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MaryBe McMillan

*North Carolina State University*

Thomas J. Hoban

*North Carolina State University*

William B. Clifford

*North Carolina State University*

Margaret R. Brant

*North Carolina State University*

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**SOCIAL AND DEMOGRAPHIC INFLUENCES  
ON ENVIRONMENTAL ATTITUDES**

**By MaryBe McMillan, Thomas J. Hoban, William B.  
Clifford, and Margaret R. Brant<sup>1</sup>**

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**ABSTRACT**

Sociologists have studied environmental attitudes for over two decades. Much of this research has sought to determine what factors are related to these attitudes. Past research has shown that certain social and demographic variables tend to have a positive influence on environmentalism. One of the more valid and reliable indicators of environmentalism is the 12-item attitude scale known as the New Environmental Paradigm (NEP). That scale has been shown to consist of three sub-scales. This paper extends previous research by examining the relative influence of six independent variables (age, gender, race, education, income, and residence) on each of the sub-scales and the overall NEP scale. The analysis generally supports the hypotheses that younger people, women, whites, and people of higher education levels hold more environmental attitudes as measured by the NEP index. Income has a significant nonlinear effect.

**INTRODUCTION**

In the midst of society's increased technological knowledge and industrial growth, a rising concern with the sustainability of the environment and natural resources raises uncertainties about the benefits of "progress" and the possibility of unrestrained growth. To describe this

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<sup>1</sup>MaryBe McMillan is a doctoral candidate, Thomas J. Hoban is an Associate Professor, William B. Clifford is a Professor, and Margaret R. Brant is a Statistician in the Department of Sociology and Anthropology at North Carolina State University. The research on which this paper is based was financed in part by the United States Environmental Protection Agency and the North Carolina Department of Environment, Health, and Natural Resources, through the Albemarle-Pamlico Estuarine Study. Contents of this paper do not necessarily reflect the views and policies of the U.S. EPA or the N.C. DEHNR, nor does mention of trade names or commercial products constitute their endorsement by the U.S. or N.C. government. The research reported in this publication was also funded in part by the North Carolina Agricultural Research Service.

shift toward increasing concern about the viability of the environment, Dunlap and Van Liere (1978) and Milbrath (1984) discuss a transition from a dominant social paradigm (DSP) that places a premium on economic growth to a new environmental paradigm (NEP) that values environmental protection.

Essentially, the DSP is an anthropocentric view that justifies human dominion over nature whereas the NEP is an ecocentric view that sees human beings not as the authority over nature but rather as part of a larger ecological system. Milbrath (1984) describes the DSP as characterized by a fundamental belief in progress and unlimited growth coupled with a faith in science and technology to solve any social problems. Milbrath (1984) and Dunlap and Van Liere (1978) see the DSP as a philosophy that encourages the maximization of wealth. In contrast, the NEP challenges the belief in unlimited economic growth by asserting that technology cannot change ecological constraints. By advocating a respect for ecological limits, adherents of the NEP encourage people to value nature for its aesthetic purposes rather than its economic potential.

Specifically, Dunlap and Van Liere (1978) identify three principal themes of the NEP which they used as guidelines for the development of a 12-item NEP index to measure environmental attitudes. First, a general theme of the NEP is that people are a part of nature and are not in dominion over it. Similarly, a second component of the NEP relates to the fragile balance of nature and acknowledges that human interference can be problematic. Finally, the NEP promotes the belief that the earth can support only a limited number of people and, thus, industrial expansion should be controlled. Milbrath (1984) notes that the shift to the NEP paradigm, coupled with the increased visibility of the environmental movement, has created conflict between those who advocate environmental concerns and those who do not. The question arises as to what factors influence environmental attitudes (i.e., what type of people are more likely to adhere to the various beliefs associated with the NEP).

This article explores the correlates of environmental attitudes. As the review of the literature demonstrates, studies have shown that several variables such as race, gender, age, income, and educational level are related to holding environmentalist beliefs. With data from a telephone survey of North Carolinians, we test several hypotheses that relate these variables to environmental attitudes. As the latter section of the article explains, the results of our research indicate that North Carolinians' attitudes follow the national trend.

This research focuses on the Albemarle-Pamlico Estuarine System in northeastern North Carolina. This system is the second largest estuary in the nation. It provides important fishery resources and economic benefits for the region. Concerns have been raised by scientists and citizens about threats to water quality from development and pollution. Information from the survey project played a role in the development of a comprehensive management plan for the region.

## LITERATURE REVIEW

Since the 1970s, sociologists have studied correlates of environmental beliefs and found that several demographic variables are related to environmentalism. Generally, research has shown that women are more likely to hold environmental beliefs than men (Arcury et al., 1986; Brody, 1984; Milbrath, 1984; Mohai, 1992). One explanation of women's environmental attitudes posits that men have more knowledge of issues related to environmental risks and that, generally, people who have such knowledge are less likely to be concerned about these types of risks (Kuklinski et al., 1982). A meta-analysis by Davidson and Freudenburg (1994, p. 328) illustrates, however, that women are more concerned about environmental hazards "not because they know less but because they care more." An explanation for this finding is that women are traditionally the caretakers and nurturers in society. Because of their role in childbearing and child rearing, women are believed to be closer to nature and, thus, more inclined toward protective attitudes about the environment (Arcury et al., 1986; Nelkin, 1981; Stern et al., 1985). Furthermore, because women tend to occupy subordinate roles in society, they have less access to institutional forms of power and are more willing to criticize decisions made by the industrial and governmental elites.

In addition to gender, research indicates that race is also a determinant of environmental beliefs. Some studies find that whites are more likely to hold environmental attitudes than African-Americans (Bullard, 1990; Dolin, 1988; Olsen et al., 1992; Taylor, 1989). Bullard (1990) and Dolin (1988) offer a social psychological explanation for the racial differences in attitudes. They speculate that because of African-Americans' subordinate position in society, they feel helpless to alter environmental policies and regulations. The differences in socioeconomic status that generally exist between African-Americans and whites could also provide an explanation for their difference in attitudes. For example,

whites generally attain higher education and income levels than African-Americans, and research has demonstrated that human capital variables are related to environmentalism (Arcury et al., 1986; Milbrath, 1984; Mohai & Bryant, 1992). Similarly, the "economic contingency hypothesis" contends that economically disadvantaged groups such as African-Americans would be especially less likely to offer support for environmental causes during a period of economic decline (Buttel, 1975).

Recent studies, however, refute the economic contingency hypothesis as well as the claim that African-Americans generally are less likely to be concerned about the environment (Adeola, 1994; Jones & Carter, 1994; Jones & Dunlap, 1992). Such contradictory findings may reflect different measures of environmental concern. While whites may demonstrate higher levels of general environmental attitudes, African-Americans show more concern over local issues of environmental health and safety (Caron, 1989; Jones & Carter, 1994; Mohai, 1990). Similarly, while African-Americans have historically been less likely to be involved in environmental organizations, they are now becoming involved in grassroots efforts to protest issues in the local community, particularly as they relate to claims of environmental racism. Hence, conclusions about race and environmental attitudes depend largely on the measure of environmental concern that is used.

The discussion of socioeconomic status in the literature on race and environmental attitudes warrants a closer examination of the research on the effects of income and education on environmental beliefs. Generally, research has found that higher income levels are associated with higher levels of environmentalism (Arcury et al., 1986; Arcury & Christianson, 1990). Herrera (1992) argues that people of higher income levels are more accustomed to living in healthy environments. Hence, they have beliefs that support environmental protection. Research that refutes the economic contingency hypothesis (Jones & Carter, 1994; Jones & Dunlap, 1992) illustrates that the effects of income on environmentalist beliefs are not as straightforward as some studies have indicated. As with the relationship between race and environmental concerns, the correlation between income and such concerns could depend on the measurement of environmental beliefs as either a general orientation or as related to local issues. The relationship between income and environmentalism could also be attributed to the higher education levels that wealthier people typically achieve.

In this vein, several studies have found that higher levels of education have a positive effect on environmentalism (Arcury & Christianson, 1990; Milbrath, 1984). The general explanation for this relationship is that education exposes a person to a broad range of ideas and beliefs and, thus, encourages a more liberal-minded perspective. Van Liere and Dunlap (1980) assert that education is the variable most consistently associated with environmental attitudes.

In some research, age appears to be the variable most strongly associated with environmentalism (Arcury et al., 1987; Buttel, 1987). Generally, younger people are more likely to hold environmental beliefs than older respondents (Arcury et al., 1987; Arcury & Christianson, 1990; Edelstein, 1988; Mohai & Twight, 1987). In an explanation similar to the one offered for women's environmental beliefs, younger people are believed to be less integrated into society and, thus, can more readily criticize industrial and governmental policies. This reasoning leads to the conclusion that attitudes will change to less environmental as people age and become more established socially. An alternative explanation states that a cohort effect occurs such that a particular age group experiences specific historical events like the counterculture of the sixties that influence their attitudes collectively. Thus, growing up in an era when environmental issues are readily discussed and debated could make young adults more inclined toward environmentalism. Some of these explanations would require a longitudinal research design that this paper does not employ.

Another variable often studied in conjunction with environmental attitudes is residence in a rural or urban area. Several studies have concluded that residence in an urban area is generally associated with greater environmentalism (Buttel, 1992; Mohai & Twight, 1987; Van Liere & Dunlap, 1980). One explanation for rural/urban differences in attitudes is that urban dwellers often live in more polluted environments and, therefore, are more aware of environmental problems than people who live in rural areas. An alternative explanation poses that rural residents often depend on the land for economic purposes, such as agriculture and extractive industries and so do not value nature for the aesthetic, intrinsic qualities esteemed by adherents of the New Environmental Paradigm. This explanation is somewhat contradictory, since one could hypothesize that rural residents who are dependent on the land for their livelihood would want to protect their source of income from possible contamination. Thus,

the relationship between rural residence and environmentalism has been somewhat problematic.

## **HYPOTHESES**

This paper explores the relationship between demographic variables and environmental attitudes among North Carolina residents. Informed by a review of previous studies (Buttel, 1987) regarding environmentalism, the specific research hypotheses are the following:

- Younger respondents are more likely to hold environmental attitudes than older respondents.
- Women are more likely to hold environmental attitudes than men.
- Whites are more likely to hold environmental attitudes than African-Americans.
- Highly educated respondents are more likely to hold environmental attitudes than those with less education.
- Respondents with higher incomes are more likely to hold environmental attitudes than those with lower incomes.
- Respondents from more urbanized areas are more likely to hold environmental attitudes than those from more rural areas.

The New Environmental Paradigm (NEP) scale developed by Dunlap and Van Liere (1978) has been used in numerous other studies (Bowman, 1977; Kuhn & Jackson, 1989; Noe & Snow, 1982). Its use in this study as an indicator of environmental attitudes allows us to determine whether attitudes in North Carolina follow the national trend or are regionally distinct.

Several researchers (Kuhn & Jackson, 1989; Noe & Snow, 1982) have demonstrated that the NEP index is multidimensional since it includes statements that cluster around three types of beliefs. Since the index can be easily divided into these three domains, we have chosen to create three sub-scales and use each as a dependent variable along with the larger NEP index. By testing the research hypotheses with each of the sub-scales and the larger NEP scale as dependent variables, we can determine whether the independent variables are correlated differently with any of the sub-scales than they are with the overall NEP scale.

## DATA AND METHODS

To test our hypotheses, we analyzed data that were part of a larger project about the Albemarle-Pamlico Estuarine System and the public's perceptions of water quality in coastal North Carolina. Data collection involved telephone interviews that were conducted in 1991. The research design was cross-sectional in nature and used a random sample of households with telephones in 100 counties in North Carolina and 16 counties in southeast Virginia. Since the project was initially designed to determine attitudes about the Albemarle-Pamlico Estuarine System, the concern arose that a simple random sample would result in too many respondents from urban areas in central North Carolina and too few respondents from coastal areas. Hence, a disproportionate stratified random sample was used so that county of residence was divided into five areas: Mountain, Piedmont, Coastal Plain, Tidewater, and Virginia. For the analysis, the data were weighted to illustrate the actual number of people in each region (Hoban & Clifford, 1992).

The telephone interviews were conducted by the Center for Urban Affairs and Community Service at North Carolina State University. Respondents over 18 years old were selected at random from each household by using the last birthday method. The completion rate for the interviews was 70.5 percent with a total sample size of 1,183 respondents. For the purposes of this study, the sample size is 1,047 with the elimination of cases with missing data and the exclusion of the twenty-four respondents of races other than African-American and white. The sample and North Carolina's general population include few people of races other than Caucasian and African-American. The literature generally discusses racial differences in terms of African-Americans and whites. Therefore, this research focuses on attitude differences between white and African-American respondents as indicative of racial differences in North Carolina.

The measure of environmental attitudes is the 12-item NEP index developed by Dunlap and Van Liere (1978). Figure 1 lists the component items of the NEP index. Previous studies have verified the validity and reliability of the NEP index (Kuhn & Jackson, 1989; Noe & Snow, 1982). The reliability of the overall NEP scale for this paper is confirmed by an alpha value of .73. The *Limits to growth* sub-scale has an alpha value of .59, the *People over nature* sub-scale has a value of .62, and the *Balance of nature* sub-scale has an alpha of .69. Although the sub-scales do not have reliability levels as high as the larger NEP index, their reliability is



**Figure 1. New Environmental Paradigm index.**

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**Component items:**

**Balance of nature (BALANCE sub-scale)<sup>a</sup>**

1. The balance of nature is very delicate and easily upset.
2. When humans interfere with nature, it often produces disastrous effects.
3. Humans must live in harmony with nature in order to survive.
4. Mankind is severely abusing the environment.

**Limits to growth (LIMIT sub-scale)<sup>a</sup>**

5. We are approaching the limit of the number of people the earth can support.
6. The earth is like a spaceship with only limited room and resources.
7. There are limits to growth beyond which our industrial society cannot expand.
8. To maintain a healthy economy, we will have to develop a "steady state" economy where industrial growth is controlled.

**People over nature (DOMINION sub-scale)<sup>b</sup>**

9. Mankind was created to rule over the rest of nature.
10. Humans have the right to modify the natural environment to suit their needs.
11. Plants and animals exist primarily to be used by humans.
12. Humans need not adapt to the natural environment because they can remake it to suit their needs.

**Response categories and coding for items 1-8:**

Strongly				Strongly
Disagree	Disagree	Neutral	Agree	Agree
1	2	3	4	5

**Response categories and coding for items 9-12:**

Strongly				Strongly
Agree	Agree	Neutral	Disagree	Disagree
1	2	3	4	5

Items range from 1-5. The additive NEP scale ranges from 12-60. The Balance, Limit, and Dominion sub-scales range from 4-20.

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<sup>a</sup>Environmental attitudes are indicated by strong agreement or agreement with these items.

<sup>b</sup>Environmental attitudes are indicated by strong disagreement or disagreement with these items.

acceptable and their inclusion in the analyses allows the various dimensions of environmentalism to be explored more fully.

Table 1 presents the descriptive statistics for all the variables in the analysis. A brief description of the measurement of each independent variable is also included. The average age of the sample is 45, slightly over half is female, and over 80 percent is white. The average years of schooling completed is 14 and the average income is \$36,000. The averages reported for the independent demographic variables are in line with the population figures reported in the census. The average overall NEP score for the total sample is 45. The dependent variables meet the assumptions for OLS regression. Since weights are applied to the data, weighted least squares regressions are used in the analysis.

**Table 1. Descriptive statistics for dependent and independent variables.**

Variable	Mean	Standard Deviation
<b>Independent:</b>		
Age (years)	45.14	15.69
Gender (1=female)	.52	.50
Race (1=white)	.84	.37
Education (years)	14.18	3.57
Income (\$1000s)	36.08	28.05
City (1=city resident) <sup>a</sup>	0.21	0.41
Small town (1=town resident) <sup>a</sup>	0.23	0.42
Suburb (1=suburb resident) <sup>a</sup>	0.18	0.38
<b>Dependent</b>		
Balance of nature	16.62	2.18
Limits to growth sub-scale	15.11	2.47
People over nature sub-scale	13.62	3.02
NEP scale	45.36	5.73

<sup>a</sup>Rural is the residual category.

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### **RESULTS**

We chose to enter the independent variables into the regression models in three blocks. The first included the respondents' age, gender, and race. The second included two indicators of socio-economic status, education and income. Finally, rural/urban residence was added by itself in the third block. This arrangement should make it easier to determine the relative explanatory power of these variables. The analyses were run in blocks, but the results are presented for the full model only in Table 2. The coefficients for each block are presented in the text.

We provide a fairly detailed discussion of the three block models for the overall NEP scale and a shorter discussion for the three sub-scales. The adjusted  $R^2$  is offered as the amount of variation attributable to the model. The estimated regression coefficients for the final regression model are presented in Table 2. Preliminary analyses suggested that income had a nonlinear effect on environmental attitudes. Therefore, a quadratic term was added to the models.

In terms of the analyses using the overall NEP index, the demographic variables of age, gender, and race account for about 5 percent of the variation in scores for the index. As hypothesized, age has a statistically significant negative effect (-.06) on environmental attitudes. Also, as expected, gender and race have statistically significant positive effects (1.02 and 2.32) on scores for the NEP index, so that women and whites have higher scores when controlling for the other variables. Race appears to have a stronger effect on environmental attitudes than gender since the standardized coefficient for race is approximately 1.7 times the standardized value for gender.

The independent variables account for almost 10 percent of the variation in scores on the NEP index when the socioeconomic variables of education and income are added to the model. An incremental F-test reveals that this model represents a statistically significant improvement in predictive ability over the previous model. In this model, age (-.04), gender (1.27), and race (2.03) continue to have statistically significant effects on environmental attitudes. The coefficient for race decreases slightly from the previous model.

In terms of the relationship between education and environmental beliefs, education has a statistically significant positive effect (.28) on scores for the index when controlling for the other independent variables in the model. Income has a significant nonlinear effect. That is, as income

**Table 2. Weighted least squares regressions predicting scores on the environment scales.**

Variable	NEP score (overall)	Balance of nature	Limits to growth	People over nature
Age (years)	-0.037** (0.011)	-0.002 NS (0.004)	-0.011* (0.005)	-0.025** (0.006)
Gender (1=female)	1.273** (0.346)	0.384** (0.135)	0.15 NS (0.150)	0.739** (0.181)
Race (1=white)	2.009** (0.466)	0.536** (0.183)	0.594** (0.208)	0.879** (0.245)
Education (years)	0.287** (0.055)	0.0751** (0.022)	0.074** (0.025)	0.138** (0.029)
Income (\$1000s)	0.051** (0.017)	0.014* (0.007)	0.009 NS (0.008)	0.028** (0.009)
Income squared	-0.0004** (.0001)	-0.0001** (.0001)	-0.0001* (0.0001)	-0.0002** (0.0001)

Note: N=1047. Table entries are unstandardized (metric) regression coefficients (standard errors of estimates in parentheses).

\* indicates p<0.05 and \*\* indicates p<0.01.

**Table 2 (cont.). Weighted least squares regressions predicting scores on the environment scales.**

Variable	NEP score (overall)	Balance of nature	Limits to growth	People over nature
City (1=city)	-0.324 NS (0.45)	-0.056 NS (0.176)	-0.022 NS (0.201)	0.246 NS (0.236)
Suburb (1=suburb)	-0.191 NS (0.488)	0.008 NS (0.191)	-0.058 NS (0.218)	-0.141 NS (0.256)
Small Town (1=small town)	-0.062 NS (0.464)	-0.195 NS (0.182)	0.07 NS (0.207)	0.062 NS (0.243)
Constant	39.67**	14.84**	13.85**	10.98**
Adjusted Model R <sup>2</sup>	0.095	0.041	0.029	0.099
Model F	13.16**	6.00**	4.19**	13.80**

Note: N=1047. Table entries are unstandardized (metric) regression coefficients (standard errors of estimates in parentheses). \* indicates p<0.05 and \*\* indicates p<0.01.

increases, there is an increase in the score on the index until high incomes are reached and the scores decrease. The coefficients are .05 for income and  $-.0004$  for income squared.

The addition of the variable measuring residence does not improve the model since the adjusted R-square does not increase and residence has no statistically significant effect on overall environmental beliefs. All the variables that were statistically significant in the previous models continue to have significant effects in this model (Table 2).

In terms of the *Balance of nature* sub-scale, the demographic variables of gender and race account for 1.3 percent of the variation in scores on this component of the larger NEP index when entered with age. The coefficients, respectively, are .38 and .54. Age is not significant. The amount of variance explained does increase to 4.3 percent when the socioeconomic variables of education (.07), income (.01), and income squared ( $-.0001$ ) are added to the model. Again, income has a nonlinear effect on environmental beliefs.

Looking at the final model presented in Table 2, age has no statistically significant effect on this sub-scale. Gender, race, and education have statistically significant positive effects on attitudes about the balance of nature, while income maintains its significant nonlinear effect. Residence is not significant.

In terms of the analysis using the *Limits to growth* sub-scale, the demographic variables (age, gender, and race) account for 1.5 percent of the variation in scores for this component of the larger NEP index. Gender is nonsignificant but age and race have significant coefficients of .01 and .60. The variance explained increases to 2.9 percent when the socioeconomic variables of education (.07), income (.009), and income squared ( $-.00009$ ) are added to the model. In this case, there is no significant linear effect, but there is a significant and negative quadratic effect. In other words, any increase in income brings about a reduction in the environmental attitude score. Based on the model, this occurs for people earning over \$86,000.

In the final model (Table 2), the effect of gender is not statistically significant. Age and race, again, have statistically significant effects on scores for the *Limits to growth* sub-scale. Specifically, younger respondents and whites continue to have higher scores. In terms of the relationship between education and beliefs in the limited ability of nature to sustain life, education has a significant positive effect. The impact of

income remains unchanged from the previous model. Residence is not a significant factor.

In the regression analysis using the *People over nature* sub-scale as the dependent variable, age (.04), gender (.57), and race (1.12) account for 5.5 percent of the variation in scores for this component of the larger NEP index. The amount of variance explained again increases significantly to 10.0 percent when education (.13), income (.03) and income squared (-.0002) are added to the model. The coefficients in this model for age, gender and race are -.02, .74 and .90. In the final model (Table 2), the addition of residence again does not increase the explained variation. Age, gender, race, education and income maintain their significance. As expected, women, whites, younger, and more educated respondents have higher scores on the *People over nature* sub-scale than men, blacks, older, and less educated respondents. Income has a significant nonlinear effect. For this sub-scale, the coding scheme was reversed so that disagreement with statements about human dominion over the earth indicates environmental beliefs.

## DISCUSSION

Overall, the analyses generally support the research hypotheses that younger people, women, whites, and people of higher education levels hold more environmental attitudes. The support for these hypotheses suggests that North Carolinians' attitudes follow the national trend. The results suggest a curvilinear relationship between income and environmental beliefs. Some of the ambiguous evidence for income reported in the literature and the results here point to the need for more careful conceptualization and analyses of the effects of income on environmental beliefs. Since urban residence was not found to have a significant effect in any of the analyses, the hypothesis that urban residents would be more likely to hold environmental beliefs than rural residents is not supported.

In terms of the relationship between specific independent variables and environmental attitudes, this study is unable to test alternative explanations for demographic differences. Future research needs to include measures of social integration and willingness to challenge authority, for example, in order to test the social-psychological explanation offered in the literature for gender and racial differences in attitudes.

These analyses do, however, reveal that environmentalism, as conceptualized and measured by the NEP, is largely a cause among well-educated whites. Throughout the models, race has a stronger effect on environmental attitudes than gender. Similarly, in all analyses, the addition of the socioeconomic variables represented a statistically significant improvement in predictive ability over the model that included only demographic variables. Generally, education has a positive effect on environmental beliefs. For the most part, income has a positive impact until higher incomes are reached and their effect on attitudes flattens out.

This study and the general body of literature confirm that African-Americans and people of low education levels are less likely to hold a general environmental orientation than whites and people of high education. The positive relationship between education and environmental attitudes demonstrates that educational programs could enhance citizens' environmental awareness and provide them with the information and resources needed to protect their communities environmentally. Recent literature on "environmental racism" (Bullard, 1990; Bullard and Wright, 1990) indicates that civil rights activists are gradually incorporating environmental issues into their larger concerns for social justice. Thus, educational programs seem especially timely, since citizens are becoming acquainted with environmental issues facing their communities and so might be more receptive to informative programs.

Other findings in this paper suggest the need for future research on the NEP index in order to further an understanding of environmentalism as a concept. Although all analyses generally support the research hypotheses, several interesting differences emerge from the analyses using each of the three sub-scales as dependent variables. For example, age does not have a statistically significant effect on scores for the *Balance of nature* sub-scale. In addition, gender has no statistically significant effect on beliefs about *Limits to growth* and the relationship with income is immediately negative. In other words, it has a more important effect as wealth increases. One possible reason is that people of higher income have more of an association with industrial management and so would be unlikely to agree with a statement such as, "To maintain a healthy economy, we will have to develop a 'steady state' economy where industrial growth is controlled." Additionally, the models for the *Balance of nature* and *Limits to growth* sub-scales explain less variation in scores than the same models account for in scores for the *People over nature* sub-scale and the larger NEP index.



These findings suggest the need for further research on the different components of the NEP index. In particular, the question arises as to whether the *Balance of nature* and *Limits to nature* sub-scales measure concepts distinct from the *People over nature* sub-scale or the larger NEP index. The possibility exists that, despite the high alpha value for the index, several items could measure different theoretical constructs. Further research on the NEP could thus contribute to a greater understanding of environmentalism as a concept and allow researchers to enhance its operationalization.

This paper suggests several directions for future research on correlates of environmentalism. Since the literature supports demographic differences in environmental attitudes, studies are needed that can test various explanations (i.e., social-psychological, subcultural, etc.) for these dissimilarities in beliefs. In addition, research that can further the development of educational programs for minority and low income communities is necessary in order to increase residents' awareness of environmental issues. Finally, the finding that certain variables are not related to scores on two of the three sub-scales of the NEP index suggests the necessity for subsequent research on the compatibility of the various items of the index. These recommendations for future research illustrate the need for increased knowledge in order to fully understand environmental attitudes.

Results of this research also have important applied implications for public policies and programs to manage natural resources. Most problems facing the Albemarle-Pamlico Estuarine system (APES) and other natural resources arise directly or indirectly from human activity. Technical solutions to many land use and water quality problems affecting these natural resource systems are available, but obstacles exist to their implementation. Many obstacles tend to be institutional or human-related (i.e., socio-economic). Conflicts over the use and management of scarce and fragile natural resources will likely become increasingly evident as resource use intensifies. This is clearly evident in the APES. Social science research can play an important role in dealing with such conflicts.

Results from this study also show a high level of concern for the APES resources (Hoban & Clifford 1992). Considerable support for a wide range of management alternatives and a high level of willingness to pay are evident. Environmentalism (as measured by the New Environmental Paradigm scale) had a major influence on support for

alternative management efforts. Results also show that educational efforts aimed at promoting a stronger environmental orientation are important. Increased public awareness and positive public attitudes will be necessary to improve water quality and promote sustainable management of natural resources. Successful resource management will require strong support from different segments of the public, support which will best be achieved by understanding public attitudes and beliefs.

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