



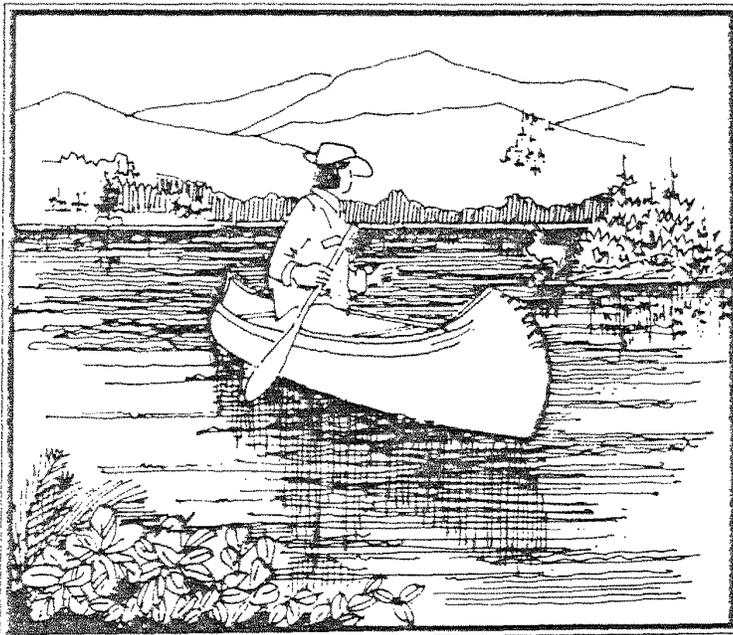
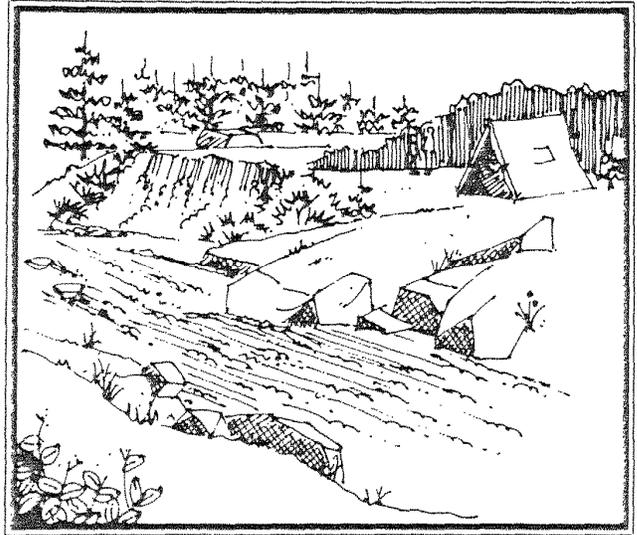
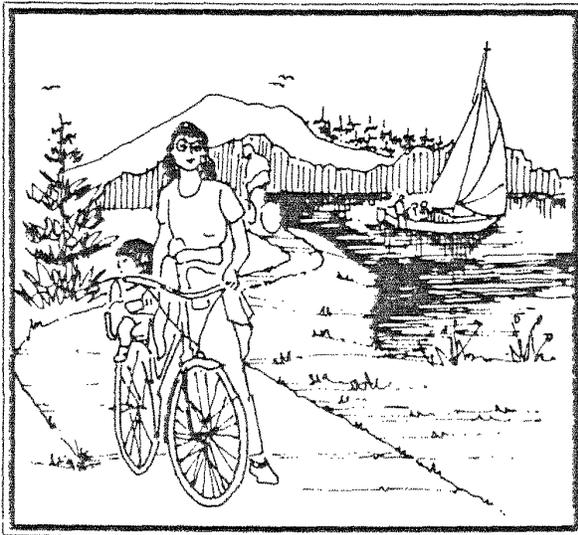
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Proceedings of the 1992 Northeastern Recreation Research Symposium

Northeastern Forest
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NORTHEASTERN RECREATION RESEARCH MEETING POLICY STATEMENT

The Northeastern Recreation Research meeting seeks to foster quality information exchange between recreation and travel resource managers and researchers throughout the Northeast. The forum provides opportunities for managers from different agencies and states, and from different governmental levels, to discuss current issues and problems in the field. Students and all those interested in continuing education in recreation and travel resource management are particularly welcome.

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PROCEEDINGS of the 1992 NORTHEASTERN RECREATION RESEARCH SYMPOSIUM

**April 5-7, 1992
State Parks Management and Research Institute
Saratoga Springs, New York**

Compiled and Edited by:

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***KEYNOTES and
GENERAL SESSIONS***

MANAGING TOURISM IN WORLD PARKS AND PROTECTED AREAS

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While protected areas and the natural and cultural resources they contain are major attractions for tourists, inappropriate tourism developments and visitor overuse can also degrade a protected area, with unanticipated economic, social and ecological effects on surrounding lands and local communities. This paper is a summary report on recommendations on tourism, including research and training needs, which derive from workshop proceedings and technical papers of the IVth World Congress on National Parks and Protected Areas held in Caracas, Venezuela in February 1992.

Background

On an international scale, tourism has been experiencing dynamic growth for over 20 years, and is now recognized as the largest civilian, or non- military industry in the world. Data compiled by the World Tourism Organization indicate that in the year 1989 an estimated 420 million travelers in the world spent approximately \$40 billion on vacation travel and associated tourism activities. (Ceballos-Lascurain, 1992). About \$ three billion of this amount can be attributed to this type of travel to the national parks of the United States.

That component of conventional tourism undergoing the fastest growth, and of particular interest and concern to the international conservation community, is a form of nature or adventure travel to the world network of national parks, wildlife preserves, world heritage sites and other protected areas. This type of travel is commonly referred to as ecotourism.

Ecotourism is defined by the International Union for the Conservation of Nature (IUCN, or the World Conservation Union) as that segment of tourism that involves traveling to relatively undisturbed natural areas with the specific objective of admiring, studying, and enjoying the scenery and its wild plants and animals, as well as any existing cultural features, both past and present, found in these areas (Ceballos - Lascurain, 1992). It can also be defined as any type of tourism that advances or supports the conservation of natural and cultural resources of protected areas.

While a large segment of the multi-billion-dollar tourism industry takes place within or between developed nations, including those of western Europe, Canada, the United States and Japan, many of the less-developed nations of the world are seeking to secure or attract a larger share of overall tourism revenues to their respective economies. In particular, their goal is to attract tourists from countries with affluent population sectors that can afford to travel (Abrahams, 1983).

As a sustainable economic activity, ecotourism holds the attractions of generating foreign exchange, providing employment and being a major diversifier of national economies. Lodges or hotel operations, for example, purchase a variety of goods and services that have important secondary effects on the entire economy. Also, an incentive may be provided for making transportation and other infrastructure improvements in rural areas.

With the tourism industry itself projecting major increases in annual revenues from global nature travel over the next decade,

tourism can be expected to have a significant influence on the development and management of the world's protected areas. The role of such areas is therefore likely to evolve from passive nature preserves to that of becoming a strategy for attaining national and regional planning goals (Gianneccchini, 1992).

The issue of tourism in protected areas is currently recognized as one of the most critical conservation concerns of the decade, and was appropriately incorporated as a major issue area to be addressed at the Fourth World Congress on National Parks and Protected Areas that was held in Caracas, Venezuela in February 1992. Under the sponsorship of the World Conservation Union, World Wildlife Fund, United Nations Environment Program, and the governments of Venezuela, United States, Canada, Sweden and Australia, the purpose of the Congress was to promote the effective management of the world's natural areas so that these can make their optimum contribution to sustaining human society. In addition, specific organizational objectives were (IUCN, 1992):

- i. to demonstrate that protected areas can be a focal point of much more broadly based rural development initiatives which can bring genuine benefits on a long-term basis to rural economies; and,
- ii. to demonstrate the value of protected areas within wider strategies for the conservation and sustainable use of the Earth's natural resources.

While the subject of tourism was not the area of much scholarship or research a decade ago, the current debate on the role of tourism in protected area management has been since characterized as a "raging controversy". The protagonists are those who envision tourism as an important tool for conservation and sustainable economic development, and others who see such benefits outweighed by adverse impacts on natural and cultural environments associated with protected areas (Budowski, 1992).

Some Environmental Trade-offs of Ecotourism

Although it is apparent that the scenic, wildlife, historic, vegetative and spiritual resources of various protected areas of the world have become, or are being actively promoted as major attractions for tourists, it is likewise apparent that inappropriate development and visitation levels can have unanticipated adverse effects on the natural and cultural fabric of the protected area itself as well as on local communities. There are concerns also that discussions of ecotourism can possibly become distorted as well as elitist, short-sighted, anti-democratic and unsustainable (Machlis and Bacci, 1992).

Selected case examples from the proceedings of the Caracas Parks Congress elucidate some of the types of social, economic and ecological concerns associated with tourism in protected areas.

In Nepal's Sagarmatha National Park (Mount Everest), for example, one of the world's most popular ecotourist destinations, current visitation levels in the order of 250-thousand people are causing chronic problems of solid waste disposal, pollution, fuelwood supply and associated landscape degradation (Banshota, Byers and Sherpa, 1992). At the same time, it is realized that very little is known about the perceptions and attitudes of western tourists, or the associated cultural impact of their behavior on the local people. Apart from these problems, however, a goal of the Nepalese tourism sector is to increase the number of tourists and mountain trekkers to one million by the year 2000 (Robinson, 1992).

Other types of environmental trade-offs associated with managing tourism in the world's protected areas are described as follows:

- In the Galapagos archipelago of Ecuador, though still one of the most unspoiled places on Earth; the natural and cultural integrity of the area is being severely threatened by rapid

tourism growth, the steady increase in modern development, and the introduction of domestic animals and exotic vegetative species (MacFarland, 1991).

- Tourism in the habitats of endangered apes in the African nations of Uganda, Rwanda and Zaire is causing concern over risk of possible disease transfer, and the loss of apes as a flagship species for funding conservation of habitats for this and other species (Aveling and Wilson, 1992).
- In Antarctica, effects of tourism have become identified with pollution of marine environments, disturbance of wildlife, and the disruption of scientific research (Marsh, 1992).
- Studies on the role of ecotourism in the Pacific Island nations of Micronesia, Melanesia and Polynesia point to problems associated with strongly differing perspectives of local communities and the national economic development sectors (Valentine and Cook, 1992).
- The Bunaken Manado Tua Marine Park and other marine parks in Indonesia lack adequate manpower and fiscal resources for proper stewardship, yet significant expansions are planned as a priority objective of tourism development (Paleté, Bisson and Usher, 1992).
- And, in the High Peaks Wilderness Area of New York State's Adirondack Park, the largest parkland in the contiguous United States, many years of continued high use levels now require a prescription of visitor management measures and a program of ecological restoration for more severely impacted alpine summits, trails, campsites and other areas (Cobb, 1992).

Ecotourism Success Models

Although some countries are experiencing adverse impacts on their national parks and protected areas, others appear to be successfully integrating tourism into the management of these areas. Kenya and Costa Rica are examples of two countries that are cited as being particularly successful in gaining recognition as world-class ecotourism destinations, and which are suggested as models of effective cooperation between private and public tourism interests (Eagles, 1992). In the case of the African Republic of Kenya, tourism has recently overtaken coffee and tea as the primary earner of foreign exchange. This sector of the national economy has increased revenue from \$55 million in 1971 to \$390 million in 1988.

In the second case example of Costa Rica, in Central America, tourism ranks behind coffee and banana production as the largest source of foreign income. This country's ability to attract tourists is associated with its unique natural landscape and diverse ecology. The national parks and protected areas of Costa Rica consist of a system of 34 units covering about 34 percent of the land area of the country. This is one of the highest such percentages in the world. The parks are also found to be well managed by a staff of dedicated and trained personnel. In the year 1976, tourism earned \$57 million in foreign exchange, and \$207 million in 1989 (Eagles, 1992).

Other examples of successful ecotourism ventures point to its role in furthering conservation ideals.

- In the case of Canada's Northwest Territories, aboriginal societies, tourism interests, and conservation agencies are finding that varying goals can be realized through cooperative action (Seale, 1992). This is due in part to the common realization that long-term sustainable development of high quality tourism experiences is seen by all as dependent upon environmental protection measures as well as a continued welcoming attitude and respect between local tourism officials and the people of host communities (d'Amore, 1992).
- In the African nation of Zimbabwe, wildlife-based tourism is increasing, with a growing market in western Europe and

North America, that is due, in part, to the recognized contribution of safari operators and professional hunters to tourism. Foreign revenue from safaris increased from \$85 thousand in 1985 to \$9 million in 1990 (Heath, 1992).

- Similarly, with the scenic splendor that characterizes the national parks of New Zealand being the primary selling point for the tourism industry in this island nation effective partnership linkages between the industry and park management have remained strong for many years (McSweeney, 1981).

And, finally, in the Greater Yellowstone Ecosystem of the northern Rocky Mountain Region of the United States, and including Yellowstone National Park, efforts to conserve this wild landscape and achieve a balance between natural resource use and protection are proving successful. Ultimately this ideal balance would sustain the diversity and vitality of wildlife populations, allow natural ecological processes to function with minimum intervention, and provide for a diversified economy that is characterized by a minimum adverse environmental impact and a high quality of life for people in the region. If successful efforts continue, an ideal model for whole ecosystem management on a regional basis could become a reality in the same manner that Yellowstone has been for traditional national park management (Glick, 1992).

The Draft Recommendations

Against this backdrop of technical papers, workshops and discussions on the subject of "Tourism in Protected Areas", 11 recommendations were drafted for incorporation into the "Caracas Action Plan" of the Fourth World Congress on National Parks and Protected Areas. These were (IUCN and Vallentine, 1992):

- i. Global, national and local agencies and organizations concerned with protection of natural areas need to adopt policies to make tourism a conservation tool;
- ii. Protected area managers need to be provided with the resources to manage tourism associated with protected areas;
- iii. Policies must be implemented which ensure that socio-economic benefits accrue to local people through their active participation in tourism associated with protected areas;
- iv. Protected area agencies and the tourism industry must cooperate to adopt codes of practice, guidelines and techniques which are compatible with long-term protected area management plans, enhance the visitor experience, and are consistent with, and reinforce conservation objectives of protected areas;
- v. In developing greater cooperation between the tourism industry and protected area management, the primary consideration must be conservation of the natural environment and the quality of life of local people;
- vi. Natural resource and tourism authorities need to develop and implement national tourism plans which incorporate respect for the natural and cultural integrity of protected areas and local communities;
- vii. Revenue generated from tourism in protected areas should be recycled for protection and management of the resource;
- viii. Protected areas agencies and tourism industries need to carry out on-site studies to assess appropriate levels of impact for the world's protected areas; obtain and monitor statistical information on tourism and recreation activities and their social, cultural, economic and environmental impacts; and, define the best locally appropriate management actions for protected areas;

- ix. Tourism in each protected area should reflect the area's intrinsic environmental values, recognizing that some areas may be inappropriate as destinations for public visitation;
- x. Education and training programs must be initiated and implemented for guides and tourism managers, and tourism programs should contribute to conservation education initiatives; and,
- xi. Tourism should be a part of a sustainable regional management strategy that offers a variety of development alternatives for local people as well as for maintaining biological diversity.

Conclusion

The recommendations on managing tourism in protected areas provide a framework for policy and planning. However, since tourism in protected areas is a new and emerging area of study in the field of natural resources conservation, and its ecotourism dimension, in particular, has become a popular, but poorly understood concept, the recommendations also serve to identify needs and opportunities for applied research and training. Case studies on ecotourism, from varying natural and cultural settings, for example, are being sought by the World Conservation Union to broaden understanding of the risks, opportunities and limitations of ecotourism as a tool for conservation and sustainable economic development.

Also, for ecotourism to be successful, it must gain the support and understanding of the travel industry, protected area managers and local people (Blangy and Wood, 1992). Educational and training programs therefore need to be developed and made available to these diverse interests. The development of a cadre of professional guides from communities in or near protected areas is an example of a type of low-impact economic venture that could result in important benefits from the design of good educational and training programs.

Finally, the master planning process for national parks and protected areas must be refined to incorporate the appropriate role of tourism as a visitor management strategy for conservation. This should require, as a minimum, the development of environmental education materials and interpretive methods and facilities that can enrich the visitor experience as well as foster an understanding of resource management practices and conservation ideals. Equally important to the planning process is the development or adaptation of techniques, such as the "Visitor Impact Management Process" of the National Parks and Conservation Association (Loomis and Graefe, 1992), to address the issue of carrying capacity.

The basic guideline for both management and research, however, is to find ways in which tourism can effectively enhance the contribution of protected areas to sustaining human society without compromising the very natural and cultural systems they were established to protect.

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ENVIRONMENTAL CONCERN

OUTDOOR RECREATION, ENVIRONMENTAL ATTITUDES AND ENVIRONMENTALLY RESPONSIBLE BEHAVIOR: PAST AND FUTURE DIRECTIONS FOR RESEARCH

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Empirical research conducted from 1971 to 1987, which focuses on the linkages between outdoor recreation activity participation, environmental attitudes and environmentally responsible behavior, is reviewed and demonstrates progressive modifications and improvements in hypotheses, measurement and analysis. Issues relevant to this line of research, research needs, and future importance are discussed.

Introduction

Certain research conducted in the 1970s through the 1980s relates to the suggestion that the emphasis on outdoor recreation in our society was an important factor in the emergence of the contemporary environmental movement and the resulting rise of public concern with environmental quality (Gale 1972). Outdoor recreation was and is an important leisure activity, and on occasion, persons who joined together to enjoy outdoor recreation activities formed groups to actively defend a favorite recreation area or other natural resource which was crucial to their continued enjoyment of their outdoor pursuit. Involvement in outdoor recreational activities may create an awareness of environmental problems by exposing people to instances of environmental degradation, create a commitment to the protection of valued recreation sites, cultivate an aesthetic taste for a "natural" environment which encourages opposition to environmental degradation, and expose outdoor recreationists to informational and educational programs stressing the importance of the quality of the environment (Dunlap and Heffernan 1975). Limited empirical data exist which support the notion that membership in outdoor recreational organizations leads to active involvement in the environmental movement (Faich and Gale 1971).

Past Empirical Studies

The relationship between outdoor recreation and environmental attitudes was first studied empirically in Minnesota in 1971. Knopp and Tyger (1973) investigated attitudinal differences between cross-country skiers and snowmobilers to account for the conflicts in recreational land use between them by utilizing highly specific, Likert-type items to measure environmental attitudes and to assess views on recreation land management issues. Their results supported the hypotheses that 1) people who engage in motorized forms of recreation are less likely to have environmentalist values than those who prefer self-propelled forms of recreation, and 2) people who engage in motorized forms of recreation are less likely to understand or sympathize with the concept of setting aside specific recreation areas for distinct purposes than those who prefer activities with less environmental impact.

The Dunlap-Heffernan Thesis

The most influential research in this area was the work of Dunlap and Heffernan (1975) with data from a 1970 Washington state survey. In order to address the question of whether involvement in outdoor recreation leads to increased environmental concern among the general public, three

hypotheses were developed and tested. The Dunlap-Heffernan Thesis, as this came to be known, has been reexamined by various researchers through progressive modifications in hypotheses, measurement, and analysis (Jackson 1989).

Dunlap and Heffernan examined whether behavior, participation in outdoor recreation activities, influences attitudes and values—environmental concern. Therefore, behavior was treated as an independent variable in that the behavior in question, participation in outdoor recreation, seemed likely to have preceded environmental concern. Different types of outdoor recreation activities were identified based on the distinction pointed out by Hendee (1969a). Consumptive activities (fishing and hunting) were those taking something from the environment, reflecting a "utilitarian" orientation of nature viewed as existing for man's utilization. Appreciative activities (hiking, camping, and visiting state parks and scenic areas) were attempts to enjoy the natural environment without altering it, reflecting a "preservationist" orientation. Dunlap and Heffernan hypothesized 1) that participation in outdoor recreation is positively associated with environmental concern, 2) that participation in "appreciative" activities is more strongly associated with environmental concern than that for participation in "consumptive" activities, and 3) that there is a stronger association between participation in outdoor recreational activities and concern for protecting aspects of the environment necessary for pursuing such activities than between participation and more "global" environmental concerns. When these hypotheses were empirically tested, the first received mixed and generally weak support, while the second and third received substantial support, although the magnitude of the associations was fairly low.

Dunlap and Heffernan suggested if involvement in outdoor recreation tends to increase environmental concern and possibly even stimulate pro-environmental actions, this bodes well for the future of pro-environmentalism in our society. Environmental concern will be strengthened if it is associated with a basic structural feature of our society such as increased leisure time devoted to outdoor recreation. Dunlap and Heffernan stated that it seems reasonable to believe that environmental concern might be translated into support for "pro-environmental" candidates and ballot measures designed to protect the environment, and that such support may become crucial as environmental issues increasingly become political issues. Outdoor recreationists may constitute a potential constituency for environmental activism.

However, such statements were made with "guarded optimism" for the following reasons: 1) observed associations between outdoor recreation and environmental concern were generally quite modest—it appeared that increased participation in outdoor recreation was likely to significantly increase concern for fairly specific environmental goals, but the degree to which concern will extend to more distant or "global" issues appeared very slight; 2) although participation in appreciative activities was increasing, and there was considerably stronger associations between appreciative activities and environmental concern than those for consumptive activities, there were still substantial numbers of participants in consumptive activities; and 3) a third type of outdoor recreation activity which was growing rapidly was not examined in the study due to data deficiencies—that of motorized activities—snowmobiling, trail biking, and all terrain vehicle use. Involvement in these types of activities may create a lack of concern for environmental quality in that these may be "exploitive" or even "abusive" of the environment. Dunlap and Heffernan's results, although weak, were intriguing enough to stimulate further investigation of the relationship between outdoor recreation participation and environmental concern.

Subsequent Empirical Studies

Further research of the hypothetical relationships of the Dunlap-Heffernan Thesis generated weak and mixed results. One study re-examined Dunlap and Heffernan's first and second hypotheses using data from a 1974 rural-based survey in

Wisconsin (Geisler, Martinson and Wilkening 1977). In this study both the independent and dependent variables were measured more broadly than in the earlier study. Geisler, Martinson and Wilkening added an "abusive" category, represented by snowmobiling, to the measure of outdoor recreational activity. The indicators of environmental concern, defined as support for public action, were complemented with several items dealing with the awareness of various environmental issues such as stream, lake, noise and air pollution, wildlife reduction and soil erosion. Geisler *et al.* argued that this broader conceptualization of environmental concern permitted a comparison of cognitive states with actual support for public action to protect the environment, and by inference, to enhance recreation. Although there was some support found for the first hypothesis, that environmental concern was associated with outdoor recreation participation, and some evidence for the second hypothesis, although weaker than the first, it was found that environmental concern was affected more strongly by respondent characteristics, such as socioeconomic status, education, age and place of residence, than by recreational habit. Geisler *et al.* concluded that their study questioned the generalization that specific types of recreation produce varying degrees of environmental concern with regard to natural resources.

Pinhey and Grimes (1979) conducted a study in Louisiana in 1974 to further test the hypotheses proposed by Dunlap and Heffernan. They found only weak and inconsistent relationships between outdoor recreation participation and environmental concern. Active participants in outdoor recreation activities were more likely than non-active participants to cite ecological or recreational reasons for evaluating Louisiana's natural marshlands as valuable, however this association was assessed as being weak to moderate. There was no difference between active participants and inactive participants with regard to preferences for preservation versus other uses of these natural areas. Furthermore, consumptive and appreciative recreationists did not differ on either measure of environmental concern. Further analysis indicated that individual characteristics (socio-economic variables) as well as time and place were more important influences on environmental concern than types of recreational activities, although these too were rather weak predictors. Pinhey and Grimes concluded that their results were more consistent with those reported by Geisler *et al.* than those found by Dunlap and Heffernan. However, Van Liere and Noe (1981) criticize the operationalization of environmental concern as valuing natural marshlands as a major weakness of this study in that it is a too restrictive measure of environmental concern. Methodological and conceptual shortcomings common to all these early studies make appropriate comparisons questionable.

Van Liere and Noe (1981) replicated Dunlap and Heffernan's original study with research among visitors to Cape Hatteras National Seashore. Two hypotheses were examined in this study: 1) involvement in outdoor activity was hypothesized to be positively associated with pro-environmental attitudes, and 2) different types of outdoor recreation were expected to have varying levels of association with pro-environmental attitudes. Stronger measures were utilized for both of the variables. Involvement was measured using two questions directed at examining 1) the average number of hours per day spent in each of several activities and 2) the number of days during a visit participants engaged in the activity. Van Liere and Noe felt this more accurately reflected involvement in several activities during the course of a visit to a park. However, they were quick to point out potential problems associated with respondent recall. Environmental orientation was measured by a 12-item "New Environmental Paradigm" (NEP) scale developed by Van Liere and Noe (1978) which asked respondents to express their general orientation toward the environment rather than awareness or concern about specific environmental problems. Ideas contained in the NEP involve the image of nature presenting a balanced system, the notion that humans are part rather than master of the ecological order, and the suggestion that growth may need to be limited in the future to protect the

environment. These concepts differ greatly from the more traditional "Dominant Social Paradigm" (DSP) (Dunlap and Van Liere 1984) which has historically characterized American culture and focuses on the anthropocentric notion that nature exists solely for human use, that people are exempt from the ecological constraints of other species and that growth and progress are universally desirable (Scott and Willits 1991). Measuring this broader "world view" was thought to be important because, as Van Liere and Noe rationalized, it is exactly these beliefs (such as "the balance of nature is delicate and easily upset") which participation in outdoor recreation is implied to arouse and cause to be internalized, and ultimately generalized to concern about specific environmental problems. The NEP scale, as a multiple-item scale, was also viewed as more reliable than single-item measures used in earlier studies.

The terminology used by Van Liere and Noe—"environmental attitudes" instead of "concern"—represents an important conceptual shift (Jackson 1989). In asking respondents to express their general orientation or attitude toward the environment, rather than awareness or concern about specific environmental problems, this was the first real effort to conceive of environmental attitudes as values, and to examine deeper influences that might explain recreational choice instead of more superficial perceptions regarding concern which emanate from it. Thus, Van Liere and Noe recognized that outdoor recreation participation could be viewed as a dependent variable which is influenced by environmental attitudes.

Despite these improvements in conceptualization and methodology, Van Liere and Noe found little support for a positive association between outdoor recreation participation and pro-environmental attitudes, and some weak support for a positive and stronger association between participation in appreciative activities and pro-environmental attitudes than the associations for consumptive or abusive outdoor recreational activities.

Van Liere and Noe suggested three possible reasons for their findings. First, it was possible that the hypotheses were true and that further improvements in measurement and study design would lead to higher levels of association. However, they noted that higher correlations would not improve the understanding of the more general issue—How is outdoor recreation participation related to the development of a general pro-environmental orientation? Second, a possible conclusion was that outdoor recreation participation was not significantly associated with environmental attitudes because of the relatively low associations. However, Van Liere and Noe's results suggest that the associations, although low in magnitude, were not spurious. A third conclusion, favored by Van Liere and Noe, was that environmental attitudes and outdoor recreation participation are linked in ways important to understanding the development of pro-environmental orientations, but the linkage is much more complex than assumed in the Dunlap-Heffernan Thesis. They suggested that research focus on specifying more complex models linking the two variables of outdoor recreation participation and environmental attitudes.

Allen and McCool (1982) stated that no one can deny the nearly universal public concern over the environment. Yet connected to this concern are far lower levels of actual behavior aimed at conserving resources and reducing pollution. They pointed out that discrepancies between attitudes and behavior have been found regarding air pollution, water resource use, litter clean-up, paying for pollution abatement, and commitment to environmental movements. Allen and McCool suggested that actual behavior, not attitudes or concern, should be the focus in research designed to improve relations between people and the environment, and reported on three complementary studies which examined relationships between outdoor recreation participation and energy conservation or environmentally responsible behavior.

The results of Study 1 suggest that people not exposed to natural environments through recreation may find it difficult in a

largely urban, technologically dependent society to develop a practical notion of ecology that could inspire ecologically responsible behavior. Exposure to natural environments may contribute to the development of a sound environmental ethic. It does seem possible that underlying environmental values and attitudes may motivate both conservation behavior and certain types of outdoor recreation participation. The results of Study 2 suggest that conservation actions occur in clusters of related behaviors which are independent of each other. Four dimensions of ecologically responsible behavior were identified: 1) political activity, 2) home modification activity, 3) recycling efforts, and 4) consumer behavior. When these ecologically responsible behaviors were correlated with recreation participation, Allen and McCool found that appreciative/low consumptive activities (gardening, bird watching, fishing and picnicking) had the highest correlation, followed by active/low consumptive activities (backpacking, hiking, canoeing, cross-country and downhill skiing, and rock climbing), followed by active/consumptive activities (dirt biking, off-road driving, horseback riding, snowmobiling and hunting). Additionally, Allen and McCool pointed out that participants in active/low consumptive activities were often the most vocal environmentalists in the community. The results of Study 3 were somewhat contradictory to Studies 1 and 2, suggesting that the relationships between recreation participation and ecologically responsible behavior may be more complex than previously thought. Cross-country skiers in the study sample tended to report a lifestyle more centered around leisure which was more energy consumptive than that for snowmobilers. Skiers took more vacations than snowmobilers and tended to travel further on those vacations.

Allen and McCool suggested that contact with natural environments and their apparent processes may contribute to the development of an environmental ethic which can lead to environmentally responsible behavior—the closer the activity to the land, its intricacies and ecology, the greater is the potential for learning. Their data suggest associations, but not true cause-effect relationships. However, relationships exist most strongly for appreciative/low consumptive activities and environmentally responsible behavior. Yet, there are some intervening variables, some type of leisure lifestyle factors, which may interact with conservation behaviors to indicate seemingly contradictory behaviors. Cross-country skiers, found to have higher socioeconomic status than snowmobilers, had more awareness of the environment than snowmobilers, but were greater in energy consumptive behavior in their leisure lifestyles. Thus, Allen and McCool identified an interesting interaction—individuals having high socioeconomic status pursue their leisure lifestyle while adapting ecologically responsible behaviors at home and work. Individuals at lower levels of socioeconomic status restructure their leisure behavior, but maintain traditional patterns of home and work energy consumption.

Jackson (1986) conducted a study in Edmonton and Calgary, Canada in 1984, and addressed some of the measurement problems discussed by Van Liere and Noe. The objective of this study was to interpret the relationship between attitudes towards the environment and preferences for different types of outdoor recreation activity within the context of the diverging values of the "consumer" and "conservator" societies. Jackson formulated two hypotheses based upon those originally developed by Dunlap and Heffernan (1975): 1) participants in appreciative (self-propelled) activities will exhibit stronger pro-environmental attitudes than participants in extractive and mechanized activities, and 2) there will be a stronger association between outdoor recreation participation and attitudes towards specific aspects of the environment necessary for pursuing such activities than between outdoor recreation participation and attitudes to more "distant" and general aspects of environmental issues.

In this study, a more comprehensive 21-item scale was designed to measure environmental attitudes which included items from Van Liere and Noe's (1981) NEP scale and several items from

Dunlap and Van Liere's (1984) "Dominant Social Paradigm" (DSP) scale. Respondents' scores on the environmental attitudes scale were factor analyzed to identify the dimensions of environmental attitudes and values that best distinguished among recreation categories. The four factors which emerged were labeled "Negative consequences of growth and technology," "Relationship between mankind and nature," "Quality of life," and "Limits to the biosphere." A six-item recreational attitude scale was also developed to test the second hypothesis. Additionally, a more direct set of comparisons between types of recreational activity was made—analysis was confined to eight outdoor activities, classified into three groups: self-propelled activities (cross-country skiing, hiking, and canoeing), mechanized activities (snowmobiling, motor biking, and dirt biking), and extractive activities (hunting and fishing). Tests of differences in attitudes were conducted on the basis of 26 "exclusive pairs" of activities by comparing people who had participated exclusively in one or the other of each pair of activities.

The results of the study supported the original Dunlap-Heffernan Thesis that participation in different forms of outdoor recreational activities is related to environmental attitudes. People who prefer self-propelled activities more frequently hold environmental attitudes consistent with the "New Environmental Paradigm" than participants in consumptive and mechanized activities, who tend to express weaker pro-environmental attitudes and even anti-environmental attitudes. Furthermore, Jackson found the dimensions of attitudes which best distinguished among the different types of recreationists, views on the quality of life and the man-nature relationship, to be those precisely which simultaneously differentiate between the values of the "consumer" and "conservator" societies.

In a further expansion of the study, Jackson (1987) compared views on the preservation of resources versus their development for recreation among the participants in the three types of outdoor recreation—appreciative, consumptive, and mechanized activities. The results indicated a stronger preservationist orientation among participants in appreciative activities, whereas, with the exception of hunters, participants in consumptive and mechanized activities held stronger pro-development views. Jackson did not attribute these differences to the simultaneous variations in socioeconomic characteristics or environmental attitudes among the recreational groups. Rather, the findings suggested that differences in outdoor recreational activity preferences represent an important source of variation in views about appropriate levels of preservation versus development. Recreationists whose satisfaction is dependent on a relatively untouched, natural environment prefer resources maintained in their natural, unaltered state. Mechanized recreationists more strongly support development of natural resources for recreational purposes, even though such development may sacrifice natural environmental quality. Thus, people who participate in different and often conflicting forms of outdoor recreation developed diverging preferences about the desirable level of preservation of land resources in Alberta and the extent to which such resources should be developed to provide outdoor recreation opportunities.

Issues, Research Needs and Future Directions

The preceding studies demonstrate the likelihood that environmental attitudes and outdoor recreation are linked in ways that are important to understanding the development of pro-environmental attitudes and orientations. However, this linkage must be much more complex, influenced by other intervening variables, than is assumed in the Dunlap-Heffernan Thesis. Hays (1987), in examining the growth of the environmental movement in the United States, points out that ideas that emerged among environmentalists were far more pragmatic, often a mixture of contradictory tendencies that precluded a commitment to a single system of thought or utopian vision. Environmentalists were keenly aware that people balanced views about work, on the one hand, and consumption and quality of life, on the other. If Hays is correct, attempts to predict who is an environmentalist or who holds a

pro-environmentalist orientation, based on personal rejection of the "Dominant Social Paradigm" and adherence to the "New Environmental Paradigm," are prone to have difficulty explaining high proportions of variation. This may be one reason why the research findings on the linkage between outdoor recreation participation and environmental concern/attitude have been mixed and of low magnitude, suggesting a need for tighter measures of environmental orientation.

At issue also is the generalizability of the research findings. Hays (1987) discusses the regional variation in the growth of environmental concern, noting regions of environmental strength in California, New England and New York, the upper Great Lake states, the Chesapeake Bay states, the Pacific Northwest, and northern Rocky Mountain states. Regions weak in environmental interest include the Plain states, Texas and the Southwest, the South (especially the southern Gulf states), and the industrial states of the Mid-Atlantic and Midwest regions. Hay's analysis of these regional variations in environmental strength and interest are based on citizen organizations and activities, state governmental agencies and their policies, the activities of state legislatures, public opinion polls in the states, and newspaper accounts of environmental issues. As a result, place of residence in terms of regional location, may effect individuals' orientations to the environment. Furthermore, there is some evidence that rural-urban differences exist regarding environmental concern (Tremblay and Dunlap 1978; Van Liere and Dunlap 1980) along with rural-urban differences reflected in outdoor recreation participation (Hendee 1969b). These differences need to be taken into consideration in future research.

In four of the research studies, environmental concern or attitudes are perceived as dependent on behavior in the form of outdoor recreation participation (Knopp and Tyger 1973; Dunlap and Heffernan 1975; Geisler, Martinson and Wilkening 1977; Pinbey and Grimes 1979). Van Liere and Noe (1981) conceptualize outdoor recreation behavior as dependent on environmental attitudes. Allen and McCool (1982) and Jackson (1986, 1987) conceptualize these linkages as being much more complex, influenced by other intervening variables. Perhaps what is needed is development of an understanding of the intervening processes which generate environmental concern. What needs to be identified are those influences which might cause individuals to interpret their outdoor experiences in a manner that creates awareness and concern about the environment and causes them to manifest that concern in their actual behavior (Van Liere and Noe 1981).

Elaborating further on a model proposed by Allen and McCool (1982) to show the relationships between participation in outdoor recreation activities and ecologically responsible behavior, perhaps participation in certain outdoor recreation activities leads to the development of a personal environmental ethic, which in turn leads to more environmentally responsible behavior in terms of environmentally benign or beneficial outdoor recreation participation. The closer the activity to the land, the greater is the potential for learning. Through involvement and exposure to certain outdoor recreation activities in the natural environment, participants may become increasingly aware of environmental sensitivity and their own personal and others' impact on the environment. This may lead to the development of a personal environmental ethic, creating a commitment to the protection of valued recreation sites which may develop further to other, more "global" pro-environmental orientations. Development of an environmental ethic may intrinsically motivate an individual to minimize their own personal impact on the environment, and thus, provide the impetus for ecologically responsible behaviors in that environment. Involvement and exposure in outdoor recreation provide opportunities for learning, which may lead to greater awareness and understanding, resulting in environmental concern which leads to action.

Further research is needed to test the relationships proposed in this model. Of great interest are the components of the outdoor recreation experience, perhaps highly activity-specific or perhaps common across many activities, which generate increased awareness of environmental sensitivity and personal impacts. How and in what ways does outdoor recreation activity lead to increased awareness? Does participation in certain outdoor recreation activity experiences lead to more increased awareness than participation in others? Hays (1987) states that the most widespread source of emerging environmental interest was the search for a better life associated with home, community, and leisure. Self-development became an important value which drove persons to seek a higher quality of life for themselves and their children through creative arts, outdoor recreation activities, summer camps and family vacations. According to Hays, the environmental quality of life is to be understood simply as an integral part of the drives inherent in persistent human aspiration and achievement. A research focus needs to be developed which examines the possible influencing variables of recreational socialization during childhood, when many individuals experience their first outdoor recreational experience. Satisfying and rewarding childhood experiences may influence the individual to continue participation, to fully integrate an outdoor recreation activity into their lifetime leisure repertoire.

Also at issue are "value judgments" associated with identifying different types of outdoor recreation activities as being exclusively consumptive, appreciative, abusive or exploitive in relation to the environmental attitudes of social groups in which the activity is shared. Bryan (1977, 1979) found that recreationists can vary from very general to highly specialized. As the level of specialization increases, attitudes and values about the activity change. Focus may shift from consumption to preservation and emphasis on the nature and setting of the activity. Thus, individuals participating in the same activity can vary from consumptive and possibly abusive, to appreciative orientations with regard to the environmental setting. This suggests future research on an alternative hypothesis: pro-environmental orientation is associated with the level of recreation specialization, which takes into account social factors which give an activity meaning (Van Liere and Noe 1981) and indicates the need for stronger measures of outdoor recreational involvement. Furthermore, perhaps the critical issue is not the activity *per se*, but rather its meaning and function for the participant and the form and organization in which participation occurs. What is the affective element in participation? Challenge? Risk? Mastery? Achievement? The potential differences in specialization may be variables associated with a pro-environmental orientation. Additionally, as pointed out by Allen and McCool (1982), outdoor recreationists participating in supposedly "appreciative" activities may actually be consuming greater amounts of energy, which can be considered ecologically irresponsible behavior, than those participating in mechanized or consumptive activities. Furthermore, as the level of outdoor recreation specialization increases, participant demand for and utilization of specialized equipment increases.

Measurement of environmental concern, attitudes and orientations is also of concern in this research. Allen and McCool (1982) pointed out existing discrepancies between attitudes and behavior and suggested that actual behavior, not attitudes or concern, should be the focus in research designed to improve relations between people and the environment. This points to possible shortcomings in the use of the more "global" DSP and NEP scales to measure environmental concern and attitudes as being potentially problematic and perhaps inapplicable in representing environmentally responsible behavior. Better indicators of environmental attitudes and concern need to be incorporated into this research. Reporting of actual environmentally responsible behavior may be much more relevant and meaningful to participant respondents. In order to measure an energy-efficient lifestyle, for example, respondents could be queried as to whether they drive less, use mass transit, car pool, purchase efficient vehicles, keep their

vehicle tuned and tires properly inflated, use energy efficient appliances, turn off lights when not in use, install compact fluorescent bulbs, insulate and weather-proof their home, and so forth. As to their ecologically responsible behavior, respondents could be asked if they recycle wastes, plant trees, garden organically at home, avoid the use of CFCs, shop ecologically, vary their diet, and get environmentally involved locally, nationally, and globally.

Additionally, there is a need to examine a wider range of recreational activities. The growing interest and participation in alternative tourism or ecotourism, which utilizes the natural environment for recreation and leisure, represents an industry whose ventures capitalize on the increasing global concern with disappearing cultures, lifestyles, and ecosystems (Johnston 1990). Socially responsible tourism and outdoor recreation are often linked with the concept of sustainable development which may be a direct manifestation of the contemporary environmental movement.

Implications

Research which examines the linkages between outdoor recreation participation and the development of pro-environmental attitudes and ecologically responsible behavior will continue to be relevant and important in the future for many reasons. Environmental consciousness of the American people will continue to be a driving force behind all aspects of life (Jernstedt 1992). As Jackson (1987) points out, different types of outdoor recreation represent diverging constituencies of support for resource protection and development. If our society is moving more towards a "conservator" society from a more traditional "consumer" society, as many writers argue (Jackson 1989), the possibility exists for anticipating changes in public views about resource development and preservation. This may be especially relevant for managers of outdoor recreation resources and professionals involved in the delivery of outdoor recreation services, in terms of effective decision making and policy formulation to meet the public's felt needs and expressed desires.

What will leisure behavior be like in a "conservator" society? According to Spry (1980), the conservator society places increasing emphasis on leisure time as an opportunity for enhancement of human quality and the enrichment of creative experience, rather than as an opportunity for the elaboration of entertainment, escalation of self-indulgence, and multiplication of apparatus. It is likely that recreation and leisure in a "conservator" society will be decentralized, small-scale, individualistic, and oriented towards the non-consumptive enjoyment of the natural environment with a minimal amount of environmental impact (Jackson 1989). Such participant behavior would demand lower levels of equipment and little or no mechanization and therefore tend to be low in energy use per person or per recreational engagement. Personal, long-term, physical and mental development would be the goal of such leisure activity. If such a notion is correct, then the emergence of new and more popular forms of leisure behavior and recreational activity may be understood as a manifestation of the restructuring of societal values and behaviors, perhaps as a direct result of changing perceptions of ecological limits and resource constraints (Jackson 1989). Although somewhat speculative, such social and attitudinal changes are likely to result in new and emerging patterns of leisure activity. These will affect personal spending on recreation and preferences about the quantity, quality, location and management of public and private outdoor recreation resources. Because of these influences, social and attitudinal changes must be recognized and acknowledged by managers and practitioners. The knowledge of the relationship between outdoor recreation participation and environmental attitudes can assist recreation policy makers and planners in anticipating future trends in outdoor recreation participation.

Outdoor recreation resource managers must also be aware that with more emerging outdoor recreation activities considered to be appreciative and low- or non-consumptive, more and more

demands will be placed on the natural environments in which such activities occur. With more use of natural recreation areas there will be more associated environmental impact, not only affecting the integrity of the land, but also affecting the quality of the experience for the user. This will require the use of innovative and effective, direct management techniques and strategies, in order to minimize associated impact. However, rules and regulations by themselves are not the answer (Hampton and Cole 1988). Leopold (1949) questioned the effectiveness of regulation over forty years ago when he stated that obligations have no meaning without conscience, and the problem we face is the extension of the social conscience from people to land. Appropriate behavior emanates from an understanding of and respect for the land, an inherent set of values within the individual user—a wildland ethic. It will be increasingly important to incorporate indirect management techniques and strategies through informational and educational programs in order to encourage appropriate user behavior.

Certain forms of outdoor recreation activity are surmised to be more environmentally benign or perhaps even beneficial than others. If environmental quality and protection are important to the future of humankind and all life on planet Earth, shouldn't such activities be encouraged? Can participation in certain activities be encouraged through direct and indirect management techniques and strategies? What are the opportunities for effective leisure education and environmental interpretation to positively affect peoples' participation resulting in environmentally responsible leisure behavior? McAvoy (1990) notes that the park and recreation professional's philosophy of service must be grounded in ecological principles, not merchant values. The professional's primary responsibility must include educating the public as well as catering to their immediate expressed desires. Leisure service professionals can have a major impact on the environmental stewardship practices of their agencies and the parks and recreation movement in general, and be the environmental conscience of park and recreation organizations if they have a common set of guiding principles, a common set of environmental ethics.

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CHARACTERISTICS AND TRAINING NEEDS OF NEW HAMPSHIRE'S LOCAL CONSERVATION DECISION MAKERS

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Town officials in New Hampshire responsible for natural resource planning were surveyed to ascertain their characteristics and desired training. Most respondents had received some training related to their responsibilities. Water resources, land use, legal issues, administration, and town planning were topics mentioned most often for future training sessions. Such results are important for training future town officials.

Introduction

Human activity has been shaping New Hampshire's landscape since the first settlers came to the area in the 1600's. Most of the land was cleared for agriculture and other uses by the late 19th century, with farms and small communities dominating the landscape (Baldwin 1990). By 1900, however, land use patterns had begun to change, and forests began to reclaim many unused fields. Today, New Hampshire is 87 percent forested (Frieswyk and Malley 1983).

Population patterns have changed as well, particularly during the last 20 years. Between 1970 and 1980, New Hampshire's population grew from 737,000 to 920,000, a 24.8 percent increase. Much of this growth, about 60 percent, was concentrated in the southeastern counties of Rockingham and Hillsborough (Luloff et al. 1985). The Census Bureau estimates that the 1990 population was 1.1 million (Bureau of the Census 1990). This continued trend of rapid population growth contributes to the pattern of land use conversion for development, particularly of forested land (Befort et al. 1987a and 1987b).

New Hampshire has a long tradition of local autonomy over many government functions. Residents have long indicated that local officials should be sensitive and responsive to the needs and desires of the people (Hulcher 1973). Such responsiveness contributes to strong faith in local government. It also reflects the fact that town officials and the impacts of their decisions are highly visible.

Importantly, the opportunity to be involved at the local level extends to land use issues. In 1971, Russell E. Train, Chairman of the Council on Environmental Quality, observed: "Land use is the single most important element affecting the quality of our environment which remains substantially unaddressed as a matter of national policy," (Hulcher 1973). Reflecting the attitude of a majority of Americans, many New Hampshire citizens contend that the issue should not be handled at the national level. With increasing population pressure, land use

policy and control issues have been raised in virtually all of the state's towns.

Given New Hampshire's rapid growth and the resulting fragmentation of the state's undeveloped lands, town officials are under increasing strain to meet the demand for new levels of environmental concern, planning, and protection. This study examines the level of natural resource knowledge and information needed by local officials serving as conservation decision-makers in New Hampshire. These include members of conservation commissions, planning boards, and zoning boards of adjustment. This study differs from others in that it examines volunteer local officials, rather than municipal officials or bureaucrats, and it addresses natural resource issues. It is aimed at determining the local officials' sociodemographic characteristics and natural resource training and information needs, as perceived by the officials. Such information is necessary if successful training programs are to be developed and implemented.

Descriptions of Local Boards

New Hampshire has a long tradition of local autonomy over government functions including land use. Eighteen larger communities have moved away from this organizational structure and adopted city/town council governing bodies. The remainder of New Hampshire's 234 towns, however, have retained local control with volunteers filling most positions, including those on the boards included in this study.

The conservation commission movement began in Massachusetts in the late 1950's as a way of including citizens in the environmental planning and management process. The number of conservation commissions has grown steadily in the Northeast, because they have proved to meet regional needs. Conservation commissions in New Hampshire are established by majority vote at the town meeting, and consist of three to seven residents (the seventh member is ex officio from the board of selectmen) serving three-year staggered terms (University of New Hampshire Cooperative Extension 1975; New Hampshire Revised Statutes Annotated 36-A:3). Conservation commission members are appointed by selectmen in towns, and by mayors in cities.

Conservation commissions are charged with ensuring the proper utilization and/or protection of the natural and watershed resources of the town. They may conduct research into local areas, coordinate ad hoc groups with similar goals, and print and distribute literature. They also must maintain an index of all open areas and wetlands, and may recommend a program for better promotion, development, or utilization of such areas. Conservation commissions keep records of their meetings and actions, and file an annual report with the town. They also file an annual report of local dredge and fill applications with the State Wetlands Board.

Planning boards are established by majority vote at town meetings. They consist of four to eight residents appointed by the selectmen or mayor, plus one selectman (or mayor) serving as an ex officio member. The number of members varies with the local government structure, while the length of terms varies from four to six years (N.H.R.S.A. 673:2). Within six months of assuming office, all non-ex officio members of a planning board are encouraged to complete at least six hours of training for this position. The training is designed and furnished by the Office of State Planning (N.H.R.S.A. 673:3-a), or through mutual agreement with the regional planning commissions. Planning board responsibilities include preparing and periodically amending the community master plan, and promoting interest in and understanding of the plan. They can develop, publish, and distribute the plan with related investigations, maps, and reports (N.H.R.S.A. 674:1, I). The planning board may make recommendations to town or city officials for town development, and for amendments of the zoning ordinances or zoning map (N.H.R.S.A. 674:1, II and V). They can propose zoning ordinances for consideration at town meetings, with at least two public hearings on the proposed

ordinance prior to the town meeting. Subject to authorization by town meeting, the planning board may adopt and administer land subdivision control regulations, and prepare and update the official town map (N.H.R.S.A. 674:1, II and V; University of New Hampshire Cooperative Extension 1975).

Zoning boards of adjustment are established by majority vote at town meetings, and consist of five residents serving staggered five-year terms. Members are appointed by the selectmen or mayor (N.H.R.S.A. 673:3, I). A zoning board of adjustment adopts its own rules of procedure, and keeps records of all meetings, which are public (N.H.R.S.A. 673:17). Like planning board members, any non-ex officio member of the zoning board of adjustment is encouraged to complete at least six hours of training for his/her respective position within six months of assuming office. As with the planning boards, this training is designed and furnished by the Office of State Planning (N.H.R.S.A. 673:3-a), or through mutual agreement with the regional planning commissions. Zoning boards of adjustment hear and decide appeals and special exceptions to zoning ordinances and administer special provisions as required by ordinance. They hear appeals in cases where there is an alleged error in an administrative order made in the enforcement of a zoning ordinance.

Methods

The data for the study were obtained through a mail survey procedure patterned after the Total Design Method (Dillman 1978). One hundred of New Hampshire's 234 towns were randomly selected as sampling sites. Lists of members for all three boards were obtained for each of the 100 towns through state associations, regional planning commissions, and telephone calls and letters to individual towns. Three members each from the conservation commission, planning board, and zoning board of adjustment were randomly selected from the lists of each town. Since not all towns maintain all three boards, nor do they always have three members on a given board, the sample population totaled 789 rather than 900.

Twenty-nine of the 789 members in the sample population were eliminated because they were no longer serving on the boards. Of the remaining 760 members, 556 returned completed questionnaires for a response rate of 73.2 percent. Response rates for the individual boards were 72.2 percent for Planning Board members, 73.8 percent for Zoning Board of Adjustment members, and 72.8 percent for Conservation Commission members. Geographically, the response ranged from 72.6 percent for the northern four counties, to 73.5 percent for southern New Hampshire.

Results

Sociodemographic Characteristics

The results of the survey demonstrate the extent of the interest in training among board members, as well as the issues currently facing the three boards.

Age and Gender. The respondents were 48.2 years old, on average, with a range of 24 to 84 years. The majority, 73.2 percent, were male. Very similar characteristics for New Hampshire local officials were reported by Luloff et al. (1984), and Luloff et al. (1991). Age and gender did not vary significantly among the boards.

Occupation. Most local officials were employed in professional positions (44 percent), such as business, medicine, and law. Nineteen percent were retired, 11 percent held blue collar positions such as carpentry or road construction, and 7 percent worked in natural resource positions such as foresters and wildlife biologists.

Education. Eighty-five percent of the responding local officials have attended college. Of those who attended college, 65 percent completed college, and 24 percent attained a graduate degree. On average, 15 percent completed high school or less.

The proportion of officials who had completed college was similar across the boards and regions of the state.

Length of Service and Length of Residence. Conservation commission members had served for an average of 4.5 years, while planning board and zoning board of adjustment members had each served for an average of 4.9 years. These differences were not significant. Board members had lived in their current towns for an average of 18.9 years, with a range of 1 to 74 years. Conservation commission members were town residents for the shortest period of time -- an average of 15.1 years. They were followed by planning board members and zoning board of adjustment members at 20.6 years each. Conservation commission members' length of residence differed significantly from that of planning board members and zoning board of adjustment members ($p < .05$).

Previous Training

Members of the three boards differed sharply in previous training; average attendance among all board members was 57 percent. On average, conservation commission members were most likely to have attended formal training (61 percent), followed by planning board (60 percent) and zoning board of adjustment members (48 percent). The attendance rate of conservation commissioners and planning board members was not significantly different. However, officials on conservation commissions and planning boards were each more likely to have attended training than were officials on zoning boards of adjustment ($p < .05$).

Topics of Previous Training Attended

Conservation commission members most frequently attended training on wetlands/water resource protection. They were significantly more likely to attend water resources sessions than were their counterparts on other boards ($p < .05$). Eighty-two percent of all conservation commission members attended these sessions, which was twice the percentage of conservation commission members who attended training on any other topic. Other important subjects included zoning and other land use controls, land acquisition, and land use planning (Fig. 1).

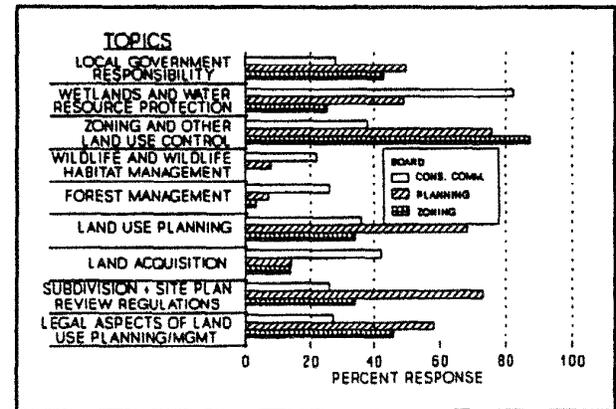


Figure 1. Topics of training attended for all board members.

Planning board members attended training on zoning and other land use control, land use planning, and subdivision and site plan review regulations with similar frequency. They were significantly more likely to attend training on land use planning and subdivision and site plan review regulations than were officials on the other two boards ($p < .05$). Sessions on legal issues, local government responsibilities, and wetlands/water resource protection were also attended by an average of at least one-half of the planning board members. Zoning board of adjustment members most frequently attended training on zoning and other land use control. Across the state, 25 to 55 percent of zoning board of adjustment officials

attended sessions covering legal issues, local government responsibilities, land use planning, and subdivision and site plan review regulations. In addition, a few officials, on each of the boards and from across the state, had attended training covering soils and gravel pit regulations.

Desired Training

Respondents were also asked to identify any desired training (Fig. 2). In contrast to the variation found among board members who had previously attended training, the number of officials currently serving on the three boards who requested additional training did not differ at the $p = .05$ level.

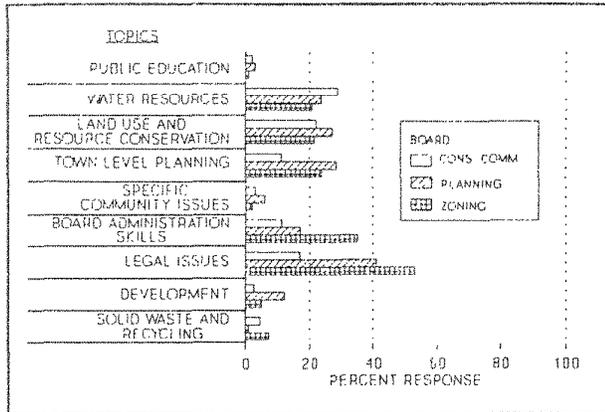


Figure 2. Topics of training desired for all board members.

Respondents were also asked to indicate the training topics or information they would like to receive. The number of officials who named a particular topic was calculated as a percentage of the 62 percent who indicated that they would like additional training.

Water resources was the most frequently requested topic among conservation commission members, mentioned significantly more than often than by members of either remaining board ($p < .05$). Eighty-two percent of these officials, however, indicated that they had attended training on this topic in the past three years. The next most popular training topic for conservation commission members was land use and natural resource conservation issues.

For planning board and zoning board of adjustment members, the most important topic for additional training and/or information was legal concerns. Interestingly, although this is a current issue for these boards, they did not consider it as a major future issue. About 60 percent of planning board and 45 percent of zoning board of adjustment officials had attended training on this topic during the past three years.

Town level planning was the second most important for planning boards. Although only 28 percent requested additional training in this subject, over 70 percent have attended training related to this topic in the last 3 years. The officials also saw town level planning as a less important issue in the future, although they believe that development will become more important in the future. A similar percentage of planning board officials requested training on land use and natural resource conservation concerns, and water resources.

For zoning board of adjustment members, the second major area of training and/or information needs was board administration. They cited it more frequently than either of the other boards. Their higher level of response differed significantly ($p < .05$) from that of conservation commission members, though not from planning board members. Moreover, 43 percent of zoning board of adjustment members had attended such training during the past three years.

Two issues absent from the training needs were development and solid waste. As discussed earlier, these officials were not as sensitive to the solid waste issue as other New Hampshire citizens and officials. The lack of training/information requests on the issues surrounding development was surprising, however, given that it is among the top current issues for both the planning board and zoning board of adjustment members.

Morris et al. (1988) conducted a study to document the planning efforts of New Hampshire's communities. Town selectmen, planning board officials, and city managers were surveyed in each of the 234 towns. One hundred fifty-eight communities returned the survey. In terms of information needs, 49 percent wanted more information on ground water/aquifer protection, 37 percent were interested in watershed protection information, and 27 percent each wanted more education on hazardous waste and land use planning. Except for hazardous waste, the degree of correspondence among the Morris et al. (1988) study and this one is notable. This is especially true for planning board and zoning board of adjustment members, who rated water resource concerns lower than did conservation commission members.

In 1989, the Society for the Protection of New Hampshire Forests conducted a survey of New Hampshire officials and residents (Dobbs 1990; Watkins 1990). They asked 300 "fellow conservationists", which included conservation commission chairpersons, to identify helpful information and training topics from checklists that emphasized local land protection through non-regulatory means. Of 66 questionnaires returned, 64 percent were interested in managing conservation lands, 62 percent in conservation easements, 58 percent in wetlands delineation, 56 percent in groundwater and aquifer protection, and 42 percent mentioned community land use planning. These issues of interest correspond well to training/information requests by officials in this study.

Time Served on the Board Compared to Training Requests

Other factors may influence local officials' training or information requests. In an effort to determine the best timing for training, training requests were compared to the amount of time members had served on their commission or board.

Each board shows a slightly different pattern. Conservation commission members most often requested additional training while in the two to five year bracket. Planning board members requested it most during their first year, and declined thereafter. Zoning board of adjustment members' requests peaked after serving for ten years. This trend follows written comments on the surveys as well. It seems to take time for conservation commission members to understand what resources are important in their community, and to become familiar with their responsibilities and authority. After the first year, they know what to ask for. Planning board members have a more closely defined role, and thus require specific training at the start. Zoning board of adjustment members show a relatively consistent level of training requests until they have served for over ten years, when requests increase. This may be due to the increasing complexity of the regulations and appeals over time, and the members' need to be familiar with them. In addition, they may have a greater level of recognition of the complexities of a given issue, due to their experience on the board.

Delivery of Training and Information

The survey also examined how best to deliver training and information. Approximately two-thirds of the local officials answered these questions. The most popular format for presenting training was a single evening or single weekend day session. Officials preferred a combination of indoor and outdoor activities as appropriate to the topic, and stated that a lecture was the best way to get information across. Many officials mentioned that handouts were helpful, so that they could later refresh their memories and show them to fellow board members who could not attend. They were willing to travel an average of 27 miles (one way) to attend a session. Eighty-five percent of those responding said that it would be helpful to have

sessions available on videotape, for use at home or to show at meetings to those who could not attend.

Discussion and Implications

New Hampshire, like many states, relies on local voluntary efforts to provide town services related to natural resource management and preservation. Here, members of conservation commissions, planning boards, and zoning boards of adjustment indicated that they needed additional training to adequately deal with the myriad of issues related to their offices.

In an era in which fewer people are willing or able to devote the time necessary to serve in such capacities, it is incumbent to provide whatever assistance is needed to facilitate their efforts. This is particularly true for meeting information needs, since errors, either through improper action or no action, by such boards likely will have long lasting effects. Identifying training needs and providing them in modes consistent with the members' desires may well be one way to most efficiently reduce the potential for such problems in the future.

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ENVIRONMENTAL AWARENESS AND VOLUNTARISM

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This study examines residents' level of environmental awareness about the Great Bay National Estuarine Research Reserve (GBNERR), and their willingness to volunteer to protect the resource. The data were obtained from a survey mailed to New Hampshire and Maine residents. Sensitivity to, and knowledge about the resource increased as environmental awareness increased. About half of the respondents expressed a willingness to volunteer to protect the Bay. The volunteers tended to be environmentally aware, knowledgeable about the GBNERR, environmental organization members, young, educated, and lived close to the Bay. The analysis suggested the type of individuals who should be targeted as volunteers, and emphasized the importance of increasing environmental awareness and knowledge about the GBNERR.

Introduction

Estuaries are coastal areas where freshwater mixes with seawater. National estuarine reserves, established through cooperative federal-state efforts, are areas set aside for long-term research, education, and interpretation. A primary aim of these research and education projects is to provide information to the state that is useful for decision-makers concerning the management and protection of estuarine resources.

The Great Bay National Estuarine Research Reserve (GBNERR) in New Hampshire was established in 1989, and is one of 19 such reserves in the United States. The GBNERR contains 4,471 acres of tidal waters and mud flats. The water area includes all of the Great Bay, the small channel from the Winnicut River, and the larger channels from the Squamscott and Lamprey Rivers. At low tide, approximately half of the Great Bay is exposed; most of the intertidal area is mud flat. The upland portion of the estuary includes 800 acres of salt marsh, tidal creeks, islands, woodlands and open fields.

Seven rivers enter the Great Bay estuary and are the major sources of freshwater inflow. The highest volumes of freshwater occur during the spring runoff. Because the ratio of freshwater to saltwater during the remainder of the year is less than 1%, the dominant hydrologic influence in the Bay is the twice daily tides. Researchers at the Jackson Estuarine Laboratory and the University of New Hampshire have gathered an extensive data

base on the hydrology of the Great Bay. A 1983 study, for example, examined the impacts of sewage treatment plants and other sources of nutrients on water quality. Time series analyses using eight years of data indicated that the estuarine water quality was good. Thus, although other estuaries have experienced major eutrophication (an overload of nutrients) problems during the last decade, this has not occurred in the Great Bay estuary because of the rapid assimilation of nutrients within the inflowing tidal rivers and vigorous tidal mixing. These features have combined to maintain an elevated nutrient carrying capacity within the system (Loder et al. 1983).

In addition to hydrologic influences, the character of the 48 mile shoreline around the Great Bay partially accounts for the good water quality. With the exception of seasonal homes such as those at Brackett and Weeks Points, the shoreline is predominantly a mixture of residential property, agricultural land, and woodlands. This pattern of development around the Bay has been driven by two considerations. First, local land use controls place restrictions on shoreline development. The towns adjacent to the Bay have classified shoreline uses for residential, agricultural and conservation purposes only. Second, many landowners continue to retain large parcels of land. Because the landowners are committed to preserving their own homestead and the open character of the area, some of these parcels are more than 100 acres in size.

Five boat launch points provide access to the Great Bay. Boating in the upper bay, however, is limited due to the extensive mud flats in the Great Bay and the shallow channels in the rivers at low tide. Most of the boaters are concentrated in the lower portions of the Little Bay, the Piscataqua River and Portsmouth Harbor; outside the boundaries of the Research Reserve. Commercial fishing in the estuary is limited. Other water dependent uses of the Great Bay include recreational fishing, clamming, oystering, bird hunting and bird watching.

Projections for future use and development of the estuary indicate a moderate rate of growth for the area. From 1970 to 1980, the eight town region grew from 38,721 to 44,475, an increase of 15%. From 1980 to 1990, census counts show a growth of 21% to 53,644. This growth translates into more construction activity, more housing and more recreational activity. With these changes come the potential for increased adverse impacts on the Reserve.

The transition of Pease Air Force Base to other uses may also disrupt the stability of the area's ecology. Among the proposed alternatives are an airport, air cargo and aircraft repair facilities, a light industry and warehousing center, a foreign-trade zone, a research park, hotel and conference space, a golf course, and a wildlife refuge. The extent of impact associated with these uses will likely be related to which combination of proposals are put into effect. As evident by the Jamaica Bay Wildlife Refuge near JFK airport in New York, for example, an airport may not harm the environment around the Great Bay, provided that the six miles of undeveloped shoreline at Pease are left as a wildlife refuge.

Other threats to the environmental quality of the Reserve come from both direct and indirect sources. Among the direct potential impacts are the toxic waste sites at Pease AFB, the filling of wetlands for new developments, and airborne pollutants from both automobile and aircraft traffic. Studies conducted in the Chesapeake Bay indicate airborne pollutants account for as much as two-thirds of organic water pollutants (Goldman 1990). Although not connected to the GBNERR, the expansion of the Portsmouth Port could indirectly effect water quality. Due to the dynamics of an estuary, pollutants that enter at any point will eventually impact the entire system. In recognition of these possible consequences, the Great Bay Reserve needs to be managed as a total system, rather than a single bay.

To mitigate the potential impacts associated with changing land use patterns, it is essential that members of the general public

understand the importance and value of the Reserve. The effective design and development of any educational effort requires baseline information on the current knowledge and awareness of the population of interest. Although a number of educational efforts for the Great Bay Estuarine Reserve have been initiated, there has not as yet been a systematic evaluation of individuals who use the area around the Reserve, local landowners, developers and conservation commissions to determine their understanding of how the GBNERR works and what the establishment of the Reserve means to them. Existing programs have tended to focus on audiences with some prior interest in the estuary (e.g. Audubon, Sea Grant). As general recognition of the existence of the Reserve increases, the number of visitors to the resource is also likely to increase. Reaching this broader audience requires a systematic assessment of the public's general and specific knowledge of and attitudes toward estuarine systems.

The study described in this paper contributes another component to the overall management program on the Great Bay by examining residents' level of environmental awareness about the GBNERR, and their willingness to volunteer to protect the Bay.

Methods

A random sample of New Hampshire and Maine residents was identified from telephone listings. The sample was stratified according to the distance the person lived from the Reserve [those living in communities adjacent to the Great Bay ($n = 350$), residents who lived in the two adjacent counties, but not in communities adjacent to the Bay ($n = 300$), and those who lived outside Rockingham and Stratford counties ($n = 200$)] Finally, a sample of conservation organization members ($n = 100$) was chosen. The organizations included the Great Bay Estuarine System Conservation Trust, the Great Bay Watch, the Audubon Society, the Society for the Protection of New Hampshire Forests, Friends of Odiorne, and UNH Marine Docents.

Two separate mailings were used with a reminder postcard after the first mailing. Of the 950 surveys mailed, 432 were returned (51%). The highest response rates were noted for organizational members and New Hampshire residents living adjacent to the Bay (83% and 61%, respectively). New Hampshire residents living outside Rockingham and Strafford counties and Maine residents were the least likely to complete and return the survey (25% and 26%).

Results

Environmental Awareness

Nine items on the survey addressed residents' specific awareness of environmental issues affecting the Great Bay (Table 1). Responses to these beliefs reflected individuals' knowledge of the importance of estuaries, and their concerns over protecting the GBNERR from industrial and recreational activities. The percent of agreement with these statements ranged from 72% to 98%.

An environmental awareness scale was constructed from these 9 survey items. Reliability statistics calculated for the scale produced an overall Cronbach alpha of .78. The overall mean value for the scale was 3.33, suggesting that many individuals were sensitive to environmental issues affecting the Bay.

Individuals were classified as being either low, medium or high on the environmental awareness scale. People in the low environmental awareness group reported an average score of less than 3.00. These respondents less often agreed with the statements shown in Table 1. People in the medium category scored, on average, 3.00 to 3.49 on the environmental awareness scale, while those classified in the high group reported average scores greater than or equal to 3.50. Twelve percent ($n = 50$) were judged to have low environmental awareness, 37% ($n = 155$) fell into the medium category, and 51% ($n = 216$) reported high environmental awareness (Table 2).

Table 1 Item composition of environmental awareness scale

Items in Environmental Awareness Scale ^a	Percent Agree	Mean	s.d.
Estuaries play an important role in the life cycle of many marine animals	98%	3.82	.43
The Great Bay is a fragile environment	95	3.61	.62
I feel a strong personal obligation to protect the Great Bay Estuary	87	3.28	.74
People do not have the right to modify the Great Bay to suit their needs	84	3.41	.83
Industries that accidentally discharge toxic substances into the Great Bay should be held financially and legally responsible for any damages	97	3.85	.52
Increasing industrial development near the Great Bay will contribute to the decline in environmental quality	84	3.34	.84
Increasing recreational development near the Great Bay will contribute to the decline in environmental quality	72	2.90	.81
More education programs should be offered on the value of the Great Bay	96	3.57	.62
More research is needed to help public agencies manage the Great Bay	86	3.24	.77

^a/ Variables coded on a four-point scale:

1 = Strongly Disagree, 2 = Somewhat Disagree,

3 = Somewhat Agree, 4 = Strongly Agree.

Overall scale alpha = .78

Although many respondents were sensitive to environmental issues affecting the Bay, there were significant differences among the three groups. Nearly two thirds of the high environmentally aware group had heard of the Great Bay Research Reserve, compared to only a third of the medium group and a quarter of the low group (Table 2).

The high environmental awareness group was more likely to belong to an environmental organization. Half of the people in this category belonged to at least one organization. Two thirds of those in the medium classification and 80% of the low group did not belong to any organization. The two most frequently mentioned organizations by the high group was the Audubon Society, and the Society for the Protection of New Hampshire Forests. Fourteen percent of this group belonged to the Conservation Trust and another 11% were members of the Friends of Odiorne.

Table 2. Environmental Awareness: Bivariate relationships

	Environmental Awareness			Chi-Square
	Low	Medium	High	
Entire Sample	12%	37%	51%	
Heard of GBNER				41.5**
No	74%	67%	37%	
Yes	26	33	63	
Organization Member				18.1**
No	80%	65%	50%	
Yes	20	35	50	
Property ownership along the Great Bay				17.3**
No	94%	97%	85%	
Yes	6	3	15	
Distance of residence from the Great Bay				13.9*
< 3 miles	22%	18%	24%	
3 to 5 miles	27	28	31	
5 to 10 miles	24	19	23	
11 to 25 miles	22	15	13	
> 25 miles	5	20	10	
Age				n.s.
18 to 24	2%	7%	4%	
25 to 34	15	24	17	
35 to 44	28	26	27	
45 to 54	11	15	14	
55 to 64	17	10	16	
65 +	28	18	22	
Gender				6.5*
Female	28%	30%	42%	
Male	72	70	58	
Education				15.8**
High School	36%	18%	14%	
Some College	17	19	20	
College	32	29	31	
Grad School	15	34	35	
Income				n.s.
<\$20,000	23%	20%	19%	
\$20,000-\$29,999	16	18	19	
\$30,000-\$49,999	37	35	38	
≥\$50,000	23	27	24	

* p < .05; ** p < .01

Over 84% of all respondents did not own property along the Bay. Respondents in the high environmental awareness group, however, were five times more likely to be landowners than the medium group (15% versus 3%, respectively), and two and a half times more likely to own property than the low group (15% versus 6%). Although most respondents did not actually own property on the Great Bay, many lived relatively close. About a quarter of those in the high and a fifth of the medium and low environmental awareness respondents lived less than 3 miles away. Extending this distance 10 miles, incorporates about three quarters of respondents in the high and low categories, and two thirds of the medium group.

Over two thirds of those in the low and medium groups were male, while the high group was divided more evenly between males and females. The high awareness group tended to be more educated than the other two groups. No significant difference among the environmental awareness groups were noted for age or income.

Perceived Problems Affecting the Bay

A number of inter-related environmental issues can influence the Great Bay. Reductions in water quality, pressures to increase development, declines in fisheries resources, and the impacts associated with recreational use all play a role in the overall quality of an estuary.

Beliefs about water quality were examined relative to specific types of impacts; for example, chemical and oil spills, direct discharge of sewerage, toxic waste, etc. For each of the water quality items shown in Table 3, evaluations of the condition as problematic consistently increased from the low to medium to high environmental awareness groups. Chemical and oil spills, direct discharge of sewerage, shoreland erosion and toxic wastes were perceived to be problems by a majority of those in the high environmental awareness group. A similar pattern emerged for the medium awareness group, although the percentage of individuals rating these water quality indicators as problematic was lower. None of these issues were rated as problems by more than 32 percent of the low environmental awareness group.

If the quality of water in the Bay declines, fisheries resources may also be impacted. Contamination of fish and shellfish, for example, was considered a problem by over three quarters of the high awareness group, about two thirds of the medium group, and half of the low environmental awareness respondents. Beliefs about declining fisheries resources showed a similar pattern of responses.

Table 3. Perceived problems affecting the Great Bay

	Environmental Awareness ^a			Chi-Square
	Low	Medium	High	
Water quality				
Chemical/oil spills	32%	50%	63%	19.5*
Sewerage discharge	31	51	60	17.1*
Toxic wastes	24	44	54	21.7*
Agricultural run-off	16	37	48	24.0*
Shoreland erosion	30	47	63	21.7*
Sedimentation	18	32	46	31.6*
Overall water quality	14	47	63	62.4*
Fisheries				
Declining fisheries	36%	51%	70%	41.3*
Contamination of fish	48	62	78	24.1*
Development				
Shoreline	27%	55%	84%	90.3*
Industrial	18	47	73	64.1*
Marina	14	40	64	50.6*
Loss of wetlands	29	61	79	63.6*
Population growth	24	62	89	115.6*
Human Impact				
Amount of boating	20%	44%	67%	44.7*
Boat discharge	33	62	78	38.9*
Jet ski usage	14	31	43	21.9*
Discarded trash	48	68	83	30.4*

a/ Cell entries are the percentage of respondents who consider the issue to be a problem * p < .01

Table 3 also displays the respondents' perceptions of problems associated with development and human impact. In general, the pattern of findings observed for water quality and fisheries were also noted for concerns over development and recreational use of the Bay. People who were in the high environmental awareness group tended to perceive these issues to be more of a

problem than either the medium or low groups. Individuals in the medium group were also more likely to rate them as problems than the low awareness group. For example, perceptions of problems resulting from population growth around the Bay, shoreline development, industrial and marina development, and loss of wetlands were greatest for the high awareness group and least for the low category.

Voluntarism

Across all groups, just under half (47%) of the respondents expressed a willingness to volunteer to protect the Great Bay (Table 4). Self-guided nature walks, boat tours of the Bay and helping to clean up the Bay were the three most popular volunteer programs. Donating money ranked fourth in importance for individuals at all levels of environmental awareness. The three least popular volunteer activities involved the repair / construction of buildings, becoming a tour guide and writing articles.

Nearly two thirds of the high environmental awareness group indicated a willingness to volunteer, compared to only 10% of the low group. As expected, simple awareness of the GBNERR was also related to voluntarism. Fifty-nine percent of those who had heard of the Reserve expressed an interest in volunteering their services; 36% of those who had not heard of the GBNERR volunteered.

Half of the volunteers belonged to an environmental organization; less than a quarter of the non-volunteers belonged to an organization. The Audubon Society, the Society for the Protection of New Hampshire Forests, the Great Bay Estuarine Systems Conservation Trust, and the Friends of Odiome were the four most commonly mentioned organizations.

The volunteers were three times more likely to own property along the Bay, lived closer to the Bay in terms of distance, and were more likely to live in either Rockingham or Strafford counties than were the non-volunteers. Length of residence in the county was not statistically related to voluntarism.

Volunteers tended to younger than non volunteers (Mean age = 45.6 versus 50.3, respectively). Volunteers had also completed more years of formal education than non-volunteers. Gender and reported income were not related to voluntarism.

To develop an understanding of which of these variables are most useful in distinguishing between volunteers and non-volunteers, a stepwise discriminant analysis was used. This analysis correctly classified 81% of the respondents into their respective groups (Table 5). Eighty-one percent of the volunteers were correctly classified, while non-volunteers were predicted with 77% accuracy. The best predictor of voluntarism was the environmental awareness scale. Individuals who were sensitive to the environmental issues affecting the Great Bay were more willing to volunteer than those who lacked this sensitivity. The respondents' age was the next variable to enter the equation. Younger individuals were more likely to volunteer than older individuals. Membership in an environmental organization, simple knowledge of the existence of the GBNERR, property ownership along the Bay, and education were positively related to willingness to volunteer, while distance of residence from the Bay and income were negatively related to voluntarism. Gender was not significant.

Table 4. Willingness to volunteer: Bivariate relationships

	Willing to Volunteer to Protect the Great Bay		Chi- Square
	No	Yes	
Entire Sample	53%	47%	
Environmental Awareness			53.1**
Low	90%	10%	
Medium	61	39	
High	36	64	
Heard of GBNERR			21.8**
No	64%	36%	
Yes	41	59	
Organization Member			20.7**
No	78%	22%	
Yes	50	50	
Property ownership along the Great Bay			12.4**
No	95%	85%	
Yes	5	15	
Distance of residence from the Great Bay			12.2*
< 3 miles	16%	26%	
3 to 5 miles	26	31	
5 to 10 miles	22	21	
11 to 25 miles	19	11	
> 25 miles	16	10	
Age			10.1*
18 to 24	4%	6%	
25 to 34	19	22	
35 to 44	22	29	
45 to 54	15	13	
55 to 64	13	15	
65 +	27	15	
Gender			n.s.
Female	32%	39%	
Male	68	61	
Education			13.6**
High School	25%	11%	
Some College	17	21	
College	30	30	
Grad School	28	38	
Income			n.s.
<\$20,000	21%	18%	
\$20,000-\$29,999	18	20	
\$30,000-\$49,999	38	35	
≥\$50,000	23	27	

* p < .05; ** p < .01

Table 5. Predictors of willingness to volunteer ^a

Classification Variable	Zero-Order Correlation	Standardized Discriminant Coefficient
Beliefs / Knowledge		
Environmental Awareness Scale ^b	.50 **	.65 **
Heard of the GBNERR ^c	.34 **	.43 **
Organization Member ^c	.31 **	.45 **
Proximity to the Great Bay		
Own property along Bay ^c	.20 *	.23 **
Distance of residence from Bay ^d	-.20 **	-.24 **
Demographics		
Age ^d	-.17 *	-.55 **
Gender ^e	.15	n.s.
Education ^f	.09	.17 **
Income ^g	.06	-.23 **

a/ The dependent variable refers to the respondent's willingness to volunteer: 1 = yes; 0 = no.

b/ Scale includes the variables listed in Table 1; Values range from 1.33 to 4.00.

c/ Dummy variable: 1 = yes; 0 = no.

d/ Variable coded from open-ended responses.

e/ Dummy variable: 1 = Female; 0 = Male.

f/ Variable coded on a 6 point scale ranging from 1 = "grade 1 to 8" to 6 = "graduate degree."

g/ Variable coded on an 11 point scale ranging from 1 = "under \$7,500" to 11 "over \$100,000."

* p < .01; ** p < .001

Discussion

Many of the respondents to this study were sensitive to environmental issues affecting the Great Bay. The classification scheme categorizing respondents according to their level of environmental awareness, however, showed marked differences among the three groups. Sensitivity to, and knowledge about the Bay increased as the level of overall environmental awareness increased. These findings suggest that programs designed to familiarize individuals about estuaries and the Great Bay National Estuarine Research Reserve may help to mitigate problem conditions before they arise.

Although perceptions of existing problem conditions occurred more frequently among the high and medium awareness groups, about half of these individuals indicated they were unsure of the actual extent of the impact. This suggests that increasing the knowledge base of all residents is important.

Across all groups, slightly less than half of the respondents expressed a willingness to volunteer to protect the Great Bay, suggesting interest exists in preserving the resource. The eight variable discriminant function analysis correctly classified 81% of these respondents. Similar to the bivariate findings, this analysis indicated that volunteers tended to be environmentally aware, knowledgeable about the GBNERR, and belonged to environmental organizations. The volunteers in this sample were young, lived close to the Bay, reported higher levels of education, and relatively low incomes. While some of these variables cannot be controlled by natural resource managers, the analysis suggests the type of individuals who should be targeted as volunteers. It also emphasizes the importance of increasing environmental awareness and knowledge about the Great Bay Natural Estuarine Research Reserve.

Given the fragility of estuaries, and the consequences associated with alternative uses both within and outside the boundaries of reserves, the GBNERR needs to be managed as a total system (including the surrounding area), rather than as a single resource. The findings reported here reinforce the need for a coordinated management effort. The New Hampshire Fish and Game Department needs to assume management control over the various volunteer programs, and continue to be involved in all decisions affecting the Bay.

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AN EXAMINATION OF ENVIRONMENTAL ATTITUDES AMONG COLLEGE STUDENTS

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This paper examines the relationship between two attitudinal components: the affective component, represented by environmental concern, and the conative component, represented by behavioral intention. Results suggests that environmental concern is a reasonable predictor of environmentally favorable behavioral tendencies and that socio-demographics have limited influence on environmental

Introduction

Earth Day 1970 is often considered by many to be the focal point of the environmental social movement of the 1960s and 1970s and the beginnings of the Environmental Era. While perhaps slowing during the 1980s, environmental concern may again be on the rise. According to Dunlap (1987, p.11) public opinion research clearly demonstrates "a significant upturn in public concern for environmental quality during the Reagan presidency." In a July 1988 poll conducted by the New York Times and CBS News, pollsters found that 65% of the public supported the idea of environmental care, an increase of approximately 20% from 1981, when the poll was first conducted (May, 1988).

It would seem logical that some of this increase could be attributed to the increased popularity of environmental education programs instituted in the school systems during the 1970s and 1980s. It would also appear reasonable to assume that a majority of those individuals presently enrolled at colleges and universities would have experienced some type of environmental education program during their elementary and/or secondary education. Finally, college students, previously exposed to some form of environmental education, should theoretically, hold environmentally conscientious attitudes.

The results of the research regarding attitudinal relationships, have varied and have been inconclusive. Attitudes have been diversely defined by social scientists, and most definitions include multiple components composing one's attitude (Bennet, 1974; Fishbein and Ajzen, 1975; Iso Ahola, 1980; McGuire, 1969). According to Fishbein and Ajzen (1975, p.6) an attitude is "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object." Thus one can see the connection between beliefs and the intention to respond in a particular manner. McGuire (1969) suggested that the attitude construct is composed of three entities: (a) a cognitive component, (b) an affective component, and (c) a conative component. In order to sufficiently investigate the relationship attitude has with behavior, knowledge, and demographic factors, the relationship between these components of one's attitude needs further examination. Predicting the influence environmental knowledge has on attitudes, and in turn, the influence attitudes have on behavior, should prove to be more reliable when the relationships between specific components of an attitude are

identified and understood. The study at hand focused on researching the latter two components of McGuire's attitudinal model, affective and conative, in order to measure the strength of the cognitive component. More specifically, this study was an investigation of the independent variable, environmental concern, and its influence on the dependent variable, environmental behavioral intention.

Purpose of Study

The purpose of this study was to determine the degree of environmental concern among college students and to investigate the influence attitude has on positive environmental action in the lifestyle of students through their willingness to give up items in major categories of adjustments to lifestyles, use of resources, and contamination of the environment. Variables such as political leaning, income, academic factors (class, major, college), age, gender, exposure to environmental education, and geographic background were also tested against the attitude of environmental concern, and against "willingness to change" attitudes.

Methodology and Research Design

The study was based on a sample of 250 college students enrolled in a Physical Education 129 course entitled "Fitness for Life," primarily comprised of undergraduate students. The first day of class during the fall semester of 1991 was chosen for data collection. The students were given a questionnaire to be completed in the first 10 minutes of class. A total of 226 questionnaires were collected at the end of class, 12 questionnaires were discarded due to incompleteness, resulting in 214 usable questionnaires, a response rate of 86 percent.

Instrumentation

The structure and format of the instrument employed was comprised of two instruments that had been tested in previous research (Dunlap and Van Liere, 1978; Thompson and Gasteiger, 1985). Dunlap and Van Liere's instrument, known as the "New Environmental Paradigm," was designed to measure a general dimension of environmental concern, and was used in this study to identify the affective component of one's attitude. In order to measure environmental behavior intentions, Thompson and Gasteiger's attitudinal survey was utilized, identifying the conative component of one's attitude.

Environmental attitude. A revised edition of Thompson and Gasteiger's attitudinal survey instrument was implemented in the first section of this questionnaire to assess the students' awareness of environmental problems by obtaining their responses to provocative statements on the subject. These revisions were determined to be necessary as a result of the changes in society that have occurred since the development of the instrument. In addition, these revisions were made in light of the relevance of the items within the context of current environmental concerns. Most of the revisions were made in the first section of Thompson and Gasteiger's instrument which measured the students' willingness to alter their behavior in order to be more environmentally sensitive. This section of the questionnaire was divided into the following five sub-sections: Food Consumption and Packaging, Personal Items, Household Items, Recreation, and Transportation. Each of these subsections consisted of a seven-item scale, and respondents were asked to rate themselves on their willingness to give up each of these items. These sub-scales were treated as separate dependent variables when the data was statistically analyzed. The remainder of the Thompson and Gasteiger instrument incorporated into this questionnaire focused on the respondent's reaction to various potential control measures dealing with environmental quality issues and was utilized statistically to aid in validating the relationship between environmental concern and environmental behavioral intention.

Environmental concern. The second part of the questionnaire for this study implemented Dunlap and Van Liere's "New Environmental Paradigm" instrument. The instrument was composed of a twelve item scale, in a Likert-type format, reflecting all of the crucial aspects of the "New Environmental

Paradigm." These aspects included; (a) the concept of a limit to growth, (b) a balance of nature, and (c) the need to reject the anthropocentric notion of natural resource use. The scale represented a global environmental disposition, in contrast to the previous scales which focused on specific problems, such as pollution, energy use, and overpopulation.

The final part of the survey instrument provided a profile of the respondent by obtaining socio-demographic background information, which was used as independent variables to examine their effect on attitudinal choice patterns. For the purpose of this study Dunlap and Van Liere's instrument represented the independent variable, and Thompson and Gasteiger's questionnaire served as the dependent variable. The combination of these two measurements aided in understanding the degree of environmental concern and its influence on behavioral intentions.

Treatment of Data

The statistics employed to analyze the data and test the research hypotheses included descriptive statistics, Cronbach Alpha Coefficient, Pearson Correlation Coefficient analysis, One-way Analysis of Variance, and finally, Scheffe's tests. The statistical results were considered significant at the .05 level. Descriptive statistics were employed to demonstrate the frequency distribution of responses, the means of each item, and the total computed scores for each scale. A Cronbach Alpha Coefficient was utilized to test reliability on each dimension of the scales and examine the item composition in each scale included in the questionnaire. A Pearson Correlation Coefficient analysis was utilized to analyze the relationship between environmental concern and environmental behavioral intention among college students. The relationships between socio-demographic variables and environmental attitudes, were tested using Oneway Analysis of Variance. The socio-demographic variables acted as the independent variables, and the study investigated the influence these variables had on environmental attitudinal choice patterns. In examining the relationships between socio-demographic variables and the various scales of behavioral intention, the overall scale as well as the individual items of each scale, were included in the analysis. Scheffe's tests were used, when significant relationship were found within these two hypotheses, to determine the differences between group means.

Analysis and Findings

All scales and sub-scales were found to have adequate overall scale alphas based on Kuhn and Jackson's study (1989) involving the stability of factor structures in the measurement of public environmental attitudes. They suggested that a score of .40 or greater is generally considered to be an acceptable level of reliability. Table 1 shows that the behavioral intention scale, consisting of 35 items, yielded a reliability coefficient of .85. When this scale was divided into its five sub-scales, each having seven items, the reliability coefficients ranged from .57 to .71. The alternate behavioral intention scale, utilized to help validate the consistency of resulting relationships in this study, yielded an alpha coefficient of .72. It has been suggested by Gieller and Lasley (1985) that Dunlap and Van Liere's (1978) scale is multidimensional and represents three attitudinal domains: "balance of nature", "limits of growth", and "man over nature". Therefore, the reliability of both the overall scale and the multi-dimensionality of the scale was examined. The reliability tests for each of three proposed domains resulted in the relatively strong coefficients of .66 for balance of nature, .53 for limits of growth, and .67 for man over nature. When the scale was tested for its overall reliability it resulted in a coefficient of .74 and all of the 12 items appeared to have a uniform correlation. Based on these findings, the alpha coefficients for testing the relative homogeneity of variables, within each scale and sub-scale, exhibit a strong degree of internal consistency among the instruments employed in the study.

Table 1. Reliability coefficients for the attitudinal scales.

Scale	Overall Scale Alpha
Behavioral Intention Scale	.85
Food Consumption & Packaging Sub-Scale	.61
Household Items Sub-Scale	.57
Transportation Sub-Scale	.60
Personal Items Sub-Scale	.71
Recreation Sub-Scale	.62
Control Measures Scale	.72
Environmental Concern Scale	.74

In examining the data, a significant relationship was found to exist between behavioral intention and the environmental concern of students when their intentions were analyzed on an overall scale and this relationship is positive in nature. The increased environmental concern of college students, thus, increases their willingness to modify behavior in favor of the environment in most of the relationships currently examined. The relationship between concern and the five sub-scales of behavioral intention resulted in significant relationships for four of the sub-scales (food consumption and packaging, household items, transportation, and recreation). The relationships were significant at the .01 level, indicating that as the level of concern for the environment increases among college students, their willingness to modify behavior in favor of the environment also increases in the four categories (see Table 2). When the relationships between concern and the individual items of behavioral intention were investigated, it was found that nearly 60% of the items were significantly related to concern. Therefore, it was determined that there is a relationship between concern and the behavioral intentions of 20 of the 35 items. For these items, the results convey that as the concern of students increases, there is a simultaneous increase in their willingness to alter behavior in favor of the environment.

Table 2. Pearson correlation coefficient analysis for behavioral intention scales with environmental concern scale.

Scale	Concern ^a	N
Over-all Behavioral Intention Scale	.377**	184
Food Consumption and Packaging Sub-Scale	.339**	193
Household Items Sub-Scale	.312**	192
Transportation Sub-Scale	.342**	191
Personal Items Sub-Scale	.131	194
Recreation Sub-Scale	.227**	197
Control Measures Scale	.350**	197

** Significant at 0.01 level

^a Indicates the R value for the correlation of the two variables.

The control measures scale was included in the analysis in order to further demonstrate the relationship between concern and behavioral intentions using an alternative behavioral intention measure. When this scale was tested against the concern scale, also using Pearson's r, a significant relationship was found at the .01 level (see Table 2). Thus, the increased environmental concern of students positively influences their willingness to adopt measures to control and limit energy use and consumption.

The outcome of the Oneway Analysis of Variance of socio-demographic variables and environmental concern yielded F-values for gender, age, student status, geographic background, parent yearly income, background in environmental education, and political leaning none of which significant at the .05 level.

Therefore, the seven independent socio-demographic variables identified in this study were found to have limited significant influence on the environmental concerns of college students (see Table 3).

Table 3. Significance of demographic variables on environmental attitudinal scales

Item in Scale	Gender ^a	Age ^b	Student ^c Status	Geographic ^d Background	Parent ^e Income	Background ^f In EE	Political ^g Leaning
Behavioral Intention Scale	NS	NS	NS	NS	NS	NS	(+)*
Food Consumption and Packaging Sub-scale	NS	NS	NS	NS	(-)*	(+)*	NS
Household Items Sub-scale	NS	(+)*	(+)*	NS	NS	NS	(+)*
Transportation Sub-scale	NS	NS	NS	(-)**	NS	NS	NS
Personal Items Sub-scale	(-)**	NS	NS	NS	NS	NS	NS
Recreation Sub-scale	(+)**	NS	NS	NS	NS	NS	NS
Control Measures Scale	NS	NS	NS	NS	NS	(+)*	(+)**
Concern Scale	NS	NS	NS	NS	NS	NS	NS

NS - Not significant * Significant at 0.05 level ** Significant at 0.01 level

^a A positive symbol indicates that females have more favorable environmental intentions than males.

^b A positive symbol indicates that older students have more favorable environmental intentions.

^c A positive symbol indicates that upper class students have more favorable environmental intentions.

^d A positive symbol indicates that students with urban backgrounds have more favorable environmental intentions.

^e A positive symbol indicates that students from lower income families have more favorable environmental intentions.

^f A positive symbol indicates that students with strong EE backgrounds have more favorable environmental intentions.

^g A positive symbol indicates that liberals have more favorable environmental intentions.

It was suggested that there would be a relationship between behavioral intentions and the seven socio-demographic variables identified in this study. Table 4 summarizes the findings of this study. It was predicted that the direction of the relationship between behavioral intention and gender would show females more willing to modify behavioral intentions, the results are inconclusive. The effect of age on the behavioral intentions of college students is minimal and the direction of the relationship tends to reveal older students having more favorable environmental intentions. The student status variable influences the behavioral intentions of college students in specific sections of the behavioral intention scale, and the direction of the relationship is generally such that upperclassmen are more willing than underclassmen to alter their behavior towards the environment as expected but with some exceptions. The geographic background of students had limited influence on their intended behavior with subjects from rural areas have more favorable behavioral intentions than subjects from both suburban and urban backgrounds. The relationship between annual family income of students and their behavioral intentions is limited, with those from higher incomes subscribing to more favorable intentions than those from families with lower income. The relationship between environmental education experience and the behavioral intentions of students resulted in limited significant findings; students with higher levels of experience with environmental education do not appear to have any more concern for the environment than students with little experience in this subject. In examining the relationship between political leaning and behavioral intention, the findings suggest that students with liberal political orientations tend to have more behavioral intentions in favor of the environment. In summary, the findings of this research reveal that socio-demographic variables have limited influence on the behavioral intentions of college students.

Discussion and Implementation

With regard to the influence the affective component of one's attitude has upon the conative component, as suggested by Fishbein and Ajzen (1975), these research findings appear to support the relationship. The subjects' environmental concern, representing the affective component, is positively related to their behavioral tendencies, or the conative component of one's attitude. Both of the scales representing behavioral intentions employed in the current study resulted in significance when this relationship was tested. This would imply that the environmental concern of college students is a reasonable predictor of environmentally favorable behavioral tendencies of those students. Thus, as the environmental concern of college students increases, it is likely that they will have more intentions to behave in manners which reflect that concern and favor the environment.

The subjects' response to items in categories reflecting adjustments to lifestyle, use of resources, and contamination of the environment reveals their limited tendencies of behavioral adjustments. The category they appear to be the most willing to modify behavior in is their recreational pursuits. This would imply that the items which are associated with their leisure are the most expendable. The items which students appear to be the least willing to give up pertain to household items and items of personal concern. Those items which students are acquainted with in a normal daily routine would, therefore, be the items they would be least likely to relinquish. Additionally, the data does appear to indicate that students have some degree of inclination to modify their behavior regarding items pertaining to food consumption and packaging. It would appear from the results that college students would comply with restrictions or alterations favoring the environment in areas associated with food and recreational pursuits. However, the restriction of commodities associated with the home, as well as items of personal concern, would not currently be acceptable among the college students included in this study, regardless of the benefit of such restriction towards the environment.

Table 4. Significance of demographic variables on behavioral intention scale items.

Item in Scale	Gender ^a	Age ^b	Student ^c Status	Geographic ^d Background	Parent ^e Income	Background ^f In EE	Political ^g Leaning
Food Consumption and Packaging							
Instant foods	NS	(+)*	(-)**	NS	NS	NS	NS
Paper towels and napkins	NS	NS	NS	NS	NS	(+)*	NS
Purchased items in plastic containers	NS	NS	NS	NS	NS	(+)*	NS
Red meat	(+)**	NS	NS	NS	NS	NS	NS
Fast-food restaurants	(+)*	NS	NS	NS	(-)*	NS	NS
Canned soft drinks	NS	NS	NS	NS	NS	NS	NS
Frozen foods	NS	NS	(-)*	NS	NS	(+)**	NS
Household Items							
Clothes dryer	NS	NS	NS	NS	NS	NS	(+)*
Home air conditioning	NS	NS	NS	NS	NS	NS	(+)*
Dishwasher	NS	(+)*	(+)*	(-)**	NS	NS	(+)*
Daily newspaper	NS	NS	NS	NS	NS	NS	NS
Hi-fi (stereo)	(+)**	NS	NS	NS	NS	NS	NS
Electric and gas heat	NS	NS	NS	NS	NS	NS	NS
Home garbage disposal	NS	(+)*	(+)**	NS	NS	NS	NS
Transportation							
Air travel (conventional)	NS	NS	NS	NS	NS	NS	NS
Automobile with more than 4 cylinders	NS	NS	NS	(-)*	NS	NS	NS
City transit system	NS	NS	NS	NS	NS	NS	NS
Supersonic jet travel	NS	NS	NS	(-)*	NS	NS	NS
Vehicles that achieve less than 25 mpg	NS	NS	(-)*	NS	NS	NS	(+)**
Ability to buy a new car within 8 years	NS	NS	NS	NS	NS	NS	NS
Long distance buses	NS	NS	NS	NS	NS	NS	NS
Personal Items							
Showers longer than 5 minutes	(-)**	NS	NS	NS	NS	NS	NS
Ability to bathe every day	NS	NS	NS	NS	NS	NS	NS
Perfume and aftershave	(-)**	NS	(+)*	NS	NS	NS	NS
Current fashion	(-)**	NS	NS	NS	NS	NS	(+)*
Hair dryer	(-)**	NS	NS	NS	NS	(+)*	NS
Credit cards	NS	NS	NS	NS	NS	NS	NS
Smoking	NS	NS	NS	NS	NS	NS	NS
Recreation							
Television	(+)**	(+)**	NS	NS	NS	NS	NS
Movies	NS	NS	NS	NS	NS	(+)**	NS
Downhill skiing	NS	(+)*	(+)**	NS	NS	NS	NS
Hunting	(+)**	(-)**	NS	(+)*	(-)**	NS	NS
Recreational vehicles	(+)*	NS	NS	NS	NS	NS	NS
Live musical performance	NS	NS	NS	NS	NS	NS	(-)*
Country club	NS	NS	NS	NS	(+)*	NS	NS

NS - Not significant * Significant at 0.05 level ** Significant at 0.01 level

^a A positive symbol indicates that females have more favorable environmental intentions than males.

^b A positive symbol indicates that older students have more favorable environmental intentions.

^c A positive symbol indicates that upper class students have more favorable environmental intentions.

^d A positive symbol indicates that students with urban backgrounds have more favorable environmental intentions.

^e A positive symbol indicates that students from lower income families have more favorable environmental intentions.

^f A positive symbol indicates that students with strong EE backgrounds have more favorable environmental intentions.

^g A positive symbol indicates that liberals have more favorable environmental intentions.

The theory of the attitudinal framework suggests that behavioral intentions are a more accurate predictor of behavior than other components of an individual's attitude. The attitudinal framework tested in the research also implies that the behavioral intentions of individuals predispose their behavior. Although the current research did not directly examine this relationship between these two attitudinal components, the results provide a basis to assume that students have a substantial level of cognitive awareness of the need for environmental protection and quality due to their high level of concern for the environment. Therefore, in the case where subjects indicate a high level of willingness to change their behavior regarding an item, it is likely that they will give these items up in comparison to other items. Based on the current study, the findings of limited numbers of students who are strongly willing to modify their behavior suggest that students are not likely to change their behavior in favor of the environment. This implication would, of course, be in reference to those items specified in the study and would be in regard to the immediate future. It is disappointing that students with higher levels of experience with environmental education do not appear to have any more concern for the environment than students with little experience in this subject. In fact, the results of the study indicate that previous experience with environmental education has limited influence on the attitudinal components, both affective and conative, of individuals. Therefore, based on this research alone, the factors which influence the affective component, leading then to one's behavioral intentions, could not be attributed to experiences with environmental education.

The theories proposed by Arcury, Scollay, and Johnson (1987), that females tend to be more favorable towards the environment, were not supported in the results of the research. In the limited cases where environmental behavioral tendencies were sensitive to the gender variable, the results were inconsistent. Females were found to have more environmentally favorable intentions regarding their willingness to modify behavior in items related to recreation; however, males tend to be more favorable regarding items of personal concern. The difference in gender was the strongest for personal items, where women consistently rated showers longer than five minutes, current fashion, and the hair dryer as more essential than did men. Among the recreation items, men rated television, recreational vehicles, and hunting as more essential than did women. Thompson and Gasteiger (1985), finding similar results, suggest the reasoning for these results is that personal items express the individuality and uniqueness of women, and the recreation items, conversely, are consistent with men maintaining a traditional masculine image.

In consideration of the objectives and goals of environmental education discussed by Hungerford et al. (1983), which imply that environmental education will enhance environmental responsibility, it is disappointing that this factor was not found to be of more importance in this study. The limited findings regarding the influence of this variable reveal that students with more experience in environmental education view the food consumption and packaging items as more expendable than those students with little experience. This finding is perhaps due to the concentration of teaching environmental responsible actions in this category, whereas the other areas are not as well addressed among environmental educators. Further findings reveal that environmental education influences the willingness of subjects to adopt measures to control and limit energy use. The findings here could possibly be due to the popularity within environmental education of teaching about alternative energy sources; less experience in this field of education would limit individuals from seeing potential options to energy and resources. The influence of environmental education still remains a limiting factor regarding its value of predicting environmental attitudes based on the results of the research.

In conclusion, the importance of investigating the environmental attitudes of college students may be a valuable indicator of the future health of the environment itself. If, in fact, the solution to environmental problems and the responsibility of environmental protection and quality is the

alteration of human behavior, as proposed by Maloney and Ward (1973), the influencing factors of environmental attitudes will remain a topic of continual study. Research in this area among college students provides researchers with some indication of the importance and needs of the educational system. It might well provide assistance in the speculation concerning the future attitudes of the public and the use of natural resources, as students move into management, the marketplace, teaching fields, politics, and other positions of influence in our society. The current research appears to imply that college students have a relatively strong degree of concern for the environment and that their behavioral intentions are more favorable as their concern increases. However, there is some indication (based on the limited degree of willingness to alter behavior in favor of the environment) that students either favor current lifestyles, regardless of the negative impacts on the environment, or may lack the skills and understanding of options regarding environmentally favorable alternatives in the item categories examined. The need for future research in this field of study among college students appears to be for a more thorough investigation of the influencing factors on both environmental concern and behavioral intentions.

Recommendations for Further Study

The following recommendations are made for further study. A more thorough framework testing the factors which influence behavior should be considered in order to determine valid predictors. One possibility would be the testing of Hines, Hungerford and Tomera's proposed model of responsible environmental behavior (1986/1987). A multi-item scale measuring the environmental education experience of respondents should be included in future studies in order to overcome the reliability problems associated with single item scales, like the one used in the current research. In order to more clearly validate the attitudinal framework considered in the current research, a study should be conducted testing the entire model suggested by the researchers (Bennet, 1974; Fishbein and Ajzen, 1975; McGuire, 1969). This investigation should include measuring the cognitive, affective, and conative components, as well as measuring their influence on overt behavior. The instrument developed for this investigation should be developed to measure these aspects on the same level. This initial research of the environmental attitudes of college students covers only a small portion of the population of all college students. To generalize the research findings, further study should be conducted on university campuses in diverse areas of the United States. Furthermore, a larger sample size, representing the population, should be considered at each study site. A test/retest sampling method should be considered in future research of this topic to help validate the consistency of respondents' choice patterns. Employing the research methods of the current research during both the beginning of the semester and at the end of the semester among the same respondents would serve this purpose. In addition, future study should compare the environmental attitudinal choice patterns of college students over time periods. This could be done by testing the research instrument included in the current study in ten years among the same population in order to compare potential differences. When measuring the self-reported behavioral intentions of individuals, future research should include a measurement to determine whether individuals currently utilize an item they are asked to respond to. Finally, it is suggested that if replication of the research on environmental concern and behavioral intentions is to occur, a more appropriate behavioral intentions scale should be developed which would measure intentions more accurately at the same level as the concern scale. This would involve designing an intention scale based on the crucial aspects of the New Environmental Paradigm. These aspects include a limit to growth, a balance of nature, and the need to reject the anthropocentric notion that nature exists solely for human use, which would then be considered as sub-scales of the overall intention scale.

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