significant, i.e., they were distinct from each other in

these capacities, the overall differences between the groups in terms of all possible environmental worldview and all possible political orientations were small. For example, one may expect the environmental worldviews and political orientations between members of Greenpeace and The Heritage Foundation to be radically opposed. In this capacity, the differences would be represented as both significant and as producing large effect sizes. This analogy is *not* indicative of the significant differences between the landscape architecture students and general education students in this study. Rather, in both cases, the significant differences between these groups were small, indicating comparatively subtle differences in environmental worldview and political orientation. Thus, in as much as the pro-environmental worldviews of the landscape architecture students could be said to reflect their values-based willingness to accept concerns relating to ‘sustainability’ and ‘ecosystem services,’ the small differences between the groups indicate that the general education students were not far behind.

### **Limitations**

The main limitation in this study stemmed from the manner in which the general education students were identified. That is, these groups consisted of students already enrolled in the *Introduction to Landscape Architecture* (LAEP 1030) course. As such, it is possible that they were drawn to the class by environmental values that were already characteristic of the choice to study landscape architecture as a major. If this were the case, the difference between the groups may have been larger if the responses of the landscape architecture students had been compared to a truly random sample of Utah State University (USU) students.

## **Conclusion**

In recent decades, American landscape architecture theory has experienced a pro-environmental trend, which has been largely related to concepts of ‘sustainability’ and ‘ecosystem services’ (Lovell & Johnston, 2009; Thompson, 2007; Wu, 2013). This trend has followed a broader pro-environmental values shift within American culture that has occurred since the second half of the twentieth century (Dunlap & Van Liere, 1978/2008; Merchant, 1992; Thompson, 1998). However, the broader trend has not occurred unanimously among the American population (Dunlap, 2008; Hawcroft & Milfont, 2010). On the contrary, pro-environmental worldview has increased among individuals with a liberal political orientation while simultaneously decreasing among individuals with a conservative political orientation (Brulle et al., 2012; Franzen & Vogl, 2013).

The results of this study are characteristic of these circumstances as they relate to landscape architecture and general higher education students. That is, among all the study criteria (i.e., environmental worldview, political orientation, gender and childhood environment), the landscape architecture students exhibited distinct differences from the general education students only in terms of environmental worldview and political orientation. However, the differences between the groups in these characteristics were small. Thus, the results suggest that, while landscape architectures students are likely to exhibit greater pro-environmental worldviews and less conservative political orientations than general higher education students, that these differences between the groups are subtle, rather than radical, in scope.

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## CHAPTER 4

### RESULTS AND CONCLUSIONS

The purpose of this thesis was to characterize the environmental values of American landscape architecture students and practitioners. For this effort, two studies were performed. The first study analyzed responses to the New Ecological Paradigm (revised-NEP) survey in order to characterize the environmental values of landscape architecture students and practitioners from Utah State University (USU) in terms of shallow and deep ecology worldview. The second study utilized the revised-NEP survey to examine the environmental worldview of general education and landscape architecture students at USU in order to identify whether they differed in their overall environmental worldviews, political orientations, genders and childhood environments. The results and implications of these studies are discussed in the following sections.

#### **The Environmental Values of American Landscape Architects**

In the first study, it was found that general education students, landscape architecture students, and landscape architect alumni from Utah State University (USU) all exhibited mid-level responses to the New Ecological Paradigm (revised-NEP) survey. A Shallow v. Deep Worldview model was developed to characterize these results. According to the analysis, the responses of the survey groups were consistent with the environmental values that characterize anthropocentric, shallow ecology worldviews. Additionally, as part of this analysis, a significant difference was identified between the

environmental worldviews of the general education students and the landscape architecture students/alumni practitioners.

Overall, the participants in this study exhibited strong agreement with the notion that humans are affected by ecological limits. However, they also exhibited uncertainty or mild confidence in the notion that humans will be able to develop technical and/or input interventions to avoid negative consequences associated with these limits. These responses indicate a strong belief in the instrumental value of ecosystems, combined with a tendency to perceive humans as the most influential, and thus most important, components of the environment. This mixture of environmental values is ultimately characteristic of anthropocentric, shallow ecology worldviews, and was exhibited by all three of the survey groups. However, the environmental worldviews of the landscape architecture students and alumni practitioners proved to be distinctly more pro-environmental than those of the general education students. Additionally, the responses of the former groups, in regard to the Shallow v. Deep Worldview model, were in close proximity to the conceptual border of deep ecology.

### **The Environmental Worldview of Landscape Architecture Students**

In the second study, it was found that landscape architecture students exhibited a small, significant difference in their environmental worldview, in comparison to general education students. As in the first study, this difference was primarily correlated to political orientation, rather than the other relevant predictor characteristics. These results indicate that landscape architecture students are likely to exhibit greater pro-environmental worldviews and be less politically conservative than general higher

education students. However, the small effect sizes of these differences indicates that, while the two groups were distinct in these respects, their overall environmental worldviews were not radically different, in terms of the full spectrum of environmental worldviews that the New Ecological Paradigm (revised-NEP) survey is capable of assessing.

### **Limitations**

The data used for these studies involved several limitations, including unequal variance and unique regional characteristics.

The first limitation, unequal variance, was due to unequal sample sizes of the groups, in addition to the Likert scale design of the New Ecological Paradigm (revised-NEP) survey. Specifically, the analyses were limited by the smaller amount of declared landscape architect students at Utah State University, in comparison to the amount of students that attended the *Introduction to Landscape Architecture* (LAEP 1030) lecture each semester. The unequal sample sizes of the survey groups was especially limiting for the linear regression analysis of the combined groups in the first study. In this analysis, the larger sample size of the general education students could create a confounding effect, where the preponderance of young conservatives in the general education students group was likely responsible for creating a positive correlation between age and agreement with the revised-NEP worldview. Additionally, Likert scales are ordinal, rather than continuous. As such, data collected on a Likert scale will rarely exhibit homogeneity of variance. However, the analyses were not performed to produce exact scientific measurements, so much as they were to assess general patterns in the worldviews of the

survey groups. Also, the statistical methods employed in this study (e.g., analysis of variance, Cronbach's *alpha* and Primary Components Analysis) followed precedents established in previous revised-NEP studies with similar differences in sample size and Likert scale (e.g., Dunlap & Van Liere, 1978/2008; Noblet et al., 2013; Schultz & Zelezny, 1998). As such, it is maintained that the statistical analyses were useful in characterizing the survey results of both studies.

The second limitation involved the unique regional characteristics of the survey groups. As mentioned in the first study, the majority of the participants in the surveys were raised in either Utah or Idaho, which are majority conservative states, as well as the two states with the greatest proportion of members of the Church of Jesus Christ of Latter Day Saints (Jones, 2004). Both political orientation and religious affiliation may affect environmental worldview (Dunlap, 2008; Franzen & Vogl, 2013; Naess 1986/2011). As such, the results of the analyses may be more applicable to landscape architecture students and practitioners in the Intermountain West than to the general American population.

Finally, a third limitation involved the method in which the general education student groups were identified, i.e., enrollment in the LAEP 1030 course. It is possible that the students in this course were motivated to enroll by environmental values that were already characteristic of the American landscape design professions. If this were the case, it would be possible that truly random student samples would exhibit significantly greater differences in environmental worldview, in comparison to the landscape architecture students and alumni practitioners in this study.

## **Recommendations**

The Shallow v. Deep Worldview model developed in the first study is not specific to landscape architecture. It could be utilized to characterize the environmental ethics of many different groups. In this way, it would be especially useful for comparing the environmental ethics of multiple groups that are theorized to exhibit distinct environmental worldviews, such as the landscape architecture and general education students were theorized to do in this thesis.

Additionally, the Shallow v. Deep Worldview model could be utilized to compare landscape architecture students and practitioners from multiple states or countries. Doing so within the USA would provide additional context for the applicability of the study conclusions to the general American landscape architecture profession. Alternatively, doing so in multiple countries would provide statistical context for characterizing landscape architecture as a global discipline. Finally, if the model could be used to identify a population of landscape architects that exhibited deep ecology worldviews, a qualitative analysis of their designs, relative to a population of landscape architects that exhibited shallow ecology worldviews, could indicate what aspects, if any, that deep ecology worldviews were most likely to influence.

## **Conclusion**

The results of this thesis indicate that American landscape architecture students and practitioners are likely to exhibit shallow ecology worldviews that are more pro-environmental than general American higher education students. In as much as their responses were typical of shallow ecology worldviews, it can be expected that these



individuals may favor landscape designs that incorporate technological and/or input interventions to sustain current human behaviors within the constraints of ecological limits, rather than more radical interventions that would involve changes to current human behaviors in order to minimize ecological impacts altogether. In the long term, these worldviews may contribute towards a “garden scenario” future (Nash, 2014, pp. 379-385), wherein self-determination in the landscape is all but eliminated in the pursuit to cultivate the greatest amount of ecosystem goods and services for humans.

However, while currently characteristic of shallow ecology, the responses of the landscape architecture students and practitioners in the first study neared the border of deep ecology in the conceptual Shallow v. Deep Worldview model. Additionally, previous analyses by other researchers have indicated that landscape architecture has been affected by an ongoing pro-environmental values shift since the 1970’s (Thompson, 1998, 2007; Wu, 2013). As such, there is reason to believe that individual worldviews within the landscape design profession may be shifting towards more deep ecology values. If this is the case, a future in which the intrinsic values of ecosystems are more closely integrated into landscape designs may be within reach.

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