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PRECURSORS OF ENVIRONMENTAL CONCERN AMONG MICHIGAN STATE UNIVERSITY STUDENTS

By

Elizabeth A. Ritchie

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ABSTRACT

PRECURSORS OF ENVIRONMENTAL CONCERN
AMONG MICHIGAN STATE UNIVERSITY STUDENTS

By

Elizabeth A. Ritchie

For many years, researchers have been interested in the predictors of environmental concern. Previous research has determined that liberals and females are more environmentally concerned than their counterparts. There is also a relationship between a person's education, and environmental concern. The key contribution of this research is to look at education in a holistic sense. I examine several aspects of education and determine their impact on environmental concern. Finally, I propose a theoretical model to describe the interaction of these variables with environmental concern.

From this research, it is clear that predicting environmental concern is a complicated task. The majority of variables analyzed in this research were consistent in their impact on environmental concern at the bivariate levels: gender, political ideology, environmental knowledge, and pre-college participation in outdoor/environmental activities were all positively related to environmental concern, even when controlling for the effects of other variables. Similarly, family income and college major were both unrelated to environmental concern at both the bivariate and multivariate levels. Four of the variables analyzed, however, revealed more complex relationships with environmental concern.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (con't.)

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Some researchers have hypothesized that there has been a general shift in American attitudes about the environment since about the 1970s. These researchers contend that a more ecologically sound worldview is emerging. There is a growing base of research that suggests that we are abandoning the idea that humans can effectively control nature without negative consequence. It has been suggested that we are realizing our place within nature, rather than our dominance over it. In recent years, there has been an increased effort to describe and quantify environmental attitude and concern, as well as understand and measure what particular variables are influential in shaping those attitudes and concern.

There have been many studies that have tried to evaluate the links between education, environmental knowledge, and environmental concern. Research in the 1970s showed that increased knowledge about environmental issues lead to an increase in concern for the environment. In the 1980s, the environmental agenda came to the political foreground, and the United States government commissioned a national survey which included environmental issues. A recent Gallup poll found that 80% of today's American college students feel the environment is deteriorating. The media inundate us with reports on global warming, acid rain, and contaminated water and food supplies. These examples suggest that the environment will remain an important issue for many years to come.

I designed this research to answer a fundamental question that had intrigued me for many years: why is it that some people are environmentally concerned, while others are not? Is there a difference in their backgrounds or their experiences

that may have shaped their thoughts, attitudes, and ideas? With these questions in mind, I developed a model to help describe some possible predictors of environmental concern. This model, presented in Chapter 2, suggests that a person's education, significant life experiences and various background variables all influence his or her environmental concern.

I had several key goals to accomplish in this study. Many researchers hypothesize that there is support for the emerging ecological worldview, or that there is an endorsement of a new ecological paradigm. My first goal, then, was to replicate the measurements of previous scales to determine the continued applicability of previous findings. Secondly, I wanted to determine the utility of the hypothetical model I proposed. Do the variables outlined in the model influence environmental concern in the way I've conceptualized them? Many researchers have examined background variables and their impact on environmental concern. Are these commonly reported relationships applicable in all situations?

A key contribution of this research is the manner in which I examine education. Many studies have examined the role that education, as a whole, plays in influencing environmental concern. Other studies have measured the impact of a particular environmental course or activity on environmental concern. I hypothesize that certain aspects of education – such as exposure to environmental education, choice of college major, a student's class standing, and his/her level of environmental knowledge – all are important in shaping environmental concern. Finally, I examine the experiences individuals have in their youth, or Significant Life Experiences, and determine if these influence environmental concern later in life.

In the next four chapters, I review the research literature, describe the methods employed in this research, report the results of my study, and provide a full discussion of the results.

CHAPTER 2

LITERATURE REVIEW

A recent Gallup poll found that 80% of today's American college students feel that the environment is deteriorating (Loges and Kidder, 2000). This statement might lead one to think that today's college students are concerned for the state of the environment. Further examination of the available literature, however, suggests this might not be an accurate assumption. There is a complex set of circumstances that shape and guide a student's attitude toward, and possible activism regarding, the environment. This thesis examines key criteria, identified in other research, which may influence the environmental attitudes of contemporary American college students.

Most research on the predictors of environmental attitudes has involved social surveys of the general public. Such surveys poorly represent student populations and those within the typical college student age range of 18 to 25 (usually due to lower response rates among this age group). Previous research has determined several factors that have some influence on environmental attitudes in the general population — it is therefore of interest to see how well these factors apply to the college student population. Although a few studies have addressed the issue of college student environmental attitude (Ridener, 1999; Berberoglu, 1995; Benton, 1993; Thompson and Gasteiger, 1985), much more remains to be done. Surveys of the general public do not include institutionalized individuals. This means there is a coverage bias inherent in surveys of the public. In order to understand environmental concern more fully, it is important to understand students'

attitudes, as well. Finally, students are often considered the leaders of the future. Therefore, their attitudes toward the environment could one day shape our world.

In this chapter, I will introduce and discuss environmental concern: its role in the larger environmental movement, its measurement as a variable and its predictors. I will discuss several background variables: gender, political ideology, family income, and community type. Many researchers also consider education to be an important variable influencing environmental concern. Due to the immediacy of education on student populations, I will treat this variable separately in the discussion and analyses. Rather than discuss education in its entirety, I will discuss specific aspects of education such as class standing, college major, environmental knowledge, and environmental education exposure. Finally, this chapter will explore Significant Life Experiences and their impact on environmental concern.

Environmental Concern.

Dunlap and Van Liere (1984) noted that there has been a general shift in American attitudes about the environment since about the 1970s. Prior to that time, they argued, people largely believed that humans could exploit nature without severe consequences to human lifestyle or ecological diversity. It was argued that human ingenuity would prevail over all environmental difficulties. There was a "belief in abundance and progress, our devotion to growth and prosperity, our faith in science and technology, and our commitment to a laissez-faire economy, limited governmental planning, and private property rights..." (Dunlap and Van Liere, 1978, p. 10). However, in the 1970s, people increasingly voiced concerns over the destruction of the environment. There appeared to be recognition that human activity was altering the physical environment to such a degree that the continued

existence of many species, including humans, was potentially in danger (Milbrath, 1984). Dunlap and Van Liere suggested that a more ecologically sound worldview has been emerging, and they described this shift in attitudes as representing a societal-level move from the "human exemptionalist paradigm" to a "new environmental paradigm."

Dunlap and Van Liere (1978) proposed an instrument to measure the degree to which a person endorsed the New Environmental Paradigm (NEP). Their original twelve-item scale was designed to reflect the degree to which a person is concerned about the natural environment, i.e. his or her environmental concern. The most recent version of the measurement instrument has fifteen items, and is called the New Ecological Paradigm scale, in order to reflect a more recent qualitative shift in environmentalism to even more holistic concern. While other measures have been used to assess environmental attitudes, the NEP scale is clearly one of the most popular and widely accepted measures of environmental concern (Dunlap et al., 2000; Furman, 1998; Gooch, 1995; Pierce et al., 1992; Arcury, 1990; Edgell & Nowell, 1989; Arcury, Johnson, and Scollay, 1986). Hence, it is the measure of environmental concern used in this thesis.

Many attempts have been made to isolate variables that contribute to a person's environmental concern. Among those most often examined – in both student and general populations – are gender, political ideology, family income, and community type. These background variables will be discussed in turn.

Background Variables.

Gender. One commonly discussed variable in the environmental concern literature is gender. Some studies have found women to be more environmentally

concerned than men (Mohai, 1992; Blocker and Eckberg, 1989; Brody, 1984). Other studies, however, have found the opposite (Arcury and Christianson, 1990; Arcury et al., 1987). Various explanations have been presented to account for gender differences in concern. Some of the most common explanations are those of socialization and parenthood status.

Socialization is the most commonly used argument to explain gender differences in concern. Depending on perspective, these explanations can highlight either women's or men's socialization (Austin and Woolever, 1994; Mohai, 1992; Blocker and Eckberg, 1989). For instance, one explanation describes women's roles as nurturers. This hypothesis suggests women are socialized to be interdependent, altruistic, compassionate, cooperative, and helpful. Further, this socialization translates into nurturing and protective feelings for the environment (Beutel and Marini, 1995; Gilligan, 1982; Chodorow, 1974). Similar arguments are advanced by proponents of ecofeminism, who suggest that women's reproductive and nurturing roles lead them to have closer connections to the natural world than men (Chodorow, 1999; Stern et al., 1993).

Another possibility stems from the idea that women's nurturing role makes them more aware of environmental health and safety issues. It is hypothesized that local issues will be more salient and involve greater potential risk to individuals. For instance, when considering local issues such as nuclear power (Solomon et al., 1989; George and Southwell, 1986; Nelkins, 1981; Brody, 1984; Passino and Lounsbury, 1976), toxic waste contamination of the local water supply (Hamilton, 1985a, 1985b), local energy development (Stout-Wiegand and Trent, 1983), and local air and water pollution (Blocker and Eckberg, 1989) women are consistently found to be more concerned than their male counterparts. Studies that examined

gender differences and environmental concern at a *general* level, however, have been inconsistent and often contradictory (Arcury and Christianson, 1990; Arcury et al., 1987; Lowe and Pinhey, 1982; McStay and Dunlap, 1983; Van Liere and Dunlap, 1980; Mitchell, 1979). It appears, then, that gender differences in environmental concern are at least partially explained by perception of risk, with women showing a higher degree of concern regarding local issues.

Men's socialization has also been used to explain differences in environmental concern. For instance, men are often raised to be providers. The Economic Growth explanation holds that men are socialized to be more involved in the marketplace and to be economic providers. This socialization, it is argued, leads men to be more competitive, less altruistic, and to value economic prosperity over environmental concern. This, then, would lead men to express a lower degree of concern on general environmental issues (Dietz et al., 2002; Zelezny et al, 2000; Blocker and Eckberg, 1997; Beutel and Marini, 1995). Studies examining this hypothesis have yielded mixed results (Austin and Woolever, 1994; Mohai, 1992).

Similar to the health and safety hypothesis is the Parenthood Status explanation. Stern et al. (1993) suggested that men and women may hold different beliefs regarding the consequences of environmental conditions, and that they may give different value weights to each type of consequence. It is argued that attitudes obtained from socialization are reinforced by the roles women take in their adult lives, with women being more likely to adopt roles as homemakers and caregivers. Women in these traditionally 'female' roles are thought to be more nurturing and therefore more concerned about environmental damage. Despite being intuitively reasonable, the research does not support this hypothesis. Blocker and Eckberg (1997) found that homemakers, and particularly *permanent* homemakers, are less

likely to recycle, to engage in 'green' activities (purchasing environmentally friendly products), or to be willing to bear the costs of protecting nature, and they have a much more positive view toward economic activity. Further, women who identified themselves as homemakers were found to rank lower, not higher, with regard to environmental concern (Austin and Woolever, 1994; Mohai, 1992; Blocker and Eckberg, 1989; Steger and Witt, 1989).

These explanations do hold some theoretical appeal for describing the apparent gender differences in environmental concern. However, the available literature does not provide coherent support for gender differences in environmental concern. What has become clear is that one force behind gender differences is the perception of risk. When a specific (often local) risk is involved, women express greater concern than men. When the issues are national or global, women still express greater concern than men, but the magnitude is often less than it would be for local issues. Student populations also show this difference. In student populations, the level of the issue being investigated is often shown to be important, with local issues showing women to be more concerned than their counterparts (Smith, 2001; Loges, 2000; Stern et al., 1993;).

Clearly, gender differences in environmental concern are complex issues. Although the literature proposes several plausible explanations, the overall picture is still ambiguous. Particularly in relation to student populations, gender is often measured as just one of a standard set of investigated variables. Because gender is one of the most commonly reported variables in environmental concern research, and it hasn't been thoroughly examined in student populations, it has been included in this analysis.

Political Ideology. Research has consistently shown more liberal individuals to show more concern for the environment (Skrentny, 1993; Jones and Dunlap, 1992; Blocker and Eckberg, 1989; Van Liere and Dunlap, 1980). There is a great deal of debate as to why this is the case. Inglehart (1990, 1977) theorized that the apparent rise in environmental concern was due to postmaterialist views of the post-Second World War generation. This generation, he argues, had to suffer very little material deprivation during their formative years, leading them to be less concerned with 'material' matters. In other words, postmaterial values reflect an individual's freedom to focus on higher-level needs, such as the environment, compared to materialist values which reflect more basic needs such as security and safety (Inglehart, 1990). Inglehart's theory rests on two main hypotheses. First, the scarcity hypothesis suggests that people will place greatest subjective value on things in relatively short supply. Second, the socialization hypothesis, argues that a person's basic values reflect the conditions that existed during the person's pre-adult years. These hypotheses suggest that the post-WWII generation will seek wider political agendas that reflect postmaterial values. Analysts have suggested that postmaterialism reflects a populist and participatory orientation, and that this is strongly related to democratic and reformist attitudes (Dalton, 1999). Further, postmaterial values are usually associated with liberal political ideologies (Inglehart 1997; Abramson and Inglehart, 1995; Gibson and Duch, 1994; Muller-Rommel, 1989; Lowe and Pinhey, 1982). Although not specifically included in Inglehart's original discussion, concern for the environment has been correlated with postmaterial values (Abrahamson and Inglehart, 1995; Inglehart, 1990; Rohrschneider, 1988), and it is generally considered in the literature to be a postmaterialist value.

With respect to student populations, it has been shown that political liberals are more likely to show higher levels of concern than their conservative counterparts (Thompson and Gasteiger, 1985; Wysor, 1983).

Based on the relatively consistent findings that liberalism is linked to environmentalism, political ideology is important to include it in this study.

Family Income. It has been widely assumed that concern for the environment is a characteristic displayed by wealthier individuals. Economists and psychologists have viewed environmental concern as a luxury or convenience, developing only after more immediate basic human needs of food, housing, and security are met (Baumol and Oates, 1979; Leff, 1978). Political scientists argue that environmental concern is a product of 'postmaterialist values' (Inglehart, 1990), which have arisen due to post-WW II affluence, as noted earlier. In each case, the arguments suggest that residents of poorer, non-industrialized nations are assumed to be less environmentally concerned than their counterparts in the industrialized world. However, Dunlap and Mertig (1995) found that residents of low-income nations tended to show *higher* levels of concern on many issues than did residents of wealthier countries.

Even within industrialized nations, income does not appear to have the expected effect on environmental attitudes. While a few studies in the United States (Arcury, 1990; Arcury and Johnson, 1987; Arcury et al., 1986) have found a positive relationship between family income and environmental concern, others have found only minimal relationship between environmental concern and income (Mertig and Dunlap, 2001; Morrison and Dunlap, 1986).

There are a few student studies that examine income as a predictor of environmental concern. One study (Thompson and Gasteiger, 1985) found that respondents from families with higher incomes had lower attitudinal scores than their lower income counterparts. This relationship should be evaluated further, particularly considering the literature appears to have a gap in this area. Because of family income's theoretical potential to contribute to environmental concern, it is included as a possible factor in this thesis.

Community Type. Past research has been ambiguous regarding the impact community type (rural versus urban) has on environmental concern. Some studies have found no effect of community type on environmental concern (Milbrath, 1975). Other studies, however, have found urban individuals to be more environmentally concerned than their rural counterparts (Jones and Dunlap, 1992; Arcury, 1990; Arcury et al., 1986; Buttel and Flinn, 1976). In contrast to residents of urban areas, residents of rural communities are often regarded as being anti-environmental. There are several arguments used to explain why these differences may arise.

The most frequent explanation given for rural-urban differences in concern considers differential exposure to environmental degradation. The Environmental Deprivation hypothesis (Bennett and McBeth, 1998; Freudenburg, 1991; Tremblay and Dunlap, 1978) claims that rural residents show a lower level of environmental concern due to the fact they live in a relatively unpolluted area. Conversely, urban residents are more exposed to air, water, and noise pollution and this would make them more apt to be environmentally concerned (Dillman and Christenson, 1975; Kromm et al., 1973; DeGroot, 1967).

Another hypothesis used to explain rural-urban differences in concern is based on occupation. The extractive-commodity, or Nature Exploitative Occupation hypothesis (Freudenburg, 1991; Mohai and Twight, 1986), contends that rural residents are more likely to participate in resource extractive occupations, such as farming, mining, and logging. Individuals in these occupations typically display the attitude that humans have dominion over the land, and that humans are not part of the ecological landscape. These beliefs are congruent with the beliefs outlined in the Human Exemptionalist Paradigm. Therefore, rural residents, who are more likely to participate in such occupations, are argued to be less likely to be concerned about environmental issues.

Closely linked to the Natural Exploitative Occupation hypothesis is the notion that rural residents are more likely to have 'pro-growth' worldviews (Murdock and Schriner, 1977). This explanation contends that rural residents are more likely to experience economic underdevelopment and, therefore, value economic growth over environmental protection.

One final hypothesis points toward socialization to explain rural-urban differences in concern. In this view, the place where individuals were socialized has an important impact on environmental concern. The community type at the time of socialization, rather than current community type, has been shown to be more important with regard to environmental concern (Glenn and Hill, 1977). In accordance with this hypothesis, individuals socialized in metropolitan areas are likely to view their surroundings as predominantly man-made. The hypothesis suggests that individuals who grew up in such an area would be more likely to see humans' efforts as a proper solution to poor environmental quality. In other words, urban residents are socialized to see people as determining environmental

conditions (Lowe and Pinhey, 1985). Consequently, individuals raised in urban environments are more likely to realize the negative impacts humans have had on the environment and have an increased level of environmental concern as a result.

Recent research has sought to further describe rural communities and their constituents. There is some evidence to suggest that there are different 'classes' within rural populations. For instance, some researchers have found a significant difference between new rural migrants and long-term rural residents in terms of their environmental concern. It has been shown that urbanites who have recently relocated to rural areas show the highest environmental concern within that community (Jones et al., 1999; McBeth and Foster, 1994).

As with other variables commonly reported in the general population literature, few studies examine the impact of community type on environmental concern in student populations. There is some indication, however, that student populations follow their general population counterparts. In other words, individuals from larger urban communities have a higher level of environmental concern (Iwata, 1981).

Recent research has shown that rural-urban differences in environmental concern are a complex issue. Despite the numerous hypotheses to explain rural-urban differences in environmental concern, there is not overwhelming support for any of them. Urbanites do consistently show a higher degree of environmental concern than do their rural counterparts, but environmental concern is not as lacking in the rural community as was once thought. Theoretically, the socialization hypothesis suggests that community type at time of socialization could play an important role in formation of environmental concern. For this reason, it has been included in this analysis.

Education.

One variable consistently discussed in the environmental concern literature is education. Educational attainment has been shown to positively influence environmental concern. In other words, more educated individuals are more likely to be environmentally concerned than are less educated individuals. Certainly, in the general population, this positive relationship has been supported (Tikka et al., 2000; Glover and Deckert, 1998; Arcury, 1990; Arbuthnot, 1977; Kolodiy, 1975).

Student populations obviously have the benefit of education, albeit 'in process'. When comparing general and student populations, there is an interesting point to mention regarding environmental concern. Students show a somewhat higher degree of environmental concern than the general population (Loges, 2000). Two possible reasons for students showing higher concern are the typical student age range and the immediacy of their educational exposure. Younger individuals, which students certainly are on average, often show a higher degree of concern (Dunlap and Jones, 1992). An important question, then, is what specifically about education contributes to shaping positive environmental concern?

Exposure to Environmental Education. One area of education that has been shown to positively influence environmental concern is exposure to environmental education (EE). Environmental education is instruction specifically aimed at increasing a student's awareness, knowledge, and appreciation of the environment (Hungerford and Volk, 1990). In the United States, there are national standards for environmental education which incorporate four key educational components: question and analysis skills, knowledge of the environment, skills for addressing

and understanding environmental issues, and personal and civic responsibility (NAAEE; NEETF). See Appendix 1 for a full listing of these standards. Although there is a wealth of research outlining how individual environmental education courses impact environmental concern (Bradley et al., 1999; Glover and Deckert, 1998; Benton, 1993; Fishbein and Manfredo, 1992; Gigliotti, 1992; Arcury, 1990; Hungerford and Volk, 1990), there are few studies that attempt to evaluate a student's overall exposure to environmental education and the impact that it has on environmental concern.

In addition to comparison with earlier research findings, a key contribution of this research is an attempt to measure exposure to the core components of environmental education and to test how this exposure relates to environmental concern.

College Major. Another important component of education is a student's chosen major. Deciding a college major is one of the most difficult considerations an American university student has to make in his/her education. Although highly dependent on a particular university, a Bachelor's degree usually requires at least four years of full-time study to complete. Within the first year, students typically enrol in general education courses. Deciding a college major or concentration usually occurs between years two and three of the student's academic progress (MSU Office of the Registrar). Several studies have found choice of college major to be linked to environmental concern score. Namely, students choosing pro-environmental majors were often found to exhibit higher levels of concern (Hodgkinson and Innes, 2001; Guimond and Palmer, 1996; Shetzer et al., 1991; Wysor, 1983).

Tikka et al. (2000) examined college major and level of environmental concern. They found that students in the biological sciences, when compared to those in other disciplines, had the most positive attitudes and showed the highest degree of knowledge with regard to contemporary environmental issues. Inversely, students in the engineering sciences had the least supportive environmental attitudes and had the least knowledge regarding environmental issues. Such findings demonstrate the importance, especially with students, of evaluating a student's area of study in addition to other aspects of their education.

Class Standing. Given the assumed linkage between education and environmental concern, one would expect a student further along in his/her academic progress to show a higher degree of environmental concern. In other words, s/he would have time to attain more education, and this should, theoretically, lead to an increase in level of concern. Many studies investigating environmental concern also explore, and control for, the influence of age. There is ample evidence that age is negatively related to environmental concern. This study employed class standing, as opposed to age. The sample for this study was college students, who are generally between the ages of 18 and 25. This age bracket does not provide enough variation to use age as a factor. Rather, this study used class standing, which focuses on how far along students are in their academic program, which, in turn, reflects the amount of education they have had.

A recent Gallup poll (Loges and Kidder, 2000) showed that class standing, or how far a student had progressed in his/her academic program, was indeed a factor in determining environmental concern. Other studies have found the opposite result

(Thompson and Gasteiger, 1985). The literature has very few studies that consider this particular question, however. This study will attempt to address this question.

Environmental Knowledge. As stated above, the literature clearly supports a positive link between education and environmental concern. It makes intuitive sense, then, that if a person knows more about environmental issues and problems, s/he will also show more concern (Arcury and Christianson, 1993; Arcury, 1990; Arcury et al., 1986). Measuring environmental knowledge is not as straightforward as it may seem at first glance, but methods for doing so have evolved over time. Early attempts at measurement relied on respondents rating their own environmental knowledge on a Likert-type scale (Arcury et al., 1986). For instance, respondents were asked to rate their knowledge regarding ground water pollution, with four answer choices from 'know a lot' to 'know very little'. Unsurprisingly, this was difficult to analyze – how much knowledge does someone who 'knows a lot' actually have?

More recent attempts to measure environmental knowledge have shifted toward asking a series of multiple-choice questions regarding environmental issues, where each question has only one correct answer. Measuring environmental knowledge in this way provides a relatively straightforward process to determine someone's knowledge on a particular environmental issue, although it does rely on issue-specific knowledge. One way to enhance the utility of this measure is to use a wide variety of issues. Using this measurement technique, a direct positive relationship between environmental concern and environmental knowledge has been shown (Bradley et al., 1999; Arcury, 1990).

The general population is often found to be rather unknowledgeable with regard to environmental issues. One national survey (Council of Environmental Quality, 1980) found that only 20% of the general population could answer seven out of ten environmental knowledge questions correctly. Student populations fare somewhat better than their general population counterparts. Maloney and Ward (1973) found that student populations could answer five out of ten questions correctly, which is slightly higher than their general population counterparts from the same study. Further, Benton (1993) found that students could answer at least eight out of ten environmental knowledge questions correctly.

In sum, there are several aspects of education that need to be considered when looking at educational influences on environmental concern, especially among student populations. A person's area of study, their class standing, their exposure to components of environmental education, and their environmental knowledge can all play important roles in influencing levels of environmental concern.

Significant Life Experiences.

Many researchers have contended that experiences during a person's formative years ("significant life experiences" or SLE) help to shape his/her environmental attitude and concern. SLE research first appeared in the literature in the early 1980s, but continuing research specifically designated as SLE research has been minimal. Instead, SLE has been examined in various disciplines, and has been given differing labels. The tradition of examining past experiences to determine their contemporary impact has been an important element in social research.

Tanner, who many consider to be the pioneer of SLE research, argued that childhood experiences were critical in the development of environmentalism. He surveyed members of several prominent conservation organizations, and asked them to qualitatively explain the formative influences which led them to conservation work and membership. Tanner (1980) found recurring themes from his conservationist sample. They often spent time in natural areas as children, had frequent contact with various habitats, had positive parental and teacher influences, and read environmental books. Based on his research, Tanner suggested the possibility of a critical link between nature-oriented childhood experiences and environmental attitude and concern, and he called this linkage 'significant life experiences.'

At almost the same time as Tanner's research, Peterson (1982) was examining environmental sensitivity. She defined environmental sensitivity as 'a basic appreciation and concern for the natural environment' (p. 5). Peterson found the following experiences most influential in shaping a person's environmental sensitivity: activities in the outdoors, a family member's positive environmental attitude, studying natural systems, reading environmental books, and personal experiences with habitat alteration. These activities are broadly similar to those outlined by Tanner's SLE research.

Other researchers have also examined the influences of significant life experiences and environmental sensitivity. Sia et al. (1985/1986) found that environmental sensitivity was a significant predictor of environmental concern. Hungerford and Volk (1990) showed that environmental sensitivity was an important variable in predicting responsible environmental action. Palmer (1993) found, again, a recurrence in theme: time spent in the outdoors, a person's level of

education, a family member's positive environmental attitude, and reading environmental books were influential in determining a person's level of proenvironmental attitudes. Despite subtle differences in labels and methodology, researchers have found markedly similar results: most people who are environmentally concerned all share certain key experiences. For the sake of continuity and ease, I will use the earliest descriptor 'significant life experience' in my discussions of this topic.

Significant Life Experiences research has several pronounced strengths. First, this area of research has been largely qualitative, setting it apart from other environmental concern research. This provides important information for comparison with more traditional quantitative research. Secondly, this research takes a person's whole life into account, seeking to understand the influence of experiences that occurred often decades earlier. Although there are some limitations to measuring an individual's memory of past events (Ross, 1997; Ross and Bueller, 1994), it appears that individuals can usually recall a 'generic' representation of childhood events (Neisser, 1981; Linton, 1982; Wagenaar, 1986). Even more promising for SLE research, an individual's recollection of particularly important or significant childhood events produces more accurate memories (Bower, 1992; Reisber and Heuer, 1992; Conway and Beckerian, 1988).

Despite the strengths of SLE research, there are some apparent weaknesses. One major criticism of early research was the pronounced gender bias. Both Tanner and Peterson's samples were overwhelmingly male - 82% and 78%, respectively. Considering that men are, in general, more likely than women to be outdoors oriented, these findings are not surprising. A second major weakness of early SLE research was that the studies (Palmer and Suggate, 1998; Palmer and

Suggate, 1996; James, 1993) only looked at environmental educators and environmental organization members. A broader comparative possibility was inhibited by the narrow range of groups studied. For comparative purposes, it is important to gain a picture of individuals with varying viewpoints and levels of activism, such as those hostile to environmental protection or those who care about the environment but have not become activists. Other research provides some insight into this question.

The outdoor recreation literature shares many similarities with SLE research. Namely, the activities reported as significant in contributing to positive environmental concern are very similar. These activities are described in the outdoor recreation literature as 'appreciative' activities, and include such things as hiking, walking, camping, and nature viewing (Tarrant and Green, 1999). These activities are remarkably similar to the influential items found in SLE research (Sia et al., 1985/1986; Dunlap and Heffernan, 1975).

The outdoor recreation literature has also extensively examined participation in activities which are generally considered to be unrelated or negatively related to environmental attitudes. These can be characterized as motorized or consumptive activities. Some examples of motorized activities are boating and riding off-road vehicles. The two most commonly cited consumptive activities are hunting and fishing. Individuals who participate in motorized or consumptive activities, then, should provide a comparative basis for participants in more appreciative activities.

The true strength of SLE research is its applicability across disciplines. Despite varying labels and methodology, researchers have consistently found certain youth activities to be influential in a person's adult proenvironmental

attitudes. It is for these reasons that Significant Life Experiences are evaluated in this thesis.

The foregoing discussion leads to the following model of influences on environmental concern. See Figure 2-1. This is the model used for understanding environmental concern among college students in this thesis. As can be seen from the figure, environmental concern is influenced by several key factors, including: background variables, education, and significant life experiences.

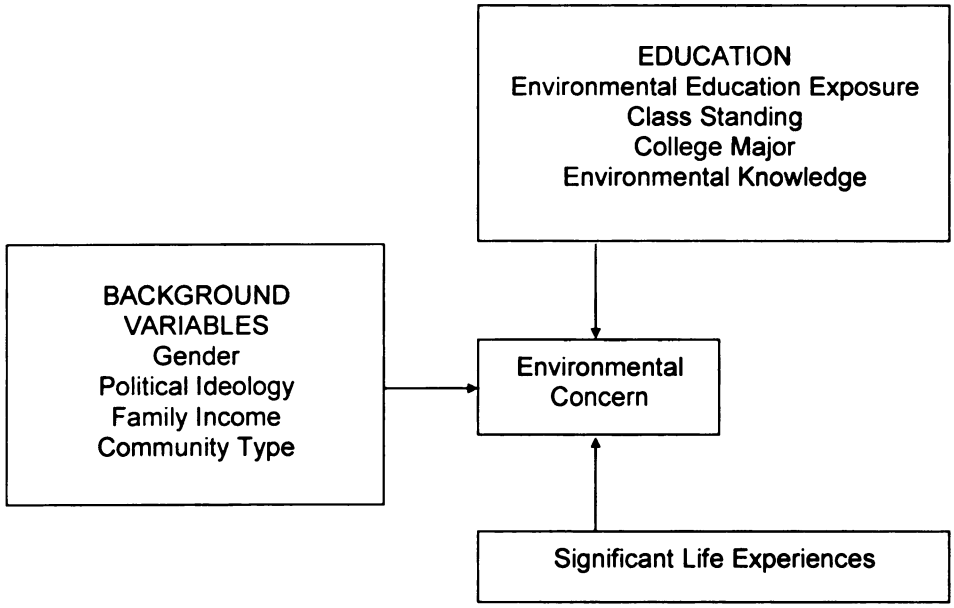

Figure 2-1. Theoretical model showing the relationship between environmental concern and: background variables, education, and significant life experiences.

Consistently, researchers have found that urban, younger, and more liberal individuals show a higher level of environmental concern. Similarly, educated individuals are typically more concerned than their counterparts. This raises an important question for student populations: do specific aspects of education – such as, college major, class standing, exposure to environmental education, and environmental knowledge – impact environmental concern? The overall picture regarding background variable and environmental concern is somewhat clearer: younger, educated, liberal females tend to be more concerned than their counterparts. Do these relationships hold true in this sample? Significant Life Experiences seem to contribute to environmental concern, but which experiences are most influential? This thesis will examine these relationships and attempt to answer outstanding questions.

CHAPTER 3

METHODS

The formative bases of environmental concern have interested researchers for decades. This research explored the overall impact of environmental education and other important background variables on environmental concern in a student population. This analysis was undertaken by distributing a mail survey to a random sample of full-time students at Michigan State University. In this chapter, I will describe how the survey was implemented, provide a description of variables (including questionnaire wording), and discuss the analytical methodology used.

Survey Implementation.

A survey was mailed in the fall of 2001 to a random sample of 1000 students at Michigan State University. This random sample was generated by the University Registrar, and the only criterion for selection was that the student had full-time enrollment at the main campus. Therefore, a selected student could be of any class standing (freshman, sophomore, junior, senior, or graduate). A variation of Dillman's five-contact protocol was used for this research (Dillman, 2000). Due to budget constraints, three contacts were used: an initial survey mailing with cover letter (return envelope-postage was included for off-campus addresses), reminder postcard, and a second survey mailing with cover letter. The initial mailing took place on October 30, the reminder postcard was mailed on November 7, and the second mailing took place on November 27. This survey was designed to be completed in less than thirty minutes. It was twelve black-and-white pages, and it was formatted in booklet style

The overall response rate for this study was 47.6% (n = 476). Eighteen surveys were returned blank. Four surveys were returned with a note declining participation. Four surveys were returned due to incorrect addresses.

DESCRIPTION OF VARIABLES

Environmental Concern.

Environmental concern was measured using the 15-item New Ecological Paradigm Scale (Dunlap et al., 2000), which has been widely used as a measure of environmental concern. See Table 3-1.

Table 3-1. Complete question wording for the 15-item New Ecological Paradigm Scale.

Listed below are statements about the relationship between humans and the environment. For each one, please indicated whether you Strongly Agree, Mildly Agree, are Unsure, Mildly Disagree, or Strongly Disagree with it.	Strongly Agree	Mildly Agree	Unsure	Mildly Disagree	Strongly Disagree
a. We are approaching the limit of the number of people the earth can support.					
b. Humans have the right to modify the natural environment to suit their needs.					
c. When humans interfere with nature it often produces disastrous consequences.					
d. Human ingenuity will insure that we do NOT make the earth unliveable.					
e. Humans are severely abusing the environment.					
f. The earth has plenty of natural resources if we just learn how to develop them.					
g. Plants and animals have as much right as humans to exist.					
h. The balance of nature is strong enough to cope with the impacts of modern industrial nations.					
i. Despite our special abilities humans are still subject to the laws of nature.					
j. The so-called "ecological crisis" facing humankind has been greatly exaggerated.					
k. The earth is like a spaceship with very limited room and resources.					
l. Humans were meant to rule over the rest of nature.					
m. The balance of nature is very delicate and easily upset.					
n. Humans will eventually learn enough about how nature works to be able to control it.					
o. If things continue on their present course, we will soon experience a major ecological crisis.					

In the original coding, Strongly Agree = 1, Mildly Agree = 2, Unsure = 3, Mildly Disagree = 4, and Strongly Disagree = 5. Eight items were worded such that positive environmental concern was reflected in a low response value. In Table 3-1, these are items a, c, e, g, i, k, m, and o. These items were recoded, such that higher scores reflected a more positive environmental concern score. A composite score for environmental concern was calculated for use in further statistical analysis. In order for this score to be calculated, a respondent needed to have attempted at least twelve of fifteen items of the NEP Scale. Those with three or fewer missing responses had these missing responses replaced with an 'unsure' value. The potential range of concern scores was fifteen (lowest concern) to seventy-five (highest concern).

There has been some disagreement regarding the dimensionality of the NEP scale. Does it measure a single construct or is it multidimensional (Dunlap et al., 2000)? When factor analysis is used, some researchers have found the NEP items to load on only one dimension (Lefcourt, 1996; Noe and Snow, 1990; Edgell & Nowell, 1989). Other researchers have found the scale items to load on as many as four dimensions (Furman, 1998; Roberts & Bacon, 1997). Most scholars, however, have found the scale to elicit three dimensions: balance of humans and nature, limits to growth, and dominance of man over nature (Kempton et al., 1995; Geller & Lasley, 1985; Albrecht et al., 1982). Due to the inconsistency in factor analysis loading, the scale designers suggest that each researcher use all the NEP items to ascertain if multiple dimensions exist for his/her particular study (Dunlap et al., 2000).

When factor analyzing the NEP items for this research, the eigenvalues showed loadings on predominantly one factor. There was a dramatic shift in

acceptable eigenvalues after the initial factor. See Table 3-2. If the New Ecological Paradigm Scale is unidimensional, there should be a sharp drop between the first and second eigenvalues, and a relatively gentle linear decline in the remainder of the eigenvalues (Zeller and Carmines, 1980). Figure 3-1 shows the scree plot of the eigenvalues for this sample. This scree plot indicates a sharp drop between the first and second eigenvalues, and a moderate decline thereafter. Therefore, for the purpose of this thesis, it is reasonable to treat the NEP as a relatively unidimensional scale. In this sample, the scale also showed a high degree of internal consistency, having a Cronbach's Alpha of 0.816.

Table 3-2. Factor analysis of the New Ecological Paradigm Scale showing five components, with principal component extraction (varimax rotation). Asterisked (*) items were reverse coded so that increased scores corresponded with increased environmental concern.

	Factors and Loadings				
	1	2	3	4	5
Humans are meant to rule over the rest of nature.	**0.816**	0.180	-0.036	0.144	0.018
Humans have the right to modify their natural environment.	**0.643**	0.258	0.197	-0.094	-0.012
Plants and animals have as much right as humans to exist.*	**0.642**	-0.032	0.145	0.228	0.376
Human ingenuity will insure that we do NOT make the earth unlivable.	0.074	**0.755**	0.159	0.046	0.154
Humans will eventually learn enough about how nature works to be able to control it.	0.274	**0.612**	0.097	-0.116	0.324
The earth has plenty of natural resources if we just learn how to develop them.	0.104	**0.598**	-0.224	0.448	-0.167
The balance of nature is strong enough o cope with the impacts of modern industrial nations.	0.187	**0.540**	0.305	0.234	-0.096
Humans are severely abusing the environment.*	0.126	0.079	**0.767**	0.125	0.037
When humans interfere with nature it often produces disastrous consequences.*	0.012	0.101	**0.736**	0.097	0.235
The earth is like a spaceship with very limited room and resources.*	0.022	0.181	0.061	**0.796**	0.155
We are approaching the limit of the number of people the earth can support.*	0.050	0.114	0.332	**0.562**	-0.031
The balance of nature is very delicate and easily upset.*	0.255	-0.093	0.117	**0.549**	0.217
Despite our special abilities humans are still subject to the laws of nature.*	0.073	0.136	0.091	0.161	**0.815**
If things continue on their present course, we will soon experience a major ecological catastrophe.*	0.322	0.128	0.489	0.452	-0.180
The so-called "ecological crisis" facing humankind has been greatly exaggerated.	0.401	0.358	0.423	0.208	-0.164
Variance Explained	28.50	8.907	7.692	7.324	6.751

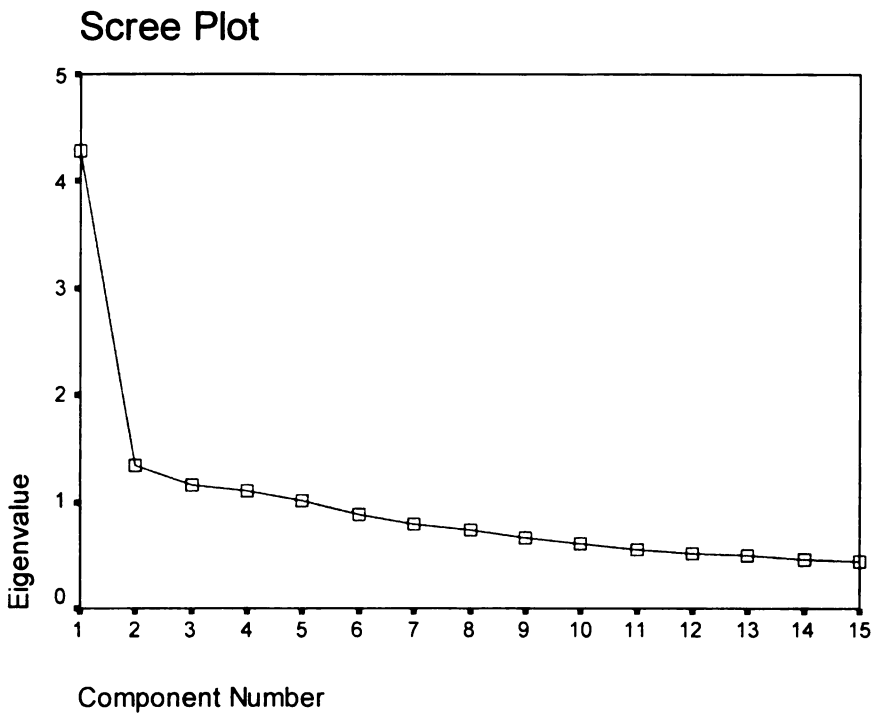

Figure 3-1. Scree plot showing factor loading for the New Ecological Paradigm Scale.

Background Variables.

The background variables (other than education and SLE, which are discussed later) measured in this study were gender, political ideology, family income, and community type.

Gender. Gender was measured by asking, "Are you male or female?" This was then recoded, with female being coded "1" and males being assigned a value of "0."

Political Ideology. Political ideology was measured by asking respondents to identify where they fell on a continuum of conservative to liberal: "Thinking

politically and socially, how would you describe your own general position?" The response options were very conservative = 1, somewhat conservative = 2, middle of the road = 3, somewhat liberal = 4, very liberal = 5, and unsure = 6. All those responding as "unsure" were recoded into a position of 'middle of the road'.

Family Income. Family income was measured by asking parents' gross household income in 2000, before deductions. The exact question wording was: "What was your parents' gross household income (before taxes) in 2000?" Five answer options were possible: less than $20,000 = 1, $20,00-$39,999 = 2, $40,000-$59,999 = 3, $60,000-$74,999 = 4, $75,000 or more = 5, Unsure = 6. Unsure responses were left coded as 'unsure' for the univariate analysis. In the bivariate and multivariate analyses, however, the unsure responses were considered missing.

Community Type. Respondents were asked the following question: "In what type of area did you spend all or most of your childhood?" Response categories were: rural farm area = 1, rural non-farm area = 2, small town (25,000 people or fewer) = 3, urban area (from 25,001 to 100,000 people) = 4, metropolitan area (more than 100,000 people) = 5, or unsure = 6. All unsure responses were coded as missing values.

Education.

As noted earlier, there are four elements of education of direct importance here: 1) a person's exposure to core components of environmental education; 2) college major; 3) class standing; and 4) environmental knowledge.

Exposure to Environmental Education. Exposure to environmental education was measured by asking students whether they had taken college courses that covered certain topics that could be considered components of environmental education. As outlined by the North American Association for Environmental Education, there are four features of environmental education: questioning and analysis skills, knowledge of environmental processes and systems, skills for understanding and addressing environmental issues, and personal and civic responsibility. Each of these four features was measured with 3 to 5 items on the survey. These items were constructed to determine a student's relative exposure to the content indicated in the national guidelines for environmental education. See Table 3-3 for environmental education question wording and response categories. For the 'questioning and analysis skills' feature, three questions (items b, c, d from Table 3-3) were asked. 'Knowledge of environmental processes and systems' was measured with five questions (items e, f, g, h, and i). For the EE feature of 'skills for understanding and addressing environmental issues,' three questions were asked (items a, j, and k). Finally, 'personal and civic responsibility' was measured with three questions (items l, m, and n).

Respondents were given the options of "Yes", "No", and "Unsure." Only a response of "Yes" was coded as 1. All other responses, including item non-response, were coded as 0. Recoding item non-response in this manner helped to preserve sample size, but was also statistically conservative. A composite environmental education exposure score (range 0-14) was generated by summing the responses to the individual items. In this sample, the scale also showed a high degree of internal consistency, having a Cronbach's Alpha of 0.841.

College Major. Respondents were asked a single open-ended question: "What is/are you current major(s)?" At Michigan State University, there are fifteen colleges that offer accredited majors. Some colleges are more likely to offer courses with environmental education components. The colleges that are more likely to offer instruction in the components of environmental education are the Colleges of Agriculture and Natural Resources, Natural Science, and Social Science. Respondents declaring a major in one of the above "environmentally related" colleges were given a value of 1, whereas respondents with majors in all other colleges (as well as respondents who were unsure of their major) were given a value of 0.

Table 3-3. Environmental education questions and possible response categories.

The following questions are to help us understand your previous educational experience in college. Please indicate if you've had any college course where you...

		Yes	No	Unsure
a.	Investigated an environmental issue?			
b.	Used popular sources (newspapers, magazines, television, world wide web) to collect information on an environmental issue?			
c.	Used scholarly sources (journals or periodicals) to collect information on an environmental issue?			
d.	Developed a specific strategy to deal with an environmental issue?			
e.	Used global information systems (GIS)?			
f.	Studied biology?			
g.	Studied geology?			
h.	Studied chemistry?			
i.	Studies physics?			
j.	Studied environmental science?			
k.	Learned about political and/or economic systems as they related to environmental issues?			
l.	Studied how humans can impact the environment?			
m.	Learned what you could do to get involved with an environmental issue?			
n.	Were asked to evaluate your personal impact on the environment?			

Class Standing. A person's grade level, or academic level, was measured by a single item. The exact question wording was, "What is your year in school?" Freshmen = 1, Sophomore = 2, Junior = 3, Senior = 4, and Graduate = 5.

Environmental Knowledge. The environmental knowledge items were designed to measure awareness of environmental issues. There were ten items in this scale. Each item had five answer choices, of which only one was considered

correct. One of the five answer choices was "unsure." See Table 3-4 for a complete representation of the questions and item format. Correct answers were coded 1 and incorrect/unsure responses were assigned a value of 0. A composite knowledge score (range 0-10) was generated for each respondent who attempted at least eight of the items. Those with one or two unanswered items received a 0 for the missing items.

Table 3-4. Complete question wording and format of environmental knowledge questions and possible answers. Correct responses are noted by a checked box.

At the present time, where does most of the energy used in the United States come from?

- ☐ Nuclear reactors
- ☐ Hydroelectric dams
- ☐ Solar Power
- ☑ Burning of fossil fuels
- ☐ Unsure

Which of the following is not considered a major cause of global warming?

- ☑ Hydroelectric power
- ☐ Loss of rainforests
- ☐ Power plants that burn coal or oil
- ☐ Automobile exhaust
- ☐ Unsure

Which of the following is true of the world's human population?

- ☐ Countries with the highest rates of population growth also tend to be those that consume the most resources per capita.
- ☐ Developed countries, such as Germany or the United States, are among those countries with the highest rates of population growth.
- ☐ Immigration is a key factor behind the growth in the world population.
- ☑ Growth in world population has been linked to declines in many animal and plant species.
- ☐ Unsure.

Table 3-4 (cont.)

Chlorofluorocarbons (CFCs) are...

- ❑ Widely used in aerosol sprays in the United States.
- ❑ A major cause of ozone pollution, or "smog".
- ☑ A major factor in the thinning of the atmospheric ozone layer.
- ❑ No longer considered problematic in the United States.
- ❑ Unsure.

Freshwater supplies...

- ❑ Are as plentiful today as they were 100 years ago.
- ☑ Are diminishing throughout the world.
- ❑ Are threatened primarily by the presence of animal feces.
- ❑ Are not considered a problem in the Untied States.
- ❑ Unsure.

Biodiversity...

- ☑ Refers to the number and variety of species present in an ecosystem.
- ❑ Has increased in recent years for many parts of the world.
- ❑ Is threatened by the presence of large, non-human, predators (such as wolves or tigers).
- ❑ Has been an important goal of modern agriculture.
- ❑ Unsure.

Acid rain...

- ❑ Is produced when CFCs are released by factories.
- ❑ Is no longer considered a serious threat.
- ☑ Is responsible for the death of forests in Europe and elsewhere.
- ❑ Has helped restore fish populations in affected lakes.
- ❑ Unsure.

What is the primary harmful effect of phosphates on marine life?

- ❑ They make fish sterile.
- ❑ They make the water cloudy.
- ☑ They feed algae, which takes oxygen away from fish.
- ❑ They make the water too acidic.
- ❑ Unsure.

Mercury has been found at unacceptable levels in:

- ☑ Seafood and fish.
- ❑ Fruit.
- ❑ Soft drinks.
- ❑ Beef.
- ❑ Unsure.

Table 3-4 (cont.)

Which of the following is not considered to be true:

- ❑ Landfills can produce methane, a greenhouse gas.
- ❑ Landfills can leach toxic substances into the groundwater.
- ☑ Pound for pound, there is more plastic found in landfills than paper.
- ❑ Landfills can contain toxic substances.
- ❑ Unsure.

Significant Life Experience.

Significant Life Experience (SLE) was measured using two scales. See Table 3-5. There were eighteen items in each scale, and respondents were asked to gauge their participation in various environmentally relevant activities both before and during their college years. For the before college experience questions, the items were worded in past tense. Possible responses were Never = 1, Rarely = 2, Sometimes = 3, and Frequently = 4. All item non-responses were coded with a value of 1, which equated to a response of "never." Again, this helped to preserve sample size and remained arithmetically conservative. Two composite variables were created. A variable for 'before college participation' (range 18-72) was generated to reflect overall participation in environmentally relevant activities prior to college. Another variable (range 18-72) was generated to reflect current participation in outdoor and/or environmentally relevant activities. These two composite variables were also factor analyzed.

Table 3-5. Question wording for Significant Life Experiences before college and current participation questions. All current participation items were worded in present tense.

Before college,/Currently, about how often did/do you engage in each of the following activities?	1 Never	2 Rarely	3 Sometimes	4 Frequently
a. Hiked and/or walked in a natural area				
b. Camped by yourself or with a group				
c. Went on family vacations and/or outing in an outdoor setting				
d. Participated in team sports				
e. Participated in individual sports				
f. Went canoeing/kayaking				
g. Went boating/yachting				
h. Went mountain biking				
i. Rode off-road vehicles (ORVs)				
j. Hunted				
k. Fished				
l. Spent time with parents in a natural area				
m. Spent time with friends in a natural area				
n. Spent time alone in a natural area				
o. Spent time in a natural area with other family member (other than parent)				
p. Read publications that focused on environmental issues				
q. Took courses in school that stressed environmental issues				
r. Watched TV programs that focused on environmental issues				

Factor analysis of the scale for participation in environmental/outdoor activities prior to college yielded four factors (see Table 3-6). Factor one outlines interactive appreciative activities: hiking, camping, vacationing, canoeing/kayaking, and spending time with others in a natural area. Factor two can be loosely labeled

as consumptive activities: hunting, fishing, and riding an ORV. Factor three can be considered as non-interactive appreciative activities: reading environmental publications, taking environmental courses, and watching environmental programs. Finally, factor four can be described as sporting: participation in individual or team sports.

Significant Life Experiences are those which occur in one's youth, which is why participation in outdoor/environmental activities prior to college was examined here. However, it is interesting to note that similar results to those stated here also occurred when examining current participation in outdoor/environmental activities.

Table 3-6. Factor analysis of Participation Before College Scale showing four extracted components, using principal component extraction and varimax rotation. Items were coded so that missing values reflected no participation in a particular activity type.

	1	2	3	4
Hiked and/or walked in a natural area	**0.728**	0.195	0.246	0.099
Camped by yourself or with a group	**0.699**	0.294	0.064	0.060
Went on family vacations and/or outings in an outdoor setting	**0.784**	0.083	0.092	0.157
Went canoeing/kayaking	**0.512**	0.428	0.086	0.117
Spent time with parents in a natural area	**0.796**	0.060	0.167	0.124
Spent time with friends in a natural area	**0.782**	0.168	0.247	0.124
Spent time alone in a natural area	**0.667**	0.241	0.344	0.030
Spent time in a natural area with other family member (other than parent)	**0.719**	0.179	0.204	0.033
Road off-road vehicles (ORVs)	0.211	**0.713**	0.052	-0.022
Hunted	0.017	**0.754**	0.119	0.071
Fished	0.341	**0.600**	0.284	0.082
Read publications that focused on environmental issues	0.321	0.089	**0.767**	0.025
Took courses in school that stressed environmental issues	0.113	0.071	**0.768**	0.076
Watched TV programs that focused on environmental issues	0.184	0.070	**0.789**	0.049
Participated in team sports	0.103	0.112	0.060	**0.864**
Participated in individual sports	0.168	0.075	0.103	**0.854**
Went boating/yachting	0.373	0.484	-0.071	0.314
Went mountain biking	0.410	0.403	-0.113	0.233

As originally argued by Tanner (1980), significant life experiences particularly in one's youth, could influence his/her environmental concern in adulthood. For this reason, participation in environmental and/or outdoor activities prior to college was used to evaluate the impact on environmental concern.

In order to determine the potential relationship between consumptive or appreciative activities and environmental concern, an additional scale measure was used. For this scale, consumptive activities were considered to be: riding ORVs, hunting, and fishing as determined by the factor analysis results. Recall that missing responses were recoded to 1 (never). The consumptive item scores were

summed to create a composite score for consumptive activity participation. The resulting scale could have a possible range of 3 to 12. In this sample, the consumptive scale showed a moderate degree of internal consistency, having a Cronbach's Alpha of 0.645. This composite consumptive score was then correlated with the environmental concern score. For appreciative activities, a similar methodology was used. For this scale, appreciative activities were considered to be the following items (as, again, determined by the factor analysis results): hiking, camping, family vacations in natural area, canoeing/kayaking, time with parents in natural area, time with friends in natural area, time alone in natural area, and time with other family member in natural area. Again, missing responses were recoded to 1 (never). The appreciative item scores were summed to create a composite score for appreciative activity participation. The resulting scale could have a possible range of 9 to 36. In this sample, the appreciative scale showed a very high degree of internal consistency, having a Cronbach's Alpha of 0.903. This composite appreciative score was then correlated with the environmental concern score.

The appreciative and consumptive scale measures were not used in the multivariate analysis since they would necessarily be collinear with the measure of before college participation. However, a test was conducted at the bivariate level to see if certain types of activities influenced environmental concern.

Analysis.

In Chapter 4, I present my results. I used a three-step approach to analyze the utility of the theoretical model (Figure 3-2), and results are presented in this fashion. Univariate analysis included descriptive statistics – frequency distributions, means, and standard deviations. Bivariate analysis included correlations for each variable in the model with the measure of environmental concern. Pearson correlations assume interval-level measurement. Despite several ordinal-level variables in this analysis, correlations are used for two key reasons. The first reason is that they are commonly understood measures of association. Secondly, they are known to be relatively robust under conditions of non-normality as well as with other violations of assumptions (Zeller and Levine, 1974). As a final method of analysis, multivariate regression was used to determine the relative importance of each variable in the model. All analyses were conducted using Statistical Package for the Social Sciences, version 11.0 for Windows.

CHAPTER 4

RESULTS

While many researchers have explored the relationship between environmental concern and several possible predictors, the relationship with specific components of education (e.g. class standing, area of study, exposure to environmental education, and environmental knowledge) has not been fully explored. A key contribution of this research is to examine several components of education and their impact on environmental concern. In addition, I evaluated the influence of other background variables and significant life experiences on environmental concern. I used a three-step approach (with univariate, bivariate, and multivariate level statistics) to analyze the utility of the theoretical model (Figure 4-1). In order to test these relationships, a survey was administered to a random sample of 1000 university students in the fall of 2001.

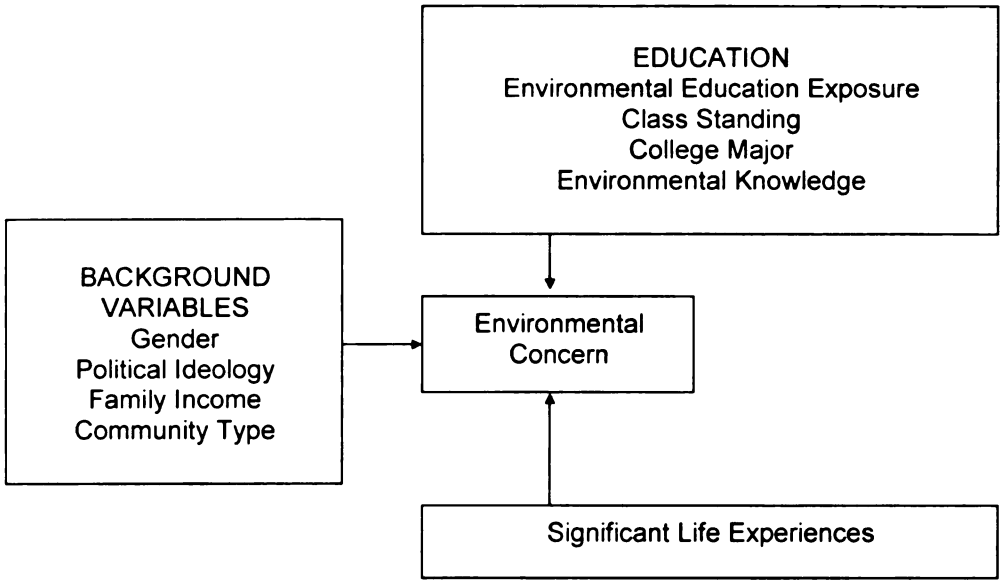

Figure 4-1. Theoretical model showing the relationship between environmental concern and: background variables, education, and significant life experiences.

DESCRIPTION OF VARIABLES

Environmental Concern.

The New Ecological Paradigm Scale included fifteen items; full results are presented in Table 4-1. Respondents gave a clearly directional response to several items. For instance, a majority of people (57.2%) strongly believed that plants and animals have as much right as humans to exist. Similarly, a majority (54.2%) also strongly believed that humans, despite our special abilities, are subject to the laws of nature.

These items, taken together, generated a scale measure of concern. Negatively worded items were recoded so that increased environmental concern corresponded to higher scores. The scores were then summed for all fifteen items. The potential range of concern scores was 15 (lowest concern) to 75 (highest

concern). In other words, higher scores correspond to greater concern. Few respondents (4.2%) scored 40 or below, and few (3.7%) scored over 70. This indicates that respondents were grouped in the middle range of scores, albeit toward the higher end of the scale. They were grouped between scores of 50 and 60, with 45.3% of the respondents falling within this range. Respondents had an average concern score of 56.2, with a standard deviation of ±8.70. The distribution tends toward greater environmental concern.

Table 4-1. Question wording for environmental concern items, taken from the revised New Ecological Paradigm Scale, and the percentage of respondents falling into each response category, and the valid n for each item.

Listed below are statements about the relationship between humans and the environment. For each one, please indicated whether you Strongly Agree, Mildly Agree, are Unsure, Mildly Disagree, or Strongly Disagree with it.	Strongly Agree (%)	Mildly Agree (%)	Unsure (%)	Mildly Disagree (%)	Strongly Disagree (%)	n
We are approaching the limit of the number of people the earth can support.	23.9	38.5	16.4	16.4	4.7	444
Humans have the right to modify the natural environment to suit their needs.	3.6	26.9	9.0	38.8	21.7	443
When humans interfere with nature it often produces disastrous consequences.	36.3	44.4	5.9	10.9	2.5	441
Human ingenuity will insure that we do NOT make the earth unliveable.	5.2	23.5	29.6	26.2	15.5	439
Humans are severely abusing the environment.	46.3	37.7	5.9	7.4	2.7	443
The earth has plenty of natural resources if we just learn how to develop them.	17.6	36.6	15.8	20.3	9.7	443
Plants and animals have as much right as humans to exist.	57.2	26.8	5.0	9.0	2.0	444
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	2.7	7.9	14.0	45.9	29.5	444
Despite our special abilities humans are still subject to the laws of nature.	54.2	35.1	7.7	2.0	0.9	441
The so-called "ecological crisis" facing humankind has been greatly exaggerated.	1.6	15.3	23.2	34.7	25.2	444
The earth is like a spaceship with very limited room and resources.	30.0	36.3	11.1	18.1	4.5	443
Humans were meant to rule over the rest of nature.	7.7	14.4	12.0	26.2	39.7	443
The balance of nature is very delicate and easily upset.	30.2	43.8	12.0	12.9	1.1	443
Humans will eventually learn enough about how nature works to be able to control it.	1.8	15.5	22.5	37.6	22.5	444
If things continue on their present course, we will soon experience a major ecological crisis.	27.3	37.9	22.3	9.7	2.7	443

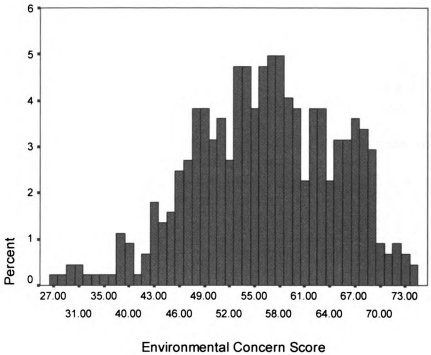

Figure 4-2. Percentage of student respondents with varying environmental concern scores, as measured by the New Ecological Paradigm Scale.

Background Variables.

Results for gender, political ideology family income, and community type are presented in Table 4-2. Approximately 62.4% of the respondents were female. The sample was widely dispersed in their political ideologies, with 44.7% expressing some degree of liberal orientation. In terms of parents' combined income, the respondents declared a range of affluence. Over 52% of the respondents stated their parents' income was greater than $75,000 per year. Over half the respondents (54.1%) came from an urban or metropolitan area.

Table 4-2. Background variable question wording, percentage of respondents within each category, and valid n for each item.

Are you male or female?	
Male	37.6%
Female	62.4%
(n)	(444)
Thinking politically and socially, how would you describe your own general position?	
Very conservative	3.8 %
Somewhat conservative	21.6 %
Middle of the road	29.9 %
Somewhat liberal	32.6 %
Very liberal	12.1 %
(n)	(445)
What was your parents' gross household income (before taxes) in 2000?	
Less than $20,000	3.3 %
$20,000 to $39,999	9.7 %
$40,000 to $59,999	18.4 %
$60,000 to $74,999	16.0 %
$75,000 or more	52.6 %
(n)	(331)
In what type of area did you spend all or most of your childhood?	
Rural, farm	9.1 %
Rural, non-farm	12.3 %
Small town (25,000 people or fewer)	24.4 %
Urban area (from 25,001 to 100,000 people)	31.9 %
Metropolitan area (more than 100,000 people)	22.3 %
(n)	(439)

Education.

Exposure to Environmental Education.

A primary focus of this research was to determine the overall impact of exposure to environmental education on environmental concern. Recall that scale items were generated from national standards for environmental education, and these are listed in Table 4-3. A score was generated to gauge overall exposure.

As can be seen in Table 4-3, respondents had a wide range of exposure to the environmental education components. Respondents had the most exposure to courses in biology, chemistry, and how humans impact the environment. Respondents had the least exposure to courses where they were asked to use global information systems (GIS), to determine a specific strategy to deal with an environmental issue, or to evaluate their personal impact on the environment.

Overall exposure to environmental education is displayed in Table 4-4. A number of respondents (9.2%) reported not having any exposure to environmental education in college. At the other end of the scale, 3.4% of the respondents reported having been exposed to 13 or 14 components. Exposure to three components was reported most often (13.4% of the respondents). A score was also generated to determine overall exposure to the components of environmental education. Respondents had an average education score of 5.96, with a standard deviation of ±3.68.

Table 4-3. Measurement of exposure to the components environmental education and percentage of respondents in each response category. Valid n = 476 for each item.

The following questions are to help us understand your previous educational experience in college. Please indicate if you've had any college course where you...

		Yes	No
a.	Investigated an environmental issue?	55.5	44.5
b.	Used popular sources (newspapers, magazines, television, world wide web) to collect information on an environmental issue?	51.9	48.1
c.	Used scholarly sources (journals or periodicals) to collect information on an environmental issue?	37.2	62.8
d.	Developed a specific strategy to deal with an environmental issue?	17.2	82.8
e.	Used global information systems (GIS)?	13.0	87.0
f.	Studied biology?	78.4	21.6
g.	Studied geology?	36.1	63.9
h.	Studied chemistry?	62.2	37.8
i.	Studies physics?	51.7	48.3
j.	Studied environmental science?	42.0	58.0
k.	Learned about political and/or economic systems as they related to environmental issues?	49.6	50.4
l.	Studied how humans can impact the environment?	61.3	38.7
m.	Learned what you could do to get involved with an environmental issue?	32.1	67.9
n.	Were asked to evaluate your personal impact on the environment?	19.1	80.9

Table 4-4. Overall exposure to environmental education. Number of components exposed to, frequency, percentage of student respondents.

Exposure to EE Components	Frequency	Percentage of Student Respondents
0	44	9.2
1	13	2.7
2	25	5.3
3	64	13.4
4	44	9.2
5	38	8.0
6	45	9.5
7	29	6.1
8	40	8.4
9	42	8.8
10	25	5.3
11	30	6.3
12	21	4.4
13	9	1.9
14	7	1.5
n	476	

College Major. Approximately thirty percent of the respondents declared majors contained within "environmentally related" colleges, i.e. the Colleges of Natural Science, Social Science, and Agriculture and Natural Resources. See Table 4-5. This figure closely matches that produced by the University Registrar (MSU Office of the Registrar, 2004). Frustratingly, a large proportion of the respondents (30.3%) left the item blank. Considering the large proportion of upper class respondents, this is puzzling. This issue will be explored more fully in the Discussion section of this thesis.

Table 4-5. Respondent declaration of college major versus the University Registrar's records for the same information. (n = 476)

	Respondent Declaration	Registrar Statistics
major in "environmentally related" college	30.3 %	32.9%
major not in "environmentally related" college	39.5 %	59.6%
unsure	30.3 %	7.5%

Class Standing. Just under three percent declared themselves sophomores, 14.9% as juniors, 56.0% as seniors, 26.2% as graduate students. Interestingly, no respondents reported themselves to be freshmen. This sample was obtained through the University Registrar's Office, and according to their records, this sample contained the following distribution: 0.8% freshmen, 5.0% sophomores, 22.1% juniors, 46.6% seniors, and 25.2% graduate students. According to published statistics (Michigan State University Registrar, 2004), the proportion of Michigan State University full-time students in degree-level courses in the fall of 2001 was as follows: 21.4% freshmen, 19.7% sophomores, 21.1% juniors, 21.8% seniors, and 16.0% were graduate students (see Table 4-6).

Table 4-6. Class standing breakdown by respondent declaration, University Registrar statistics for the sample, and University Registrar statistics for population.

	Respondent Declaration (%)	Registrar for Sample (%)	Registrar for Population (%)
freshmen	0.0	0.8	21.4
sophomores	2.9	5.0	19.7
juniors	14.9	22.1	21.1
seniors	56.0	46.6	21.8
graduate	26.2	25.2	16.0

There are quite a few puzzling aspects to these data. As can be seen from Table 4-6, there are discrepancies between Michigan State University's population, the random sample drawn, and the respondent declaration of class standing. Possible explanations for these differences will be explored in the Discussion section of this thesis.

Environmental Knowledge. The survey asked ten questions to gauge respondents' knowledge of environmental issues (see Table 4-7). The maximum possible knowledge score was ten, which would indicate that all the knowledge questions were answered correctly. In other words, higher scores correspond to greater environmental knowledge. Just under six percent (5.8%) of the respondents answered all the questions correctly, and 0.9% of the sample answered all the questions incorrectly (see Table 4-8). The distribution tended toward the 'knowledgeable' end of the scale, with a mean value of 6.5 items answered correctly. Respondents seemed to be more knowledgeable, as indicated by a high proportion of correct responses, regarding causes of global warming, freshwater supplies, the meaning of biodiversity, and mercury contamination in food. Conversely, respondents did not seem to be as knowledgeable about acid rain, the harmful effect of phosphates, or typical landfill composition.

Table 4-7. Responses to each of the environmental knowledge questions. Column 1 shows the question wording and the correct answer (indented). Column 2 represents the percentage of respondents giving a correct response. Column 3 represents the percentage of respondents giving an incorrect response.

Question Wording and Correct Response	Correct Response (%)	Incorrect /Unsure Response (%)	n
At the present time, where does most of the energy used in the United States come from? Burning of fossil fuels.	67.6	26.5	448
Which of the following is not considered a major cause of global warming? Hydroelectric power.	87.5	12.5	447
Which of the following is true of the world's human population? Growth in world population has been linked to declines in many animal and plant species.	62.9	37.1	447
Chlorofluorocarbons (CFCs) are... A major factor in the thinning of the atmospheric ozone layer.	58.6	41.4	442
Freshwater supplies... Are diminishing throughout the world.	88.9	11.1	449
Biodiversity... Refers to the number and variety of species present in an ecosystem	80.3	19.7	447
Acid rain... Is responsible for the death of forests in Europe and elsewhere.	48.1	51.9	447
What is the primary harmful effect of phosphates on marine life? They feed algae, which takes oxygen away from fish.	32.7	67.3	447
Mercury has been found at unacceptable levels in: Seafood and fish.	81.5	18.5	448
Which of the following is not considered to be true: Pound for pound, there is more plastic found in landfills than paper.	39.4	60.6	442

Table 4-8. Knowledge score based on number of correct responses given by respondents. Number of correctly answered questions, frequency, and percentage. (n = 448)

Correctly Answered Questions	Frequency	Percentage
0	4	0.9
1	10	2.2
2	10	2.2
3	15	3.3
4	38	8.5
5	48	10.7
6	77	17.2
7	93	20.8
8	75	16.7
9	52	11.6
10	26	5.8

Significant Life Experiences.

Significant Life Experiences are described as instances, usually in a person's youth, where an activity shapes his/her view of the environment. This study asked a series of questions relating to past and present participation in outdoor/environmental activities which are assumed to influence environmental concern (see Table 4-9). Respondents were quite likely to indicate 'sometimes' or 'frequent' participation in the following activities prior to college: hiking or walking in the outdoors, family vacations in the outdoors, team sports, individual sports, and spending time with friends in a natural area. Respondents more often gave a 'never' or 'rarely' participation rating prior to college for the following activities: canoeing, boating, mountain biking, riding off-road vehicles, hunting, fishing, being alone in a natural area, reading environmental publications, and taking environmental courses. Possible scores for the overall index of before college participation could range between 18 and 72. Higher scores correspond to greater

participation in outdoor/environmental activities before college. This sample had an average before college participation value of 40.3. See Figure 4-3. This shows that respondents, prior to college, tended toward non-participation in outdoor/environmental activities.

Table 4-9. Questions regarding participation in outdoor and/or environmental activities. The first line indicates the percentage of respondents who participated in outdoor and/or environmental activities before college: "Before college, about how often did you engage in each of the following activities?" The second line indicates the percentage of respondents who currently participate in outdoor and/or environmental activities: "Currently, about how often did you engage in each of the following activities?" (n = 476)

	Never (%)	Rarely (%)	Sometimes (%)	Frequently (%)
Hiked and/or walked in a natural area	11.6 15.5	25.2 27.3	42.2 41.4	21.0 15.8
Camped by yourself or with a group	21.0 39.3	30.3 27.1	35.7 24.8	13.0 8.8
Went on family vacations and/or outings in an outdoor setting	17.4 36.1	21.6 31.5	37.2 23.3	23.7 9.0
Participated in team sports	14.3 43.5	16.8 27.7	20.4 20.0	48.5 8.8
Participated in individual sports	15.1 30.0	19.1 28.2	30.9 25.0	34.9 16.8
Went canoeing/kayaking	35.7 53.8	37.4 28.4	22.7 15.3	4.2 2.5
Went boating/yachting	29.4 50.2	33.8 24.6	21.6 17.6	15.1 7.6
Went mountain biking	50.0 62.8	26.7 20.8	19.5 12.6	3.8 3.8
Rode off-road vehicles (ORVs)	64.9 82.6	18.5 10.1	12.0 6.1	4.6 1.6
Hunted	81.3 87.6	7.6 5.7	5.9 3.6	5.3 3.2
Fished	31.5 66.0	37.4 19.7	22.1 9.9	9.0 4.4
Spent time with parents in a natural area	19.1 46.8	31.9 32.1	34.2 16.8	14.7 4.2
Spent time with friends in a natural area	11.6 22.3	26.5 29.8	42.4 37.8	19.5 10.1
Spent time alone in a natural area	23.9 29.8	31.3 29.2	29.4 28.4	15.3 12.6
Spent time in a natural area with other family member (other than parent)	28.4 46.4	34.2 27.1	29.0 21.6	8.4 4.8
Read publications that focused on environmental issues	37.2 34.2	35.7 30.7	22.7 25.8	4.4 9.2
Took courses in school that stressed environmental issues	48.1 54.6	35.7 21.2	12.4 13.7	3.8 10.5
Watched TV programs that focused on environmental issues	21.8 29.2	35.1 28.4	32.6 27.3	10.5 15.1

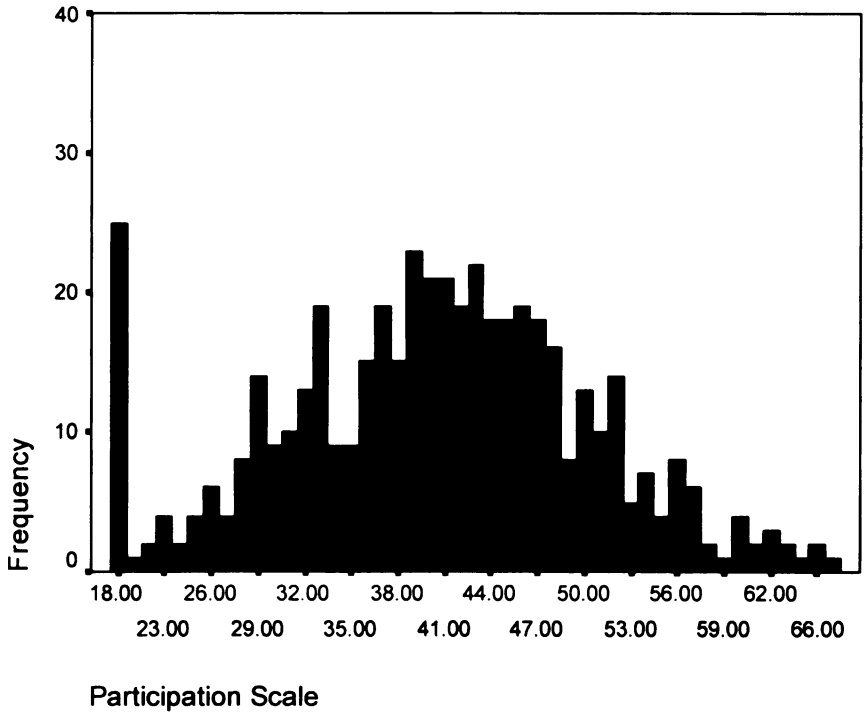

Figure 4-3. Overall index of before college participation in environmental and/or outdoor activities. (n = 476)

Current participation in environmental/outdoor activities was also low, with an average value of 34.4 for the current participation scale. See Figure 4-4. Again, this shows current activity level in outdoor/environmental activities tended toward non-participation. Respondents were likely to indicate 'sometimes' or 'frequent' current participation in only one activity: hiking or walking in a natural area.

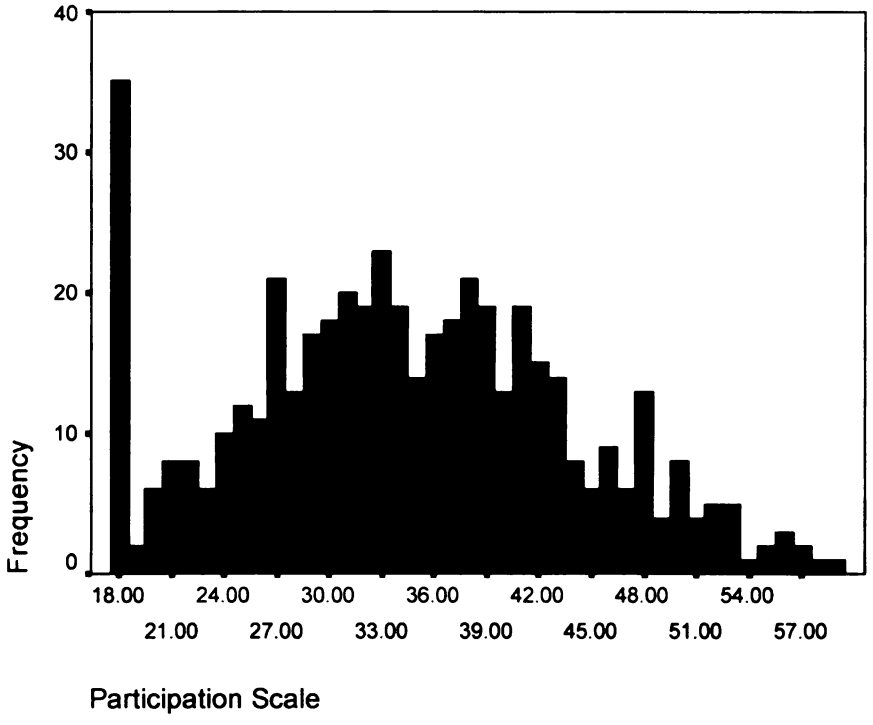

Figure 4-4. Overall index showing current participation in environmental and/or outdoor activities. (n = 476)

Consumptive activities (riding off-road vehicles, hunting, fishing) had low before college and current participation (see Table 4-10). Hunting had the lowest participation level with just over eighty percent (81.3%) of respondents having never hunted before college, and 87.6% of respondents stating they never currently hunt. All consumptive activities had more participation before college than currently.

Respondents showed greater participation levels in appreciative activities (hiking/walking, camping, family vacations in natural area, canoeing/kayaking, spent time in natural area alone/with parent/with other) than consumptive activities. Before college, respondents participated in the following appreciative activities most often: spending time with friends in a natural area (42.4%), hiking/walking in a natural area (42.2%), and taking family vacations in a natural area (37.2%). Current

participation in appreciative outdoor and/or environmental activities had a similar pattern to that before college. Currently, respondents participated most often in the following events: hiking/walking (41.4%), spending time with friends in a natural area (37.8%), and spending time alone in a natural area (28.4%).

BIVARIATE ANALYSIS

It has been argued here that certain background variables, education, and significant life experiences all contribute toward shaping a person's environmental concern. The results presented here tend to reinforce that which is reported elsewhere in the literature.

As can be seen from Table 4-10, females are significantly more environmentally concerned than are males. Similarly, liberal individuals are significantly more environmentally concerned than conservative individuals. It should also be noted that women are significantly more liberal than are men. There was no relationship found between income or community type and environmental concern, although urban residents had significantly higher incomes than did their more rural counterparts.

Table 4-10. Correlations between environmental concern and background variables. Note: * = correlation is significant at the 0.05 level (two-tailed test); ** = correlation significant at the 0.01 level (two-tailed test).

	Environ. Concern	Gender[a]	Political Ideology[b]	Family Income	Comm. Type[c]
Environmental Concern	1	0.210**	0.270**	0.054	0.046
Gender		1	0.122*	0.006	-0.036
Political Ideology			1	-0.050	0.086
Family Income				1	0.200**
Comm. Type					1

a: female = 1
b: more conservative = 1
c: more rural = 1

There was a significant ($p < 0.01$) positive relationship noted between the following: environmental concern and environmental knowledge; class standing and environmental knowledge; and environmental knowledge and environmental education (see Table 4-11). In other words, the more environmental knowledge a student had, the higher degree of concern s/he showed. Students further along in their academic careers showed higher levels of environmental knowledge, and more knowledgeable students had more exposure to the components of environmental education. There was a significant positive relationship ($p < 0.05$) between the following: environmental concern and environmental education; and class standing and college major. In other words, the more exposure a student had to environmental education components, the higher degree of concern s/he showed. There was a significant negative relationship ($p < 0.05$) between college major and environmental education. This result is puzzling and will be examined further in the Discussion chapter.

Table 4-11. Correlations between environmental concern and education variables. Note: * = correlations is significant at the 0.05 level (two-tailed test); ** = correlation significant at the 0.01 level (two-tailed test).

	Environmental Concern	Class Standing	College Major	Environmental Knowledge	Environmental Education
Environmental Concern	1	0.007	0.060	0.300**	0.152*
Class Standing		1	0.115*	0.177**	-0.018
College Major			1	-0.081	-0.670*
Environmental Knowledge				1	0.221**
Environmental Education					1

Tanner (1980) suggested that significant life experiences in one's youth could help positively shape a person's environmental attitude. For this reason, participation in environmental and/or outdoor activities before college is examined more closely in this thesis. The results of this research show that participation in outdoor and environmental activities in one's youth does, indeed, play a role. Table 4-12 shows there was a significant ($p < 0.01$) positive relationship between environmental concern and (before college and current) participation in outdoor/environmental activities. Individuals who participated in environmental and/or outdoor activities showed a higher degree of environmental concern than their non-participatory counterparts. Similarly, there was a significant positive relationship between before college participation and current participation in

outdoor/environmental activities. Even so, current participation levels in outdoor/environmental activities were somewhat less than participation pre-college.

Table 4-12. Correlations between environmental concern and participation in outdoor/environmental activities, both before and after college. Note: * = correlation is significant at the 0.05 level (two-tailed test); ** = correlation significant at the 0.01 level (two-tailed test).

	Environmental Concern	Before College Participation	Current Participation
Environmental Concern	1	0.238**	0.189**
Before College Participation		1	0.737**
Current Participation			1

There was a significant ($p < 0.01$) positive relationship between environmental concern and participation in appreciative activities before college (see Table 4-13). Individuals who participated in appreciative activities before college were more likely to have higher levels of environmental concern than their counterparts. Interestingly, there was also a significant and positive relationship between participation in consumptive and participation in appreciative activities prior to college.

Table 4-13. Correlations between environmental concern and participation in consumptive outdoor/environmental activities before college and appreciative outdoor/environmental activities before college. Note: * = correlation is significant at the 0.05 level (two-tailed test); ** = correlation significant at the 0.01 level (two-tailed test).

	Environmental Concern	Consumptive Activities Before College	Appreciative Activities Before College
Environmental Concern	1	-0.009	0.157**
Consumptive Activities Before College		1	0.486**
Appreciative Activities Before College			1

MULTIVARIATE ANALYSIS

To determine how these variables interact more sophisticated statistical analyses are needed. Multiple regression allows us to predict the impact of particular variables while holding all others constant. For this research, multiple regression was used to determine which variables influence environmental concern (see Table 4-16). In order to avoid multicollinearity, the appreciative and consumptive activities scales examined in the univariate and bivariate analyses are not examined in the multivariate test of the model. The regression results are presented in Table 4-14. The independent variables account for 25.3% of the variance in environmental concern.

Table 4-14. Regression output of independent variables on environmental concern. For each variable, the level of each parameter or scale range is given in parenthesis below the variable name.

Model	R	R-Square	Adjusted R Square	Std. Error of the Estimate
1	0.503	0.253	0.229	7.717

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	36.045	4.204		8.574	0.000		
Gender (0, 1)	5.232	0.930	0.289	5.626	0.000	0.907	1.10
Political Ideology (1 – 5)	1.909	0.424	0.227	4.501	0.000	0.939	1.07
Family Income (1 – 5)	0.139	0.378	0.019	0.367	0.714	0.915	1.09
Community Type (1 – 5)	0.887	0.380	0.124	2.335	0.020	0.854	1.17
Environmental Education (0 – 14)	0.049	0.143	0.019	0.350	0.727	0.811	1.23
Major (0, 1)	0.010	0.011	0.048	0.941	0.347	0.919	1.09
Class Standing (1 – 5)	-2.032	0.648	-0.161	-3.314	0.002	0.909	1.10
Environmental Knowledge (1 – 10)	1.030	0.227	0.242	4.539	0.000	0.842	1.19
Before College Participation (18 – 72)	0.224	0.069	0.228	3.265	0.001	0.492	2.03
Current Participation (18 – 72)	-.0434	0.071	-0.042	-0.609	0.543	0.503	1.99

Considering that some variables were significant in the bivariate analysis, but not in the multivariate analysis, multicollinearity should be examined.

Multicollinearity is defined as the undesirable situation where the simultaneous multiple correlations among independent variables are strong. To assess multicollinearity, one uses the tolerance statistic or the variance inflation factor (VIF), which build in the regression of each independent variable on all others. Tolerance is calculated by $1 - R^2$ for the regression of that independent variable on all other independents, ignoring the dependent variable. As a general rule, if tolerance is less than 0.20, a problem with multicollinearity is indicated (Schroeder et al., 1986). VIF is the reciprocal of tolerance. Therefore, when VIF is high there is a high multicollinearity and instability of the regression coefficients. Examining the tolerance for this sample, multicollinearity does not appear to be problematic.

Background Variables.

Gender. The unstandardized gender coefficient is significant and positive. This indicates that women, while controlling for all other factors, are more concerned than are men. Being female leads to a 5.232 point increase in environmental concern.

Political Ideology. The unstandardized coefficient is significant and positive. This indicates that liberal individuals, while controlling for all other factors, are more concerned than their conservative counterparts. A unit increase in the ideology measure (toward greater liberalism) leads to a 1.909 point increase in environmental concern.

Family Income. Family income was not found to be a significant predictor of environmental concern in this sample.

Community Type. Community type had a positive and significant effect on environmental concern. Individuals from urban areas, all else being controlled, were more concerned than their rural counterparts. A unit increase in the community type variable (toward a more urbanized area) leads to a 0.887 point increase in environmental concern. Interestingly, community type was not found to be significant in the bivariate analysis, but is found to be significant in the multivariate analysis. This relationship will be explored further in the Discussion chapter of this thesis.

Education.

Environmental Education. Environmental education exposure was not found to be a significant variable in the multiple regression analysis. This is also interesting, considering it was significant in the bivariate analysis. This relationship will be explored further in the Discussion chapter of this thesis.

Class Standing. The unstandardized coefficient for class standing was negative and significant. This implies that year in school is negatively related to environmental concern. According to these data, a unit increase in class standing leads to a 2.032 point decrease in environmental concern. This relationship will be explored further in the Discussion section of this thesis.

College Major. Major was not found to be a significant variable in the regression analysis.

Environmental Knowledge. The unstandardized coefficient shows that environmental knowledge had a positive and significant impact in this regression analysis. A unit increase in the environmental knowledge score leads to a 1.030 point increase in environmental concern.

Significant Life Experiences.

Participation in environmental and/or outdoor activities prior to college was found to have a positive and significant influence on environmental concern. This implies that individuals who participated in such activities prior to college, while controlling for all other factors, were more concerned than those who did not participate. A unit increase in participation in environmental/outdoor activities prior to college leads to a 0.224 point increase in environmental concern. Current participation in environmental and/or outdoor activities was not a significant variable in this regression analysis.

The primary aim of this research was to determine the utility of the hypothesized model for describing the predictors of environmental concern. The results presented here are a valuable step in the evaluation of that model. The utility of the model and a thorough discussion of the results will be presented in the next chapter.

CHAPTER 5

DISCUSSION

Researchers have been interested in environmental concern, and its predictors, for decades. Drawing on the breadth of that information base, there does appear to be some loose agreement on the predictors of environmental concern. This research was designed and implemented to determine the answers to several fundamental questions about environmental concern. First, are the predictors in a student population the same as those found by other researchers? This research looked particularly at gender, political ideology, family income, and community type as possible predictors of environmental concern. A second fundamental question of this research concerned the impact of education on environmental concern. The variables examined here included exposure to components of environmental education, college major, class standing, and environmental knowledge. Previous studies have concentrated on measuring the impact of a particular course or activity on environmental concern. A key contribution of this research was the evaluation of environmental education exposure, in a holistic sense, and its impact on environmental concern. Finally, this research examined the importance of significant life experiences. Following from the literature, these experiences included a range of environmental and/or outdoor activities, such as hiking/walking in a natural area, camping, canoeing/kayaking, mountain biking, riding off-road vehicles, hunting, fishing, spending time in a natural area, and reading or watching environmental books or programs.

Any discussion of environmental concern is a difficult one. There are many ideas surrounding what is (and is not) an environmentally concerned individual. An

equally important question is, if indeed a person develops environmental concern, when and how does this happen? Many studies have attempted to answer these questions through surveys of the general population. Many researchers have also studied student populations for similar reasons. Student populations offer a ripe area for study. If it can be conceded that today's students are tomorrow's leaders, it is important to understand their attitudes about the environment. I will begin this discussion with some thoughts and evaluation of some commonly reported background variables. Secondly, I will discuss education and the findings of this research. Finally, I will assess the influence of significant life experiences on environmental concern.

Before proceeding, it should be noted that environmental concern in this sample was relatively high. This corroborates the results of other studies of student groups (Thapa, 2001; Hodgkinson and Innes, 2001; Shetzer et al., 1991).

Background Variables.

This study examined how several background variables influence environmental concern. This research looked specifically at gender, political ideology, family income, and community type. Each of these variables will be discussed, in turn.

Gender. Gender is commonly discussed in the literature as a predictor of environmental concern. The results of these previous studies, however, have been somewhat mixed. While most studies have found women to be more environmentally concerned than men, other studies have found the opposite. In this sample, in both the bivariate and multivariate analyses, women were found to be significantly more concerned than their male counterparts, corroborating much of

the prior literature on gender and environmental concern (Dietz, 2002; Smith, 2001; Zelezny, 2000).

Political Ideology. Research has consistently shown liberal individuals to show more concern for the environment than their conservative counterparts. This study found liberal individuals to be significantly more concerned than their conservative counterparts, which again parallels results from numerous other studies (Dunlap, 2000; Forgas and Jolliffe, 1994; Samdahl and Robertson, 1992).

Family Income. It was once widely thought that concern for the environment is more often shown by wealthier individuals. However, like most studies, this study did not find family income to be a significant predictor of environmental concern. Family income is often a contentious item on social surveys. In this study, students were asked to estimate their parents' gross annual income.

One note of caution about this finding is that it is highly likely that students simply didn't know this information and guessed at their parents' household income.

Community Type. Past research regarding the impact community type (rural versus urban) has shown that urban individuals are usually more concerned than their rural counterparts.

In this study, community type was not found to be significantly correlated with environmental concern at the bivariate level. However, the multiple regression analysis did find community type to be significant. This disparity is somewhat difficult to explain. Clearly, however, when controlling for the effect of other

variables, a person's residence during socialization appears to have an influence on their level of environmental concern.

Education.

Education is consistently discussed in the environmental concern literature. In a broad sense, it is commonly held that educated individuals are more environmentally concerned than their less-educated counterparts. This research attempted to tease out specific aspects of education and determine their impact on environmental concern. This study specifically examined the impact of environmental education, college major, class standing, and environmental knowledge.

Exposure to Environmental Education. Many studies have examined the impact a single course or activity has on environmental concern. This research sought to examine environmental education in a holistic sense. In other words, does a student's exposure to environmental education (as a whole) impact his/her environmental concern?

In this study, students had quite a wide-ranging exposure to the components of environmental education, with a slight skew toward the bottom half of the scale (i.e. less exposure). Considering the higher proportion of juniors and seniors in this sample, the relatively low exposure level is somewhat unexpected. It makes some intuitive sense that the longer a student is in a university, the more likely it is s/he will be exposed to the components of environmental education. This research did not bear this out, however. There was no significant relationship between class standing and environmental education at the bivariate level. However, once a

student reaches upperclass standing (i.e. junior or senior level), it is more likely that s/he will begin specialized courses toward his/her major. If the student's major is in an environmental field, it is likely that s/he would enroll in courses likely to present the components of environmental education. The results of this research, however, do not corroborate this hypothesis: there was a *negative* and significant relationship between environmental education and college major. Exposure to environmental education was found to be significantly and positively correlated with environmental concern. In the multivariate analysis, however, this variable is surprisingly not found to be significant.

There are several concerns regarding the measurement of this item. For instance, despite the broad question wording for the environmental education items, there were still quite a few individuals who fell in the "no" category. On several items, there is an almost even split between those respondents who answered "yes" and those answered "no". It may be that the respondent did not understand the question wording or phrasing. For instance, consider the following question from the survey: "Please indicate if you've had any college course where you developed a specific strategy to deal with an environmental issue?" It is possible that respondents didn't understand how to interpret the word "strategy".

A second concern regarding the measurement of the environmental education items was specifically item e, which asked if they had ever "had a college course where you used global information systems (GIS)?" Unfortunately, this was a typographical error: GIS is an acronym for *Geographic* Information Systems, not global information systems. One can only speculate on whether the students caught this error, or not. Did students catch the error, but still understand that it meant Geographic Information Systems? Were they confused by the incorrect

term? This component of environmental education – question and analysis skills – was measured with four items, which may have statistically minimized the impact of the typographical error. However, it is impossible to accurately gauge the impact. For these reasons, we can only accept the results for this item with extreme caution.

College Major. Deciding a college major, which usually occurs between the sophomore and junior years, is one of the most difficult decisions any university student faces.

Research has shown that students who choose an environmentally related major often show a higher level of environmental concern (Shetzer et al., 1991; Wysor, 1983). Specifically, students in the biological sciences, compared with other disciplines, have been shown to have the most positive environmental attitudes.

For the purposes of this research, majors within three main colleges at Michigan State University: the College of Agriculture and Natural Resources, the College of Natural Science, and the College of Social Science were considered to be environmentally related. In 2002, Michigan State University outlined a new initiative in environmental science and policy (ESP). The Colleges of Agricultural and Natural Resources, Natural Science, and Social Science have been designated as the units to deliver instruction in the new environmental science and policy initiative. This ESP designation by the university further supports the choice of these colleges being designated 'environmentally related' in this research. Just over thirty percent of students in this sample declared themselves to be in an environmentally related college.

This particular item had several curious qualities. First, there was a discrepancy between what students declared in the survey versus what they

declared to the University Registrar. For instance, just under forty percent of the respondents declared majors that did not fall within an environmentally related college. However, the University Registrar's documentation showed that just under sixty percent of this sample declared majors not housed in the environmentally related colleges. This discrepancy can possibly be explained if one considers the nature of students and the timing of when a major is declared. As previously stated, students at Michigan State University usually declare their major between the sophomore and junior years of study. It may be that sophomore students originally declared a particular major with the University Registrar, later changed their minds (as juniors or seniors), but never filed the proper paperwork with the University Registrar to declare this. Michigan State University has a complex major structure, and there are many options from which to choose. Undecided students may have simply picked a major in their sophomore year, knowing that this could be changed at a later date. Another complicating factor in the choice of major is that there are several majors offered that are interdisciplinary. These are often difficult to label, and students may have been categorized as "unsure" because of this difficulty. It is only at the time of graduation that the student must be certain that his/her declared major is accurate. It is important to note the discrepancy in the "unsure" category, as well. Just over thirty percent of respondents declared their major as "unsure" or were coded as such given the ambiguity of their response, while the University Registrar only had 7.5% of the sample as "unsure". This would also indicate that students had perhaps changed their minds, but didn't inform the University Registrar of this fact.

Another difficulty with the college major item is the rough grouping of majors by the university. For instance, a student may have listed themselves as a

'business' major but might have been studying environmental business, or s/he may have listed engineering but have been studying environmental engineering. From the imprecise survey question, it was impossible to determine such cases. There is also a great gap between majors within any college. For instance, within the College of Social Science, there are majors as diverse as economics and anthropology – two majors with very different perspectives and ideologies.

Particularly important for this research is the determination of when a student develops his/her environmental concern, if it does develop. It is unclear, for instance, whether increased environmental concern develops in a student before, during, or after they have chosen a particular major or program. This is impossible to determine unless longitudinal research is employed; this fell outside the bounds of this research.

Class Standing. This study assumed that there was a positive link between education and environmental concern. This study utilized class standing to determine the progress of the student's educational attainment. In other words, a freshman would not have received as much education as a senior. Further, it would be expected that a senior, having had more education, would show a higher level of environmental concern.

The results for this study were very interesting. Again, students' survey declarations and University Registrar statistics are not congruent. The statistics loosely match for freshmen, sophomores, and graduate students. However, the statistics for juniors and seniors do not. Just under fifteen percent of respondents stated they were juniors, whereas the University Registrar had 22.1% of the sample comprised of juniors. Similarly, 56.0% of respondents declared themselves as

seniors, whereas the University Registrar only had 46.6% of the sample comprised of seniors. What can account for this discrepancy? It is unlikely, in this instance, that the University Registrar's statistics are incorrect. Class standing is determined by a student's attainment of credit, and this is a non-ambiguous situation. Perhaps it is a case of wishful thinking on the part of respondents. Or, perhaps seniors were more likely to respond to this survey.

A further point to mention considers the difference in this sample's class standing distribution versus that of the entire university population. This random sample only drew 0.8% freshmen, whereas freshmen make up 21.4% of the MSU student population. Similarly, the sample had 5.0% sophomores, whereas the university population is comprised of approximately 19.7% sophomores. This indicates that the sample was not necessarily representative of the wider university population, under-representing under-classmen. Although certainly unintentional, it is likely that the Registrar provided a questionable sample. It is possible that there may be a difference between under- and upper-classmen views of the environment, and that the under-representation of under-classmen may bias the interpretation presented here.

Lastly, class standing and environmental concern were not significantly correlated at the bivariate level. Class standing was significant at the multivariate level, and the relationship was negative. When controlling for other factors, a unit increase in class standing leads to a 2.022 point *decrease* in environmental concern. In other words, as a student progresses in his/her academic career, their environmental concern decreases. This was certainly an unexpected finding, and explaining this occurrence is complete speculation. Perhaps as a student progresses in his/her academic career, they become more concerned with

graduating and finding employment, and this causes them to be less environmentally concerned.

Environmental Knowledge. The scientific literature clearly supports a positive link between education and environmental concern. Following from this, it makes some intuitive sense that the more a person knows about environmental issues and problems, the more concerned they are likely to be. This research asked ten questions to gauge respondents' knowledge of environmental issues.

In general, students in this sample tended toward the "knowledgeable" end of the scale. However their knowledge seemed to be around specific topics, such as global warming, freshwater supplies, the meaning of biodiversity, and mercury contamination in food. This occurrence isn't necessarily surprising. Measuring environmental knowledge with question-answer items is inherently issue-specific. This is a bias commonly accepted in the literature, and was accepted here. This thesis assumed an increase in class standing would lead to an increase in knowledge. It makes some intuitive sense that an increase in knowledge would also lead to an increase in environmental concern. This, however, was not supported by the data. There was no significant relationship found between environmental concern and class standing at the bivariate level.

The direction of the relationship between environmental knowledge and concern is ambiguous. It is plausible that there is a reciprocal relationship between these variables. In other words, environmental concern could lead one to seek out information, resulting in greater levels of knowledge. Or, conversely, increases in one's environmental knowledge could stimulate greater levels of concern about the environment. For the scope of this study, I assume the latter, as this is also a

common assumption in the appropriate literature. Regardless of the directionality of the relationship, the literature, as well as the results of this study, clearly supports a positive relationship between environmental knowledge and environmental concern.

Significant Life Experiences.

Several researchers believe that a person's experiences during their formative years help to later shape their environmental attitude and concern. The research into significant life experiences and the outdoor recreation literature are very similar in their determinations. There appears to be a distinct difference in the attitudes of individuals who participate in particular types of outdoor and/or environmental activities. In other words, hypothetically, individuals who participate in appreciative activities (hiking, walking, camping, etc.) have different attitudes from individuals who participate in more consumptive activities (hunting, fishing, motorized activities, etc.). This was, indeed, supported by the data presented here.

The results of this study noted a difference in participation levels before college and currently. Participation in outdoor/environmental activities decreased once the student was in college. What explanations are there for this decrease in level of participation? Perhaps it is a question of time. Perhaps college students have less time to participate in outdoor/environmental activities. Some of the activities listed – such as boating, riding an ORV, hunting, and fishing – require some financial contribution, whether in the form of equipment or the purchase of a license. Perhaps college students do not have the financial means to participate in some environmental/outdoor activities.

Participation in environmental/outdoor activities – both prior to college and currently – was significantly and positively related to environmental concern at the

bivariate level. However, current Significant Life Experiences were not found to be significant at the multivariate level of analysis. Why does participation in environmental/outdoor activities drop out of the multiple regression? Perhaps it is due to the current and past activity being so highly correlated. In other words, participation in one type of activity may lend itself, in general, to doing another outside-type of activity. The results presented here – the high correlation between pre-college and current participation, and between consumptive and appreciative activities – seem to support this hypothesis.

The original aim of this research was to determine the utility of a theoretical model, outlined in Chapter 2, for describing the predictors of environmental concern. From this research, it is clear that predicting environmental concern is a complicated task, but a general picture has emerged. There is a relationship between various background variables and environmental concern. Namely, liberals and females are more environmentally concerned than their counterparts. There is also a relationship between a person's education and environmental concern. This research has shown that the type of education a person receives is important in shaping his/her environmental concern. Environmentally knowledgeable individuals and those who have had exposure to environmental education components are more environmentally concerned than their counterparts. Significant Life Experiences prior to college also are important. Individuals who participated in environmental and/or outdoor activities before college are more environmentally concerned than their counterparts.

The multivariate analysis also pointed to the prediction of environmental concern being a complicated task. The majority of variables analyzed in this research were consistent in their impact on environmental concern at the bivariate

levels: gender, political ideology, environmental knowledge and pre-college participation outdoor/environmental activities were all positively related to environmental concern even when controlling for the effects of other variables. Similarly, family income and college major were both unrelated to environmental concern at both the bivariate and multivariate levels.

Four of the variables analyzed, however, revealed more complex relationships with environmental concern. Two variables – exposure to environmental concern and current participation in outdoor/environmental activities – were positively and significantly related to environmental concern at the bivariate level but not when other variables were controlled in a multiple regression. For the latter, current participation, this is undoubtedly due to its strong inter-relationship with pre-college participation. The changing effect of environmental education exposure is more difficult to explain. Perhaps the strong relationship between exposure to environmental education and environmental knowledge leads to environmental education dropping out as a predictor once other variables are controlled for. It may not be exposure per se that leads to concern, but the retention of information about environmental issues that influences concern about them. Clearly, exposure to environmental issues/education must come before knowledge, but exposure itself may not directly influence environmental concern.

This research also showed two variables – community type and class standing – which were insignificant in the bivariate analysis, but significant in the multivariate analysis. When controlling for other variables, relationships can become 'unhidden'. In these cases, it is possible that one or more of the other variables were acting as suppressor variables, but once they were controlled, the relationship became apparent. Similarly, bivariate relationships can disappear once

other variables are controlled. For instance, class standing had a negative effect in the multiple regression. Could it be that once we control knowledge, class standing has the opposite effect? In other words, once we take away the effect of greater knowledge among upperclassmen, then younger underclassmen are more concerned?

This research took important steps in corroborating previous research into the predictors of environmental concern, and it attempted a new approach to evaluating the impact of education, as a whole, on environmental concern. In this research, background variables (particularly gender and political ideology) played a significant role in shaping environmental concern. A key contribution of this research was the attempt to isolate particular areas of education and determine their respective impact on environmental concern. It is clear from multiple levels of analysis presented here that environmental knowledge does positively relate to environmental concern. Lastly, the link between Significant Life Experiences and environmental concern was explored. It is clear from this analysis that participation in outdoor/environmental activities in one's youth is significant in positively shaping environmental concern later in life. Based on these findings, the proposed model did show some utility in describing the predictors of environmental concern in students.

Although this research was successful in exploring and evaluating some of the predictors of environmental concern in students, there are still many other questions left unexplored. For instance, what contributes to a person being not concerned for the environment, or even anti-environment in his/her attitudes? Another important question is: Does class standing really influence environmental concern? Due to the (reported) under-representation of underclassmen in this

sample, it is difficult to gain a clear picture of how this variable influences concern. Finally, exposure to the components of environmental education needs to be more thoroughly explored. The attempt made in this research was original and unique; a more thorough and comprehensive scale for measuring environmental education exposure should be developed and evaluated.

There are several interesting implications of this research. It is widely believed that we are pushing the limits of the Earth to the threshold of collapse. How do we make a difference? David Orr, one of today's most popular authors on education, has said that 'to create a constituency for the long haul, we need farsighted leadership at all educational levels committed to making ecological literacy central to the debate about national educational goals and standards' (Orr, 1994). This research has shown that liberal females, from urban surroundings, are more likely to show increased levels of environmental concern. Further, participation – both before and during university – positively contributes to environmental concern. These areas are either biologically determined or shaped prior to the student entering higher education. What can be done to help create the 'constituency' that Orr suggests is necessary? Increasing participation in outdoor/environmental activities and increasing environmental knowledge do make a positive difference to environmental concern. Therefore, these activities and aims should be built in to any modern academic curricula. The purpose of education should be to promote or 'draw out' the best qualities of the human species. In other words, education should promote awareness, tolerance, and citizenship in a global sense. Understanding and cultivating environmental concern is a necessary step that all educators will face in order to create our shared and sustainable future.

APPENDIX A

National Standards for Environmental Education

Question and Analysis Skills

- Questioning: students are able to develop, modify, clarify, and explain questions that guide environmental investigations of various types. They understand factors that influence the questions they pose.
- Designing Investigations: students know how to design investigations to answer particular questions about the environment. They are able to develop approaches for investigating unfamiliar types of problems and phenomena.
- Collecting Information: students are able to locate and collect reliable information for environmental investigations of many types. They know how to use sophisticated technology to collect information, including computer programs that access, gather, store, and display data.
- Evaluating Accuracy and Reliability: students can apply basic logic and reasoning skills to evaluate completeness and reliability in a variety of information sources.
- Organizing Information: students are able to organize and display information in ways appropriate to different types of environmental investigations and purposes.
- Working with Model/Simulations: students are able to create, use, and evaluate models to understand environmental phenomena.
- Developing Explanations: students are able to use evidence and logic in developing proposed explanations that address their initial questions and hypotheses.

Knowledge of Environmental Processes and Systems

- The Earth as a Physical System
  - Processes that Shape the Earth: students understand the major physical processes that shape the Earth. They can relate these processes, especially those that are large-scale and long-term, to characteristics of the Earth.
  - Changes in Matter: students apply their understanding of chemical reactions to round out their explanations of environmental characteristics and everyday phenomena.
  - Energy: students apply their knowledge of energy and matter to understand phenomena in the world around them.
- The Living Environment
  - Organisms, Populations, and Communities: students understand basic populations dynamics and the importance of diversity in living systems.
  - Heredity and Evolution: students understand the basic ideas and genetic mechanisms behind biological evolution.
  - Systems and Connections: students understand the living environment to be comprised of interrelated, dynamic systems.
  - Flow of Matter and Energy: students are able to account for environmental characteristics based on their knowledge of how matter and energy interact in living systems.

- Humans and Their Societies
  - Individuals and Groups: students understand the influence of individual and group actions on the environment, and how groups can work to promote and balance interests.
  - Culture: students understand cultural perspectives and dynamics and apply their understanding in context.
  - Political and Economic Systems: students understand how different political and economic systems account for, manage, and affect natural resources and environmental quality.
  - Global Connections: students are able to analyze global, social, cultural, political, economic, and environmental linkages.
- Environment and Society
  - Human/Environment Interactions: students understand that humans are able to alter the physical environment to meet their needs and there are limits to the ability of the environment to absorb impacts or meet human needs.
  - Places: students understand "place" as humans endowing a particular part of the Earth with meaning through their interactions with that environment.
  - Resources: students understand that the importance and use of resources change over time and vary under different economic and technological systems.
  - Technology: students are able to examine the social and environmental impacts of various technologies and technological systems.
  - Environmental Issues: students are familiar with a range of environmental issues at scales that range from local to nation to global. They understand that these scales and issues are often linked.

<u>Skills for Understanding and Addressing Environmental Issues</u>

- Skills for Analyzing and Investigating Environmental Issues
  - Identifying and Investigating Issues: students apply their research and analytical skills to investigate environmental issues ranging from local issues to those that are regional.
  - Sorting the Consequences of Issues: students are able to evaluate the consequences of specific environmental changes, conditions, and issues for human and ecological systems.
  - Identifying and Evaluating Alternative Solutions: students are able to identify and propose action strategies that are likely to be effective in particular situations and for particular purposes.
  - Working with Flexibility, Creativity, and Openness: while environmental issues investigations can bring to the surface deeply held views, students are able to engage each other in peer review conducted in the spirit of open inquiry.
- Decision-Making and Citizenship Skills
  - Forming and Evaluating Personal Views: students are able to communicate, evaluate, and justify their own views on environmental issues and alternative ways to address them.

- Evaluating the Need for Citizen Action: students are able to decide whether action is needed in particular situations and whether they should be involved.
- Planning and Taking Action: students know how to plan for action based on their research and analysis of an environmental issue. If appropriate, they take actions that are within the scope of their rights and consistent with their abilities and responsibilities as citizens.
- Evaluations the Results of Actions: students are able to evaluate the effects of their own actions and actions taken by other individuals and groups.

Personal and Civic Responsibility

- Understanding Societal Values/Principles: students know how to analyze the influence of shared and conflicting societal values.
- Recognizing Citizens' Rights/Responsibilities: students understand the importance of exercising the right and responsibilities of citizenship.
- Recognizing Efficacy: students possess a realistic self-confidence in their effectiveness as citizens.
- Accepting Personal Responsibility: students understand that their actions can have broad consequences and accept responsibility for recognizing those effects and changing their actions when necessary.

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