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A STUDY OF THE RELATIONSHIP OF ENVIRONMENTAL
EDUCATION TO ENVIRONMENTAL ATTITUDES
AMONG COMMUNITY COLLEGE STUDENTS

By

John Christopher Ducat

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ABSTRACT

A STUDY OF THE RELATIONSHIP OF ENVIRONMENTAL EDUCATION TO ENVIRONMENTAL ATTITUDES AMONG COMMUNITY COLLEGE STUDENTS

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Environmental educators maintain that environmental education results in more positive environmental attitudes and behaviors. They also assert that information disseminated by either the mass media or traditional higher education has not resulted in these outcomes. This study was designed to test the validity of these assertions with the student body of a public junior college.

This study examined the relationship between the possession of environmental information and the students' attitudes and behavioral intentions toward the natural environment. It also sought to determine the relationship between students' scores on these dependent variables and their exposure to mass media (hence environmental) news and/or the number of college credits earned to date. Finally, the study sought to determine if the instructor's modeling positive environmental behaviors or providing the students with practical environmentally positive alternatives to current behaviors would influence the students to attain higher scores on these same dependent variables.

The study was conducted in three phases. The first phase utilized 240 students divided into experimental and control groups by classroom. The experimentals (taught by the researcher) received a nine-hour special presentation in current environmental issues and concerns. The controls (taught by three other instructors) were taught the traditional "Introduction to Sociology and Anthropology" course without the environmental unit. All classes were pre- and posttested for environmental information, environmental attitudes, and environmental behavioral intentions.

Analysis of covariance demonstrated significant gains in environmental information and very significant gains in both environmental attitudes and behavioral intentions in favor of the experimental group. Furthermore, a Pearson correlation of the dependent measures demonstrated that they had a very significant relationship to each other, one that allowed the experimenter to predict over 75 percent of the variance on any of the measures using any other measure.

In a second follow-up study conducted at three and six months after the treatment, attitude changes were shown not only to persist, but actually to improve over posttest gains. Actual environmentally positive behavior changes were reported by most of the students sampled.

One-way analysis of variance conducted on the pretests of the students in phase one failed to show any differences between high and low consumers of mass media news or between students with high and low quantities of college credits earned to date.

The third phase of the study utilized four "Introductory Sociology and Anthropology" classes all taught by the researcher.

Students within each class were randomly assigned to experimental and control groups. In two of these classes experimentals were exposed to a special one-hour treatment in which the researcher showed a one-hour slide presentation which depicted his modeling desirable environmental behaviors in his own lifestyle. Controls were posttested prior to viewing this presentation. Subsequent analysis of covariance failed to show significant differences between experimental and control groups in their possession of positive environmental attitudes and behavioral intentions, although experimentals did score somewhat higher.

The other two classes involved in the third phase were divided as described above and the experimentals received a special one-hour presentation where the researcher provided them with a variety of practical, environmentally positive, alternative behaviors prior to the posttest. Again, controls were posttested prior to exposure to the special presentation. Analysis of covariance again failed to show significant differences between groups although again experimentals scored somewhat higher on the dependent variables of positive environmental attitudes and behavioral intentions. In both of these third phase tests methodological problems were encountered which could have affected test results.

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CHAPTER I

INTRODUCTION

The environmental abuses of the past and present have led increasingly large numbers of experts to voice warnings similar to the following, "If Homo Sapiens is to continue as the dominant species of life on Earth, modern man must come soon to a better understanding of the Earth and of what he has been doing to it." (Ehrlich and Ehrlich, 1972)

By 1977 the population explosion, coupled with "advancing" technology and industrialization, and the attendant problems of environmental stress--pollution in all its forms, depletion of resources, limited space, malnutrition--had been documented beyond serious contention. Similarly, beyond debate is the necessity of having a well informed and highly motivated citizenry (at least in a democracy) to develop and support reasonable and workable solutions to ecological and conservation problems which take on greater urgency daily.

While some may disagree, Ehrlich nonetheless has contended that, "The explosive growth of the human population is the most significant terrestrial event of the past million millenia. Three and one-half billion people now inhabit the Earth, and every year this number increases by 70 million. Armed with weapons as diverse as thermonuclear

bombs and DDT, this mass of humanity now threatens to destroy most of the life on this planet . . . no geological event in a billion years--not the emergence of mighty mountain ranges, nor the submergence of entire subcontinents, nor the occurrence of periodic glacial ages--has posted a threat to terrestrial life comparable to that of human overpopulation." (Ehrlich and Ehrlich, 1972, p. 1)

At the current annual growth rate of approximately 2 percent the world's population will double by the year 2,000, despite the fact that approximately 34,000 persons, mostly young children, die of starvation every day (Sutton and Harmon, 1973). As the President's Science Advisory Committee's panel on World Food Supply stated as early as 1967, the food supply will not keep pace. Nor has it. This panel strongly urged the initiation of programs of population control immediately.

Any program of population control rests primarily on the motivation of people to regulate family size. Studies in numerous countries at differing developmental stages and population densities have supported the conclusion that people tend to have the number of children that they say they want (Ehrlich and Ehrlich, 1972, and Villegas, 1976). In other words, if population control is to be effective, attitudes must change.

Coupled with the issue of population is the issue of resource use, resulting in both resource depletion and pollution. According to the United Nations Conference on the Human Environment, "The depletion of natural resources is, of course, one of the chief reasons for uncertainty concerning the continued ability of the earth to support future human civilizations" (Ward and Dubos,

1972, p. xiii). In the highly controversial study, The Limits to Growth, Meadows and Meadows challenged the contention that only "future civilizations" will be endangered. Indeed, they demonstrate that many of the elements critical to current technology/industry will be exhausted before the year 2000 at current exponential rates of use.

Given the general validity of this assumption, what of Americans' use of natural resources? According to Packard, "Americans used more resources in the years between 1914 and 1954, not to mention the years since then in which resource use has grown exponentially, than all men had in the 4,000 years of recorded history before that time." (Packard, 1968) In fact, "The volume of waste produced by the average American doubled between 1920 and 1970 and is expected to increase by half again between 1970 and 1980. Each American produces one ton of waste per year, and at a given time accounts for 11 tons of steel in personal possessions (more than 40 percent of which are luxury items--15 times the amount of the average of such items for the rest of the world), most of which are designed to become junk as soon as possible." (Anderson, 1976) If industrial wastes are also considered, this admittedly incredible figure doubled to over two tons of solid waste per person in 1975 (Southwick, 1975).

Obviously Americans have the worst record of resource waste of any nation in the world at any point in history. We have approximately 6 percent of the world's population and consume 30 to 40 percent of its resources (Ehrlich, 1972 and 1974; Meadows and Meadows, 1972; and Southwick, 1975). We also consume approximately 35 percent of the world's energy, yet, ". . . more than 50 percent of all the energy the U. S. produces is wasted. . . ." (Startwell and Abell,

1975) That's twice the amount of energy consumed by the 107 million Japanese annually.

This waste of resources has been largely the product of consumer attitudes and ignorance. And, as might be expected, it has contributed very significantly to pollution.

Pollution, even when considered alone, has increased at alarming exponential rates. Many experts maintain that the earth has been so assaulted in recent years that recovery may not be possible at all. Others maintain that we still have some time, though few suggest we have much time, to halt the outpouring of poisonous substances into the environment.

Clear signposts exist to document the severity of the problem. For example, a recent survey of 969 public water systems in the United States concluded that 41 percent deliver "inferior water" and 9 percent deliver "dangerous water" according to liberal U. S. Public Health Guidelines (Southwick, 1975). This comes as not real surprise when one considers that since World War II the United States has pumped more than 100,000 chemical substances into the Great Lakes alone, 99,000 of which haven't been analyzed in terms of their present or potential hazards to man or the larger environment (The State Journal, Nov. 28, 1976). The American public has been advised that it will cost approximately \$72 billion to maintain the Great Lakes, the world's largest natural freshwater source, at present levels (The State Journal, Dec. 8, 1976).

According to the Cousteau Society, some 8,000 new chemicals, or new uses of existing chemicals, have been developed each year. Among other adverse effects of these chemicals in recent years, the

Society has reported that they have been responsible for approximately 31 percent of workers' health problems (Calypso Log, December, 1976).

Perhaps the ultimate impact of water pollution has been best expressed by Jacques-Yves Cousteau when he stated, "Each month we now pour so many millions of tons of poisonous waste into the living sea that in perhaps 20 years, perhaps sooner, the oceans will have received their mortal wound. . . ." (National Wildlife, April-May, 1975) He has estimated that total marine life has already been reduced by approximately 40 percent in as many years. The sole reason: man. A telling example is the city of Los Angeles which pumps more than 200 million gallons of raw sewage into the Pacific daily. The oceans are absolutely essential to man's survival in many ways, not the least of which is that they produce approximately 40 to 50 percent of his oxygen.

As has been pointed out above, pollution is a product of population and industrialization. But as Commoner has pointed out, some technologies have been more destructive than others. He maintained that, "Since 1945 the increases in environmentally destructive technologies and products range anywhere from 200 to 6,000 percent." He concluded, "This pattern of economic growth is the major reason for the environmental crises." (Anderson, 1976)

As man's numbers and industrial capacity increase, other species have been crowded and/or polluted into extinction. According to the Smithsonian Institution, "Nearly a tenth of the world's flowering plants are so scarce now as to be considered in danger of extinction." (Gasnell, 1976) The picture is no brighter for animals, as the 1972 Wildlife Conference on Endangered Species reported

that 10 percent of all species of wildlife are now endangered, including 15 percent of those animals in the United States. In fact, the Department of the Interior has reported that even man's closest "relatives" are not exempt, with 54 species of other primates listed as endangered or extinct (The State Journal, Nov. 26, 1976).

This admittedly grim picture has been further complicated by the fact that modern transportation and communications have produced a worldwide "revolution of rising expectations." The developing nations not only desperately need but are beginning to demand more adequate food supplies and a greater share of the world's resources, including non-renewable resources. Given that the United States consumes far more than its share of these finite resources, increased demands by others must result in increased competition and the stress that accompanies same. For example, while approximately 20 million people starve annually and a majority of the world's people are inadequately fed, United States citizens consume 62 percent more than the maximum daily food requirements. In fact, if the U. S. had fed its production of high protein grains and grain supplements to people directly, instead of to food animals which are 10 to 25 percent efficient, it could have made up for 90 percent of the world's protein deficiency (Ehrlich, 1974). To most of the world's people the continuation of such inequalities is unthinkable.

The momentous problems briefly etched above are not solvable by what Hardin defines as a "technical solution," that is, "one that requires a change only in the techniques of the natural sciences, demanding little or nothing in the way of change in human values or ideas of morality." (Garrett Hardin, "The Tragedy of the Commons,"

in Enthoven and Freeman III, 1973) The solution to these and related problems will require a reapplication of technology to be sure, but they will also require highly significant changes in political values and processes, as well as changes in economic and social values. It therefore logically follows that, at least in democratic nations, an enlightened citizenry is essential to successfully cope with these environmental problems.

In recent years environmental issues have received greater media coverage, but this exposure has been generally of a fragmented nature, i.e., we learned that an oil spill had occurred and that "environmentalists" were concerned, but we did not receive the basic information needed to assess this problem in terms of its effects on various flora and fauna, including man himself. Thus most media coverage has not provided its audiences with any coherent framework into which news items might be placed to gain any organized understanding of the items' significance or their interrelationships with other issues or concerns. As a result, cognitive dissonance may lead to a depreciation of the individual listener's, viewer's, etc., role in the creation of the problem and/or a depreciation of his/her responsibility to take any sort of corrective action.

It can be argued that the presentation of coherent bodies of knowledge, theories, etc., are not the rightful responsibility of the media but more properly are considered a legitimate function of the public educational system. It may be assumed that young people will acquire sufficient organized information about our environmental situation to be motivated to think and act in a manner which would contribute to the solutions to problems they understand and appreciate.

It has even been assumed that our young people have acquired a reasonable understanding and appreciation of these problems in the course of their pre-college public education. Have they? It has been further assumed that our public institutions of higher education have contributed significantly to their students' environmental literacy by building on whatever base the students may have acquired. Is this in fact the case?

Does the public higher education experience, which aims at developing an enlarged perspective in its students, including an accurate world view of man and his environment, does such an institution meaningfully contribute to the development of an understanding of our urgent environmental problems and instill in its students any desire to contribute to the solutions so urgently needed? Or does the public higher education experience ignore the transmission of this information which is absolutely vital to any accurate world view of man's relationship to man or to his larger environment? How well do the consumers, i.e., the students, believe their public institutions have prepared them to understand and deal with environmental issues?

If adequate environmental information is being presented by our public institutions of higher education, are they also instilling the desired knowledge and attitudes which stimulate the student to active concern? Does acquiring such environmental knowledge and attitudes affect the way the student intends to act, or does act, toward environmental issues?

Is it necessary or even desirable for the instructor of an environmental education course to model environmentally positive behaviors? Does such modeling result in more positive environmental

attitudes and/or behavioral intentions on the part of the students?

Is it essential that students learn what they can do in their current situation to improve environmental conditions? Does the absence of such information affect their internalization of environmentally positive attitudes or reduce their initiative to act in an environmentally positive manner?

This study is an attempt to determine the answers to these and similar questions as they relate to the program of one public junior college.

More specifically, this study will undertake steps to test the hypotheses that teaching a two to three week unit concerning basic environmental issues will result in students demonstrating increased environmental information, more positive environmental attitudes, and more expressed willingness to engage in environmentally desirable behaviors. It has been hypothesized also that the normal curriculum provided by the public junior college does not significantly increase the students' scores on these variables and that attending to more mass media news likewise has no appreciable effects on these environmental variables. Finally, two issues related to the teaching of environmental education programs were tested. First, the hypothesized positive influence on students' attitudes and behavioral intentions resulting from the instructor's modeling of the behaviors he advocates for others was tested. And secondly, the hypothesized positive effect of the instructor providing students with information outlining actual steps that they could take to assist in improving environmental quality was tested. It was expected that those receiving such information would demonstrate more positive attitudes and more willingness to

engage in environmentally positive behaviors.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The need for changing attitudes is a prerequisite for controlling environmental decay has been noted. Stebbens (1971), in discussing the relationship between attitudes and the willingness to act towards correcting environmental problems, maintained, ". . . the solution lies rather in changing social attitudes, which is far more difficult than developing new techniques. It seems clear that until we can achieve a wide-spread change in our attitude toward nature, the degradation of our biosphere will continue." (p. 168)

Attitudes

Since this study is generally concerned with the effects of information on attitudes and subsequent behavior as it relates to environmental issues, it would seem appropriate to first designate our parameters when utilizing the term attitude. This seems particularly important since the term attitude has perhaps been the most widely used concept in the behavioral sciences by both theorists and researchers.

Historically, attitude has been used in a variety of contexts, e.g., in the 17th century the term referred to the physical positioning of an artist's subject with respect to a background (Liska,

1975). The modern use of the term, however, has its roots in the work of Wilhelm Wundt and his colleagues in their experiments concerning the speed of reaction to a stimulus. They discovered that an individual who was in a "set" to make a response could do so far faster than another person not so prepared. This discovery was followed by a number of others from which the general concept of attitude as a predisposition to action emerged.

By the 1930's social psychologists were using "attitudes" in numerous contexts. In fact, one encyclopedic summary of attitude studies (Nelson, 1939) listed approximately 30 different meanings for the term. Examples include (1) organic drives, (2) a "core of affect," (3) the emotional concomitants of action, (4) permanently felt dispositions, (5) a disposition modifying rising experience, (6) a way of conceiving an object, a posture of consciousness, (7) an integration of the specific responses into a general set, and so on. Note that most of these usages also infer an affective or feeling component. This context was perhaps best expressed by Thurstone's 1931 definition of attitude as, "The amount of affect for or against a psychological object." (Loree, 1970) From such conceptions emerged the concept of attitude as incorporating affective as well as cognitive components. This idea has persisted and is generally regarded as given by modern theorists and researchers with little modification; e.g., Brieveld (1973), "The general affective response to a denotable psychological object" (p. 204); or Kapp (1972), "A person's favorable or unfavorable expression toward a class of objects or events." In a similar vein a recent conference held at Cornell University on "The State of the Art on Methodology for Studying Environmental Perceptions,

Beliefs, Values and Attitudes," identified cognitions as basic to all psychological states and distinguished a belief (i.e., a cognition which had the feeling attachment of credulity) from an attitude (i.e., a cognition which had the feeling attachment of "valence" or attractiveness).

Taking the process a step further Bennett (in Swan and Stapp, 1974) first agreed. "Attitudes consist of affect and cognitive components." He then added, "Attitudes also cluster together to form values. Values motivate and guide people's actions. In this respect, they have been equated with clusters of attitudes with action tendency components."

While the term "value," like attitude, may take a multitude of different meanings, the researcher uses it throughout this paper in this context.

Today there are basically two major conceptions of attitude in the literature. While both have certain elements in common (e.g., both assume a stimulus-response framework), they differ in the kinds of inferences their proponents would derive from the behavior referent (observable attitudinal responses). These two types of conceptions are called (1) probability conceptions and (2) latent process conceptions (Liska, 1975, p. 27).

Generally speaking, probability conceptions of attitude stress consistency of response to various stimulus objects or situations. Examples include: Campbell, "An individual's social attitude is an enduring syndrom of response consistency with regard to a set of social objects"; Rosenberg, et al. (1960), "Predispositions to respond in a particular way toward a specific class of objects"; Sarnoff

(1960), "A disposition to react favorably or unfavorably to a class of objects"; Kretch and Crutchfield, "An enduring organization of motivational, perceptual and cognitive processes with respect to some aspects of the individual's world"; and Fuson, "The probability of occurrence of a defined behavior in a defined situation." Among the advantages of this conception of attitude is the fact that measurement becomes a rather straight-forward task.

On the other hand, latent process conceptions of attitude, while also including the notions of the stimulus-response framework and of consistency or probability, have gone a step further and postulated the additional idea that the individual's behavior is affected, mediated, or somehow shaped by some underlying process. Examples include: Allport, "An attitude is a mental and neural state of readiness exerting a directive influence upon the individual's response to all objects and situations to which it is related"; or Doob, "An attitude refers to an implicit response that is both anticipatory and mediating in reference to patterns of overt responses, that is evoked by a variety of stimulus patterns, and that is considered as socially significant in the individual's society." Given this orientation, the task of measurement becomes one of classifying the individual on a hypothetical quantitative continuum, that being the latent variable. This classification is then thought to further explain or condition the probability of the expression of the attitude. While this conception of attitude has the advantage of allowing more complex thinking of the relationship of affective and cognitive components to behavioral expressions, it poses the serious problem of demonstrating the existence and functioning of the latent variable or variables.

For this reason this writer has adhered to the concept of attitude as a psychological state with affective and cognitive components that influence the probability of a given response or class of responses to a stimulus or class of stimuli.

More specifically, this study has utilized a synthesis of two definitions of attitude in an attempt to provide clear conceptual parameters. The first definition is that of Osgood, et al. (1957), which held that attitudes ". . . are predispositions to respond, but are distinguished from other such states of readiness in that they are predisposed toward an evaluative response." This definition provides us with a gestalt view of attitude. The second definition provides the dissected view, i.e., Krech, et al. (1962), which stipulated that an attitude is ". . . an enduring system of positive or negative evaluations, emotional feelings, and pro or con action tendencies with respect to a social object."

Both these definitions included, or alluded to, three component parts of an attitude. These three components, cognitive, feeling, and action tendency, make up the operational definition of attitude for this study.

It has been generally accepted that attitudes are acquired through the socialization process and are subject to change or modification through experiences which have an effect on either their cognitive or affective components or both. It has been generally accepted also that attitudes have the properties of direction or favorableness, salience, intensity, and generality (Remmers and Gage, 1955). Remmers and Gage also identified attitudes as public or private, common or individual. In that system, "Public attitudes

are those that people will talk about freely in almost any social situation; the more a person thinks his attitudes are likely to be disapproved or punished, the more private he is likely to keep them." (Worth, 1966, p. 8) Similarly, "Common attitudes are when many people have attitudes of more or less favorableness, intensity, and the like, toward a given attitude object; individuals may however have attitudes toward things that no one else is aware of or cares about." (Worth, op. cit.)

In addition, Katz and Stotland (1959) have also classified attitudes by type. They have identified five types, including (1) affective associations, which are formed by generalizing a positive or negative affect to surrounding objects and do not contain a behavioral component, (2) intellectualized attitudes, which develop from our need to order our perceptions and have a heavy cognitive component as well as an affective core and may or may not influence behavior, (3) action-oriented attitudes, in which valued objects stimulate need-satisfying action tendencies with a minimum amount of cognitive activity, e.g., attitudes toward eating, (4) balanced attitudes, which have an elaborate cognitive content, and action orientation, an affective core, and serve consciously recognized and accepted needs, and (5) ego-defensive attitudes, which are similar to balanced attitudes but originate from internal conflict and result in behavior directed at objects that cannot solve the conflict. In such a typology the intellectualized and balanced attitudes become the focus of the environmental educator who wishes to see changes in affective and cognitive components result in positive action.

Environmental Attitudes

Having developed the basis for an operational definition of "attitude" above, environmental attitudes become an enduring system of affective evaluations, emotional feelings, and action tendencies with respect to the natural environment either as a totality or in relation to specific subparts thereof, e.g., an individual's attitude(s) toward water pollution. This definition holds that an individual's internal psychological state involves a tendency to perceive and react in a particular manner toward some aspect of his environment. Hence this definition parallels that used by Perkes (1973).

When conceived of thus, "Environmental education has as its goal nothing less than transforming man's attitude toward the world in which he lives" (Quinn, 1976, p. 65) For the environmental crisis didn't just happen, "Instead, problems of environmental pollution are the result of the collective interaction of many economic, social, political, and technological factors which are ultimately the product of human attitudes and values." (Towler and Swan, 1972, p. 54) Towler and Swan pointed out that, "In a democratic society, the resolution of problems such as pollution is closely linked with public participation in decision-making. What we should be striving to do is to create a future citizenry which is knowledgeable about the bio-physical environment and its associated problems, aware of how to become involved in the resolution of these problems, and is motivated to do so." (Ibid.)

While some (e.g., Morgan, Hendee, etc.) have argued that it is not the function of education to deliberately seek to affect the

attitudes and values of students, the writer disagrees. Rather, he concurs with Gratz who asserts that, "Teachers have the responsibility to help inform students about the crises in the environment. . . . The student's way of thinking must also be developed to make it readily apparent to him that an extremely serious threat is involved--a threat that calls for action and sacrifice on his part." (Gratz, 1971, p. 73)

In a similar manner, Herrscher (1973) argued that we must overcome certain existing attitudes toward the environment if we are to even begin to seriously approach any solutions to the environmental crisis. Specifically, he argued that we must overcome the notion that everything on this planet was placed here primarily for our benefit and use, and that we are not separate from or superior to the rest of creation but are interrelated with and interdependent on all other things.

In short, "There seems to be almost unanimous agreement among environmentalists that part (if not all) of our environmental problems stem from our current social values." (Swan, in Swan and Stapp, 1974, p. 34) Since this is the case and since, "It is impossible to have human interaction when some form of persuasion does not exist" (ibid., p. 35), the issue of whether or not environmental educators should aim their instruction at changing environmental attitudes and values becomes, for the researcher at least, a non-issue. Like Knapp, he believes, "It is naive to assume that teachers do not attempt to impose specific attitudes and values upon their students, educational institutions were organized to shape cultural values and attitudes of youth." (Knapp, 1972, p. 2) And like Hoether (1973), the writer feels we too, ". . . should not apologize for attempting

to create a new population and environmental ethic (pp. 12-13). Thus the researcher concurs also with Stapp when he states, ". . . if environmental education is to achieve its greatest impact, it must (1) provide factual information that will lead to understanding of the total biophysical environment, (2) develop a concern for environmental quality that will motivate citizens to work toward solutions to biophysical environmental problems, and (3) inform citizens as to how they can play an effective role in achieving the goals derived from their attitudes." (Stapp, et al., 1969, p. 30)

In consideration of this discussion and for the purposes of this study, environmental education programs shall be defined as, "Any program of education for or in the outdoors; man and his relationship to his cultural, natural, and physical environment; development of environmental awareness and ethics; rational utilization of our environment; conservation of our natural resources; pollution control education; or nature study and interpretation." (Perkes, 1973, p. 12)

One product of environmental education is the possession of environmental information. For purposes of this study the success of any program of environmental education shall be measured by the subject's store of environmental information as measured by the Syracuse Environmental Awareness Tests, Level III, Form A. The other product of environmental education is (or should be) the possession of pro-environmental attitudes. For purposes of this study the presence or absence, intensity, and direction of environmental attitudes will be defined as the respondents scores on the Syracuse Environmental Awareness Test, Level III, Form D, and the Ducat/Harrison Environmental Attitude Inventory.

The Problem

Having developed the operational definitions necessary for study of the effectiveness of a program of environmental education, the writer will now turn his attention to a number of further questions. First, does environmental education (information) effectively impact environmental attitudes? Secondly, if such an effect does occur, are some groups impacted more than others? Thirdly, what factors other than information affect environmental attitudes? And finally, are changes in environmental attitudes reflected in changes in actual behavior?

Since these are very different questions, they will be taken up separately. In general, the review sequence will follow Stapp's (1969) proposal that as an individual acquires broad environmental understanding (knowledge), he will develop a social conscience (attitudes) that will affect his behavior (actions) toward the total environment.

Environmental Knowledge-- Attitude Relationship Studies

There is increasing recognition in the literature that not all knowledge will lead automatically and quickly to attitudes and behavior favorable to pollution abatement . . . Nevertheless the general assumption is highly plausible, that a broad public literacy of biological and ecological concepts is at the heart of defining, reclaiming, and maintaining environmental quality The assumption that such concepts can be taught is indicated already in both theory and research; but the results of education are variable, sometimes resulting in little or no change.

(Ramsey and Rickson, 1976, p. 10)

While the researcher concurs with Ramsey and Rickson, he does, however, feel that in all fairness it is necessary to point out

that while not all studies demonstrated a clear and significant change in attitudes toward environmental issues or conservation, the overwhelming number did. In reviewing approximately 30 such studies, all but 6 did demonstrate a clear and significant change in environmental attitudes as a result of increased information or exposure to ecological principles. In addition, several of those studies which did not demonstrate this relationship can be shown to suffer from methodological problems which the writer will discuss presently. For the sake of convenience these studies are summarized in outline fashion in Table 1 below.

In Quinn's (1976) study tenth grade students were exposed to 20 "value sheets," two per week for ten weeks, each presenting environmental information and/or outlining an environmental issue or problem, and no significant attitude change occurred. When one considers how these "value Sheets" were employed, however, this seemingly discordant finding becomes far more understandable. The "value sheets" were handed out to students to review and discuss with their friends and take home to review. Only ten minutes were allowed in class for discussion per week and that discussion took place between 4-5 peers who were broken into small groups for this purpose. The important thing to note here is that students received no in-class instruction, the teacher did not hold students responsible for the material, nor did the teachers take any significant part in the discussion. Under these conditions one would not expect to find any significant change in attitudes because there was very little change in information. To assume that 10th grade students would, on their own and without incentive, internalize information obtained in school on their own

TABLE 1

SUMMARY OF ENVIRONMENTAL INFORMATION/ATTITUDE STUDIES

Source	Author/Date	Methodology	Results & Special Considerations
1. Worth (1966) and Perkes (1975)	Wieve1 (1947) Iowa	Random sample of high school freshmen and seniors compared for conservation knowledge and attitudes	Seniors had more conservation knowledge and more favorable attitudes. Males and high GPA correlated with both information and attitudes
2. Perkes (1975)	Fitzsimmons (1965)	300 college students randomly assigned to experimental and control groups with pre and post testing for environmental info. and attitudes	Exposure to documentaries (exp. group) resulted in more positive attitudes. Further, where both attitude change and info. gain occurred there was a significant relationship between them, i.e., the greater the info. gain the greater the shift in attitudes.
3. Whiteman (1965)	Same	College freshman biology courses with experimental group exposed to 5 week conservation unit. Pre and post testing for attitude change.	Used Laug's (1960) attitude instrument. Experimentals showed a significant change in conservation attitudes. Sex not a significant variable.
4. George (1966)	Same	Pre & post tested 1,618 high school & college students & adults for attitudes, then gave experimentals a "special conservation education experience."	Significant differences in all 3 groups. Conservation attitude changes associated with motivation, interest, and exposure to conservation information. Age & education correlated with attitude differences (not sex or residence).
5. Quinn (1976)	Same	Used attitude as a "value indicator" in four classes of tenth graders in each of 5 schools. Random assignment to experimental and control groups. Experimentals received 2 value sheets each week for 10 weeks.	No significant differences as a result of experimental condition.

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| 6. Bowman (1974) | Bowman
Ohio State (1972) | Using a control-experimental design with pre and post testing on 331 college students and a self-designed instrument (Kuder Richardson reliability 0.660-0.824 and panel validated) and ANOVA | Significant change in attitudes as a result of introductory environmental management course. No difference found between effectiveness of lecture-discussion and simulation study methods of instruction. |
| 7. Cohen (1973) | Same | Administered 75 item questionnaire measuring environ. information & attitudes to 454 high schoolers in 7 schools. Then partialled out those with high & low information. | Found higher information associated with more favorable attitudes, and more willingness to express attitudes. |
| 8. Cohen & Hollingsworth (1973) | Same | In follow-up to #7 above using a 17-item subtest & reworking data. | Males higher in information. Mass media often confuses students with technical terminology. Many S's in low info. group at concrete operational level (Piaget's model) despite chronologically being at formal operations level. |
| 9. Doran, et al. (1974) | Swan (Detroit) (1970) | Used photographic slides of air pollution. S's high school seniors. | Those students least able to escape Detroit's polluted air were the least aware of the air pollution depicted in the slides. |
| 10. Hounsshell & Liggett (1973) | Same | Random sample of 1,881 sixth graders in North Carolina. Used the Environmental Knowledge & Opinion Survey. | A correlation coefficient of .6 between environmental information & attitudes. Female and urban S's have more favorable attitudes. Overall level of information was low (14.3 out of 35). |
| 11. Hounsshell & Liggett (1976) | Same (1973) | Pre & post tested 6th graders' environmental information & attitudes with teachers who had received special environmental workshop (experimentals). Used Environmental Knowledge & Opinion Survey. | Found significant differences in both info. & attitudes in experimental group. Time of exposure to experimental teachers made a significant difference in S's attitudes. Girls scored higher on both Info. & attitudes. |

12. Lunneborg & Lunneborg (1972) Same (1970-71)
Experimental-control design with pre & post testing for environmental info. & attitudes. 25 teachers attended workshop in Washington state.
Found a significant change in social values related to environmentally favorable attitudes and a slight tendency to consume less in the experimental group. Experimentals became more humanistic, more person-centered and more responsible to others.
13. Milson (1975) Same (1972)
Using 88 secondary teachers randomly selected from volunteer pool & pre & post testing for environmental attitude & info. and compared with controls not attending environ. symposium.
Found a significant difference between pre & post tests for both information and attitudes in experimental group.
14. Scott, et al. (1973) Same
Questionnaire for environmental information & attitudes with pre & post administration (Michigan YCC Camp evaluation). No other formal methodological procedures employed.
Found camp experience did increase information but not necessarily produce more positive environmental attitudes.
15. Stamm & Bowes (1972) Same
In an analysis of community attitudes of citizens (N=174) of Grafton & Park River, N. Dakota toward Army Corps of Engineers & alternate flood control proposals. Interviews using closed Lickert items.
Found the strength & nature of S's environmental attitudes closely correlated with (1) the info. they are exposed to; (2) previous knowledge of environmental issues; and (3) those whose environ. activities they are likely to support & perceive themselves in agreement with.
16. Hamilton & Asche (1974) Same
With self-developed scale & N=306 secondary students, used random assignment to experimental & control groups. Experimental S's taught 7 day introductory unit in environ. education. Statistical procedure used ANOVA. Groups pre & post tested for info. & attitudes.
Found no significant differences but did have an effect in the positive direction for experimental group.

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| 17. Hendrick, Snell & Hengeveld | Same | 10% random sample of Omaha liberal arts college (N=50). Students asked to identify & rank national problems. Natural science majors compared with other students. | No significant differences noted between natural science majors & others in the assignment of environmental issues as priorities. However, some courses (including general ecology) did influence S's assignment of priorities. |
| 18. Lingwood (1970) | Willeke (1968) | Study of the effects of perceived water pollution in San Francisco Bay Area. | Found, "Respondents who had received more information about Bay pollution were more likely to believe contact with the Bay's waters could be harmful." (p. 235) |
| 19. Lingwood (1970) | Same (1969-70) Univ. of Mich. | N=142 (1969) & 147 (1970) college students. Used survey questionnaire to determine total news knowledge, environmental knowledge & attitudes before & after environmental teaching. | Found that even with the operation of a ceiling effect in the earlier sample they observed a significant shift toward more concern regarding environmental problems. 75% S's interviewed indicated a "moderate" or "great" increase in concern. |
| 20. Souers (1973) | Same | Pre & post testing of all students at Binford Jr. High with experimental receiving an incidental treatment regarding overpopulation. Treatment consisted of 2-30 min. films, 30 min. address, & a 15-30 min. class discussion. | Found experimental S's were significantly more concerned and knowledgeable about overpopulation. |
| 21. Harmon (1974) | Same (1973) | Random assignment to experimental & control groups with 38 Univ. of Utah S's enrolled in Human Ecology course. Pre & post tested for environmental knowledge & attitudes. Experimentals received course in four 8 hour days, controls over 8 weeks. | Found no significant differences between groups taught in different time frames for attitudes but did get a significant difference in knowledge. Also found a significant difference between pre & post tests for both information & attitudes for both groups. |

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| 22. Mitchell & Lunneborg (1973) | Same (1971)
Washington state | Evaluative study of environmental education program for 1st graders in two schools. Experimental S's evaluated by interviews, parent questionnaires, teacher evaluations and two I.Q. type tests. S's post tested. | No significant differences between groups. (See discussion.) |
| 23. Rocchio (1971) | Same | Assessment of summer workshop in environmental education for Colorado youth. Self-report questionnaires & actual behavior form basis for conclusions. | Found S's (N=50) report more positive attitudes and that approximately 20 of the youngsters have shown a continuing interest by active involvement in community affairs and attendance at follow-up sessions. |
| 24. George (1966) | Laug (1958) | Using 50 college freshmen enrolled in a biology class with experimentalists exposed to 2 week conservation unit & field experience. All S's pre & post tested for information and attitudes. | Found a significant difference in both information and attitudes in the experimental group. |
| 25. Whiteman (1965) | Same (1963-64)
Iowa | Using Laug's Lickert type scale, pre and post testing for environmental information & attitudes tested class exposed to environmental info. (2nd semester class) using 1st semester class & a biology class at Northwestern College as controls. | Found a significant difference in attitudes on post test for experimental group. Sex not significant. Also found that 4-H & summer camp experience had some effect on higher pre test scores. |
| 26. Harrison (1975) | Same
Indiana | Evaluative study of private liberal arts college (Taylor Univ.) in developing environmental awareness in its students. Cross-sectional study with questionnaires for conservation attitudes. | Found the strongest positive influence to have been through course offerings (mostly conservation) of the biology department. |
| 27. Ramsey & Rickson (1976) | Same
Minnesota | S's 482 high school seniors from 3 schools divided into "passionately | Found only 10% of S's differed in their knowledge on the two scales. Also found |

27. Ramsey & Rickson (1976)
(Continued)
- interested" and others. Measured "ecological knowledge" & "Trade-off knowledge" separately. Correlated with Tau C and significantly related at .0001.
- that knowledge of ecological concepts leads to positive attitudes toward pollution abatement measures and that knowledge of either type is likely to lead to moderate rather than extreme positions on both pollution abatement & consideration of trade-off costs. A high knowledge of trade-off costs (alone) is likely to produce resignation to pollution much more than the assignment of high priority to trade-off costs. High GPA also correlated with more favorable attitudes.
28. Perkes (1973) Eaton (1971)
- 10th grade S's (Vo. Agr. class, biology cl., & random sample of all 10th graders in 12 schools) compared for health knowl. & enviro. attitudes. Evaluative criteria included the Health Education Test and an attitude inventory using the semantic differential technique.
- Found a significant relationship between health knowl. & environ. attitudes for both classes but not for random sample of all area students.
29. Perkes (1973) Cole (1964)
- "The amount of information about concepts and bias in information were systematically varied to study their effects on attitudes toward experimental concepts. Both variables were found to affect the intensity of attitudes. The intensity of attitudes increased as the amount of information increased and as bias intensity increased. However, bias in information had the greatest effect." (p. 46)
- Found only slightly more favorable attitudes among science majors (not significant).
30. Pettus (1976) Hoover & Schultz (1963)
- In study of attitude differences between science & non-science majors toward the environment & conservation. Arizona State University.

time is, at best, naive. Had Quinn assessed information gain, the writer is confident he would have found no significant change in this variable as well.

In their study Hamilton and Asche (1974) randomly assigned 306 secondary school students to experimental and control groups that were pre- and post-tested for environmental information and attitudes. While they found no significant differences in the two groups on the attitude post test, there was an effect in the positive direction for the experimental group. This effect led the authors to conclude, "An introductory unit in environmental education can affect attitude changes." (p. 188) The lack of a significant change must also be considered in the light of the length of exposure to the environmental information, e.g. seven days, and the fact that the pre- and post-testing occurred within a one week period. The authors, in considering their findings, recommended both a longer trial for information exposure and a longer time span between pre- and post-testing.

In both the Hoover and Schultz (1963) and Hendrick, Snell, and Hengevold (1972) studies, natural science majors were compared with non-science majors in terms of environmental attitudes. In both studies no significant differences were found to exist. It should be noted, however, that the assumption made here is that natural science majors are exposed to more environmental information, hence should score higher on attitude instruments. In the former study the authors conducted a follow-up study in which they concluded that ordinary science education (at least at Arizona State University) has very little relevance for basic conservation, either in terms of information or attitudes.

This finding is consistent with other research (e.g., Harrison, 1975) which demonstrates that general ecological information is generally not included in what is considered a natural science curriculum. In the later study, two special conditions should be noted. First, we have a ceiling effect operating here as most subjects, natural science as well as others, identify "environmental deterioration" as the number one national problem. Secondly, some specific courses, including general ecology, were seen to influence students to score the ecology issue higher than students not exposed to these courses, thus reinforcing the idea that a natural science major may not be exposed to specifically ecological information to any greater degree than students in other curriculums.

In the Scot, et al. (1972) Y. C. C. study, gains in environmental information did not result in more positive environmental attitudes in all camps. Again we have a ceiling effect operative in this case as initial attitudes were very highly favorable and secondly, it was determined that the character of interpersonal relations within the individual camps tended to discriminate between those camps showing gains in positive attitudes (over their previously very positive attitude scores) and those remaining the same or even reducing slightly. In those camps where interpersonal relations were good, gains in information did result in more favorable attitudes and vice versa.

Finally, in the Mitchell and Lunneborg (1971) study, we also found methodological difficulties. The major problems with this study include the fact that the experimental and control groups were not pre-tested for information or attitude levels, instead comparisons were

made with other children of similar age not treated. Even the authors acknowledged this as a caution in interpreting their findings. In addition, the authors noted that in interviews assessing the degree of environmental awareness of the students, volunteer judges tended to equate longer answers with more environmentally aware answers ($P = .0001$ plus) and that the control group tended to give more environmentally unsound answers than the experimentals. These limitations were enough to cast serious question on the study's results.

From the above analysis the writer believes it safe to conclude that there exists a relationship between increased environmental information or knowledge and more favorable environmental attitudes. In addition, if education can affect environmental attitudes, they tend to be more or less enduring favorable environmental predispositions. In fact, "After many years of investigation, Remmers has concluded that attitudes can be changed and that these changes persist for some time. Peterson and Thurstone demonstrated that the changed attitudes from seeing a single movie persisted for as much as a year and a half." (Whitman, 1965, p. 46)

It is also interesting to note that many of the experts maintained that one element in any successful environmental education program should be providing the learner with information as to how to become involved in the resolution of environmental problems. The assumption here is that knowing how to become involved would somehow increase the chances of environmentally positive action. To the best of the researcher's knowledge, this assumption has never been tested.

One possible source for support for this assumption can be found in cognitive dissonance theory. Festinger's Theory of

Cognitive Dissonance held that there are three types of relationships that can exist between items of information. They are as follows:

1. If A psychologically implies B, or B psychologically implies A, then A and B are in a CONSONANT RELATIONSHIP.
2. If A psychologically implies not-B, or B psychologically implies not-A, then A and B are in a DISSONANT RELATIONSHIP.
3. If there is no psychological implication at all from A to B, or from B to A, then A and B are in an irrelevant relationship.

(Lawrence and Festinger, 1962, p. 36)

That theory viewed the individual as perceiving and avoiding conflicts between his store of cognitive elements--attitudes, motives, actions, and new and conflicting information or actions. Like much of the theory concerning cognitive functioning, dissonance theory held that the individual would strive to maintain cognitive consistency (see, for example, Heider, 1958; Newcomb, 1953; Lawrence and Festinger, 1962; Osgood and Tannenbaum, 1955; etc.). Hence when unavowed new information or behavior conflicts with the individual's existing cognitive elements, dissonance occurs. Since the nontensional state is balance, the individual experiencing dissonance strives to reconcile the dissonant elements. Several forms of mental operations can be involved in reducing dissonance. One is to reduce the importance of the new element(s). A second is to strengthen the importance of the old elements or reinforce the old elements with additional supporting elements. A third means to reduce the dissonance is to adopt the new information, attitude, or behavior.

The above theory has implications for environmental education in that it predicts that students will experience less dissonance, hence less attitude change, if they are not aware of how they

contribute to environmental problems and how they might alter their behavior in specific ways to improve the situation. In theory, it is much easier to depreciate dissonant information if one's behavior remains consistent with the old information. The fact that the old behavior persists because the individual is unaware of a practical alternative does not reduce the tendency to strive for cognitive balance, hence leading to either a depreciation of the importance of the dissonant element (in this case the pro-environmental information or attitude) or the rationalization of the old behavior by adding new supporting cognitive elements.

It is further interesting to note that in a number of the studies reviewed above, e.g., Hounshell and Liggett (1976) and Perkes (1973), there is reason to suspect that the personal characteristics and environmental commitment of the individual providing the environmental information may have an effect on the degree to which attitude change occurs. In the former case cited above, the time the subjects were exposed to the environmental education source had a significant effect on attitude change. In the latter case, greater intensity of the bias of information produced greater attitude change. In other words, if the source of environmental information models very positive environmental attitudes and behaviors, greater attitude change in the positive direction seems probable, especially if the source has credibility with the receivers of the information (see, for example, F. Powell, 1963).

Source credibility is a function of ". . . (a) the extent to which the source of a message is perceived to be a source of valid assertions (his expertness) and (b) the receiver's degree of confidence

in the source's intent to communicate only those assertions he considers valid (his trustworthiness)" (Powell, 1963, pp. 61-62). The trustability of the source as an important component of credibility is well documented, e.g., see Lumsdaine and Sheffield, 1949; Pastors and Harowitz, 1955; Haiman, 1949; Hovland and Weiss, 1952; etc. Hence, a source who could demonstrate that he/she considers his/her assertions valid enough to devote much time and energy to them (i.e., model them) would have more credibility than one who does not. The same argument can be advanced for expertness, i.e., a source that can demonstrate having performed a given behavior will generally be recognized as having more expertise in the area under consideration than one who has not performed the behavior.

Sources of Environmental Attitudes

Since environmental attitudes are acquired basically the same way as other attitudes, i.e., through the socialization process, it would seem reasonable to expect that many of this culture's major socializing institutions affect these attitudes as well as others. This is no doubt accurate when all attitudes which have a bearing on some aspect of the environment are considered, for this would include nearly all attitudes whatsoever. However, when the term "environmental attitudes" is used in the narrower sense, i.e., as an awareness of environmentally destructive practices and concern for environmental or ecological quality, then for the great majority of the people in this society the issue of an environmental crisis has so recently risen to prominence that several of our most powerful socializing institutions, notably the family and the church, have played a

relatively minor role in shaping these attitudes. There are, of course, exceptions to this generalization, e.g., families that were involved in the earlier conservation movement or whose work (or major recreational activities) involved a close relationship with or understanding of nature (and/or a dependence on environmental quality), have no doubt contributed to socializing an awareness of and concern for such environmental quality in their membership. However, the main sources of information about environmental topics, notably the awareness of and concern for environmental quality, have been the media and our educational institutions. Unfortunately, as we shall see, the media have had by far the greatest impact on the greatest number in this regard.

Hence we see that, "In terms of mere exposure, the mass media are clearly our most efficient educators. The average American spends three and a half hours a day in front of a television screen, and another two and a half hours a day listening or half-listening to the radio." (Sandman, in Swan and Stapp, 1974, p. 211) Hence, in terms of exposure to events, including environmental events, the media have a tremendous potential for educating the American public and in the narrowest sense have been largely instrumental in doing so. However, as Sandman went on to note, most of the content of the mass media is oriented toward entertainment and ". . . the entertainment content of the media is environmentally irrelevant, and much of it is environmentally irresponsible. What educational content there is is unplanned, unintended, and unintegrated." (op. cit., p. 212) In fact, in many ways the non-news mass media content reinforces undesirable environmental practices and values, e.g., glorification of large

families, advertising for overconsumption and waste, themes of man against or above the rest of the natural environment, etc. ad nauseum. Hence we see that only in that portion of media time dedicated to "news" is there any significant positive or neutral environmental content.

According to Sellers and Jones (1973), "The deterioration of the environment was discovered by the news media sometime in 1969." (p. 53) This "discovery" may have been due to the Santa Barbara oil spill and related events. However, the important point to note is that the "discovery" was perhaps 100 years late. In other words, "The media failed to discover the environmental crisis before it was a crises. They failed to discover individual environmental problems before these too became critical. And the media are failing today to discover the environmental crisis of tomorrow." (op. cit., p. 223) In effect, the media are serving as a "late notice system," when what is needed is an early warning system.

There are a multitude of reasons for the failure of the mass media to provide adequate (or even near adequate) information to the American public concerning environmental issues.

First, the news media tend to be event-oriented and, "Event reporting is a linear, compartmentalized procedure that obscures the fact that environmental change is a process. It perforce focuses our attention on man's projects rather than on nature's processes." (Sellers and Jones, 1973, p. 52)

Secondly, while the scientific and academic communities provide much of the data used for environmental news, they seldom convey

the information to the public directly, except perhaps through professional journals which are not information sources utilized by large numbers of Americans. Instead, ". . . government agencies and private corporations provide most of the environmental information for the press and public." (Rubin, et al., 1974, p. 61) This is highly undesirable because there is no way to assess the environmental information coming from private industries as they are not obliged to provide the public with any information they do not chose to. Obviously they, like government agencies, are not going to provide totally unbiased, complete, and prompt information in many cases, and in fact are known not to in many documentable cases.

Thirdly, Shoefeld (1975) and Murch (1974) both pointed out that the media frequently subscribe to "Afghanistanism." This is the rule which stipulates that if you are going to unmask a problem, you want to make sure it is a far-away problem, hence a safe problem. This principle, they maintain applies particularly to local media coverage of environmental issues. The reasoning is nicely summarized by Sandman, who pointed out that, "Advertisers are often polluters, and big advertisers are often big polluters; they do not like to see their names in investigative news stories." (Swan and Stapp, 1974, p. 224)

Other frequently mentioned problems include the fact that few news gathering agencies have adequately trained environmental journalists, and that journalists typically tend to be distrustful of information provided by environmentally-oriented individuals or groups. Yet in their attempts to be "objective" they often obscure biologically objective criteria for environmental stress or damage in favor of the criteria employed by various human interest groups. This frequently

confuses the issue (but no doubt makes "better copy"). Also the media are subject to time, financial, and space limitations which do not allow adequate treatment of the issues. The result is that the issues are often presented in an oversimplified manner which both fosters a belief in an oversimplified solution and the expectation that such a solution could be readily accomplished, "if only"

The media are also subject to various internal and external pressures which result in news coverage which in Tanner's words is "episodic, incomplete, sensational, and trivial." For an in-depth discussion of these problems see especially Swan and Stapp, 1974; A. Murch, 1974; and Down, 1974.

The fact of the matter is that the media in our society are not designed for education and do not perform this function in any meaningful way concerning the environmental crisis, other than by informing the public that there is a "crisis," and even in this respect they may be performing a terrible disservice to the American public. For while the media have been instrumental in increasing the concern of the American public toward environmental abuses and decreasing environmental quality, they have actually discouraged any significant involvement or changes in behavior on the part of the worst environmental offenders, i.e., their viewers, listeners, and readers. As Sandman pointed out, "The media contribute to this tendency not to use media-acquired information and attitudes in at least two ways. First, the speed of modern mass communications, especially radio and television, encourages the view that informed action is impossible, and perhaps inappropriate as well." Secondly, ". . . the very format of media news presentations is aimed at rewarding the reader, listener, or

viewer for the mere act of reading, listening, or viewing. Reporters are taught to 'round out' their stories, to work at creating the impression that all relevant questions have been asked and answered--that the job (reporter's and audience's) is done." (Swan and Stapp, 1974- p. 217)

The fruits of these practices can be clearly seen in studies such as that performed by Murch (1974) in Durham, North Carolina. In that study it was observed that Durham residents were more likely to perceive pollution as a significant problem as the reference moved away from their immediate surroundings. Murch argued that one reason for that pattern is the media's focus on the broader aspects of the problem. And, as numerous other research findings have supported (see for example Fazio, 1974; Seed, 1970; Bart, 1972-A; Stamm and Bowes, 1972; and Tanner, 1971), Durham residents, like most Americans, obtained their environmental information from television, radio, magazines, local newspapers, and personal friends, in that order. Murch also noted that ". . . concern for environmental issues directly increased with more exposure to news programs, and particularly with exposure to reports about the environment. When this kind of media contact is taken into account, it explains much of the difference observed between the better--and the lesser--educated." (p. 22) Better educated people consume more news related media and, to date, knowledge is the best correlate for environmental attitudes.

However, when these same concerned Durham residents discussed above were asked what a solution to pollution problems might be, they, like the grade school children studied by Towler and Swan (1972), either said they couldn't decide or skipped the question. In fact,

"Even those who believed that they could do something as individuals often didn't have a clear idea of what that might be." This, Murch maintained, ". . . is as much as we can expect from the general lack of public guidance and the imbalanced way in which the media have stressed the 'ecological crisis' but not its solutions." (Murch, 1974, p. 25) In fact, as Sandman pointed out, ". . . the mass media almost never prescribe any environmental action for their audience." (Swan and Stapp, 1974, p. 221) The ultimate result of this imbalanced media coverage of environmental news has been, as Shoeneld (1975) observed, that of making environmentalism a "spectator sport" for most Americans.

That assertion, incidently, finds support in terms of the cognitive dissonance theory. By not providing their audience with information as to how they may contribute to the problem, or steps they can take to ease the problem, the receiver of the information can feel concern but continue to act in an inconsistent manner (in terms of that concern) because he/she is not aware of the inconsistency, or even if aware, can more easily rationalize the continuation of the old behaviors if information or models as to alternative behaviors are not available. That situation not only allows the individual to have the socially desirable attitude and keep his comfortable behavior patterns, but it also furnishes others struggling with dissonant information a whole group of apathetic models which can be used in a number of ways to rationalize their own inaction.

Given that ". . . hard environmental news is the kind of information least likely to be translated into behavior by the media audience," and the fact that "It is also the kind of information that

dominates media coverage of the environment," Sandman concluded, "Environmental activists, not surprisingly, find mass media news a poor source of information." (p. 225)

Hence we see that the media are not providing the American public with the type of information which will lead to a citizenry which is knowledgeable about the environment, aware of how to become involved in solving environmental problems, and motivated to do so. If the media are not doing the job, then what of the educational system?

Correlates of Environmental Awareness and Concern

Before we turn our attention to the role of the educational system in fostering an environmental consciousness in the citizenry, perhaps it would be appropriate to examine what segments of the American public are now the most informed and concerned about environmental problems and issues.

As has been demonstrated, those with more environmental information have more positive environmental attitudes, and hence also tend to be those who demonstrate more concern about environmental problems. For purposes of this discussion then, the characteristics of the most informed, those with the most positive environmental attitudes, the most concerned, and those most willing to take corrective actions or become actively involved, will be considered as one group. This construct, in general terms, does in fact accurately describe these subgroupings. This fact, incidentally, provides some of the most direct empirical evidence for postulating a relationship between

attitudes and behavior. For while behavior is a very complex issue involving a great number of interacting elements in any given situation, and while not all individuals who are aware of, have positive attitudes toward, and are concerned about the environment express that concern in their behavior, still those who may be termed environmentalists do in fact share these same characteristics. Hence the probability conception of attitudes as predispositions to action is given support in fact.

Who are the environmentally aware/concerned? According to Murch (1974), ". . . there is little doubt that such (environmental) concern is greatest among those in the higher socioeconomic strata, including the better educated, the better employed, and whites. Practically all of the available evidence points in this direction." (p. 22) These findings are widely supported in the literature, e.g., Morrison, 1972 and 1974; Ditton and Goodale, 1974; Chaney, 1970; Hornback, 1974; Knapp, 1972; Kreger, 1973; Knowlton, as well as Dillman and Christenson, in Burch, et al., 1972; Scott, Driver, and Morans, 1973; Swan, in Wohlwill and Carson, 1972; Lingwood, 1972; Kilween, St. Denis, and Hall, 1974; and Allen, 1972, among others.

It is interesting to note some of the rationale for these segments being the most aware/concerned. The most obvious, and most cited, explanation is that these segments are the most exposed to sources of information, including environmental information, and are also the largest consumers of media in general, and the printed media in particular. This confirms the researcher's earlier observations on the relationship of information to attitudes and earlier comments regarding the role and limitations of the mass media relative to

environmental issues.

Whites can be seen to be more concerned because they are the higher socioeconomic strata, the better educated, and the better employed. In addition, non-whites, who according to Kreger (1973) often see the environmental crisis as a "diversionary issue," often have more immediate concerns, e.g., civil rights, employment, and so forth. For these reasons, among others, blacks and other minorities are greatly underrepresented in the environmental movement.

Whites, the better educated, the better employed, and the more affluent can also be seen to possess several other characteristics that incline them to be more aware/concerned. First, they are ". . . personally better prepared both economically and mentally to accept the costs of environmental reforms that those of lower socioeconomic status." (Morrison, in Burch, et al., 1972) Morrison also noted that they have more leisure time to devote to environmental matters and that they possess higher aspirations for and have more opportunities to enjoy the natural environment. This assessment is supported by the work of Ditton and Goodale, 1974, in concluding their analysis of the users and non-users of the recreational opportunities of the Green Bay area with the observation that ". . . those most insulated from the environment, in this case the waters of Green Bay, are also most tolerant of degraded conditions." (p. 26) In fact, as Downs pointed out, "The elite's environmental deterioration is often the common man's improved standard of living." (Murch, 1974, p. 84) At least in the short term.

This privileged segment of American society is also the segment that is the most socially and politically active, and the segment

that has the greatest opportunity to actually effect changes. This means that these people feel a greater sense of control and, as Orr (1974) has demonstrated, high alienation and/or feelings of powerlessness produce apathy in relation to environmental issues.

These findings also support earlier observations regarding the cognitive dissonance theory, i.e., those persons with the most information, including information on possible alternative behaviors and the means to alter their behaviors, either experience more dissonance to change, have fewer cognitive elements opposing change, or those elements supporting existing nonenvironmental behaviors have less saliency. It is not as easy for this individual to continue to use practices which he/she knows are harmful if he/she is aware of alternatives and has the means to engage in those alternatives without severe cost to himself/herself.

In addition to the correlates mentioned above, several others have been demonstrated to be characteristic of the environmentally aware/concerned. While the evidence is somewhat mixed, most studies have identified males as more aware/concerned than females (see for example Cohen and Hollingsworth, 1973; Knapp, 1972; Kronus and Van Es, 1976; Knowlton, in Burch, et al., 1972; Lingwood, 1972; and Souers, 1972). The most probable reasons for this difference include differential socialization, the fact that males have more knowledge in and exposure to the natural sciences, and the higher occupational status of most males.

Both population density of residence and geographic location also correlate with environmental awareness/concern. A number of studies (including those of Tichenor, Donohue, et al., 1971;

Knowlton, in Burch, et al., 1972; Kronus and Van Es, 1976; Hounshell and Liggett, 1973; Donohue, Olien, and Tichenor, 1974; and Chaney, 1970) identify urban and suburban dwellers and those residing in the West and Midwest as more aware/concerned than those residing in rural areas or in small towns and those residing in the East or southern areas of the nation. Part of the explanation for these findings can be attributed to income, occupational and educational levels characteristic of these areas, and part is no doubt due to the fact that environmental deterioration is most severe in urban areas. Caution must be used here, however, when assuming that those who experience the worst environmental deterioration are the most aware of it, as a number of studies demonstrated that many times this is not the case.

Such studies as those conducted by Donohue, Olien, and Tichenor (1974) and Allen (1972) have demonstrated also that, at least in relation to local environmental problems and reforms, a more pluralistic community structure (hence usually a larger population) insures more favorable environmental attitudes because the costs of reforms are not as threatening to the residents in terms of loss of income, loss of employment, and so forth. Using a similar rationale, Morrison (in Murch, 1974) noted that those engaged in occupations not directly threatened by the costs of environmental reform, e.g., professionals, teachers, government employees, etc., tend to be more environmentally aware/concerned. This observation also holds true internationally, i.e., those nations that can afford it the most are the most concerned, and the worst offenders it should be noted.

Research has indicated also that youth is associated with higher levels of environmental awareness/concern. Studies such as

Chaney, 1970; Hornback, 1974; George, 1966; Knapp, 1972; Kronus and Van Es, 1976; Dillman and Christenson, 1972; Pettus, 1976; Scott, Driver and Morans, 1973; Lingwood, 1972; Buys and Nartker, 1976; and Allen, 1972; identified older students and those between roughly 15 and 30 years of age as the most aware/concerned. Part of this difference, especially in reference to younger vs. older students, can be attributed to differences in exposure to information/education. Some of this difference is also due to the differences in the cost of environmental reform to the different age groups. As Hornback (1974) points out, young people typically have lower levels of commitment to the existing social structure. Furthermore, "Economic constraints or changes in consumer patterns do not threaten people who have not established dependable incomes, and who have not had the opportunity to develop consumer habits." (p. 198) In short, younger people have less to lose from changes aimed at environmental reform, and they also have more of a "long term" in which to enjoy the benefits of same. Thus environmental reform produces less dissonance in this segment of the population.

While other correlates have been identified, especially in relation to awareness/concern at the local level, the evidence for them is less conclusive. Hence, the writer will not include any detailed discussion of them here.

An Assessment of Environmental Education

The relationship between environmental information and environmental attitudes has been clearly demonstrated earlier in this paper. It has also been demonstrated that while the mass media,

particularly the broadcast media which are the most attended to by most Americans, can and have had an impact on increasing the public's concern about environmental deterioration. They do not, however, relate the kind of information that produces a citizenry which is knowledgeable about the biophysical environment and its associated problems, aware of how to become involved in the resolution of these problems, and motivated to do so.

What of the educational system, then? Are we educating the citizenry to the nature and seriousness of the environmental crisis? Do students in the natural sciences, social sciences, or arts learn an appreciation and understanding of basic environmental and/or conservation concepts? Do most students?

In a comparative study of normal biology classes and biology classes taught basic conservation principles as part of the normal curriculum Whiteman (1965) found a significant change in the positive direction for conservation attitudes in the experimental group and either no difference or a slight movement in the negative direction in those classes taught in the traditional manner. This led him to conclude, ". . . that the teaching of the conventional type biology course has little effect upon the formation of favorable attitudes toward resource conservation." (p. 98) These findings are generally supported in the literature. Although much work still needs to be done in this area and the number of applicable studies is small, what evidence there is, is supportive.

In concluding a similar analysis, George (1966) stated, (Conservation Education can and should be directed at the high school and college levels, for attitudes are found to reflect the extent of

involvement with such experiences." (p. 122)

Benett, in Swan and Stapp (1974), reinforced the notion that environmental education does change attitudes and values as we have documented elsewhere, but he finds also that students demonstrate an increase in their ability to act on these attitudes. He exposed 75 junior high school students to a 12 hour block of environmental education and found a 7.2 percent increase in the posttest for the "ecological value system index" he had developed and a 6.2 percent increase in the "index for ability to act on an ecological value system." His study, incidentally, included not only the conventional paper and pencil tests but also two unobtrusive measures of behavior.

Asch and Shore (1975), in a controlled test of elementary students' behavior as a result of exposure to environmental education, found a highly significant difference in favor of the experimental S's. Not only did they demonstrate more environmentally constructive behaviors in the field, but they also demonstrated less destructive behaviors than the controls.

Fazio (1974) designed a survey to test college students' ability to use science information to solve environmental problems. He found that "College students can interpret environmental problems with respect to using past school science learnings. . . ." (p. 5) He also found that 79 percent of the students surveyed said they would prefer to take a physical science course centered on environmental problems as opposed to the conventional course.

Harrison (1975), in a study of the environmental impact of the college experience on students in a small, private liberal arts college found the strongest positive influence to have been

principally through course offerings (primarily conservation) of the Biology Department. This led him to conclude that "The higher education experience, per se, is insufficient to produce the desired 'environmental' results; rather, a purposeful emphasis on environmental studies is required." (abstract) This conclusion also seems to be shared by the students themselves, as approximately 80 percent of them do not believe they presently possess adequate knowledge of, nor a sound philosophy in regard to environmental issues. It is also interesting to note that approximately 90 percent of them ". . . profess to believe that educating people to environmental issues and needs is essential to solving environmental problems. They are agreed also . . . that giving attention to environmental issues is appropriate for a liberal arts college" (p. 60)

Thus we see that there is a great deal of evidence to suggest that an increase in environmental information generally leads to more positive environmental attitudes. There is also, the researcher believes, sufficient evidence to suggest that more positive attitudes are related to more constructive environmental behavior, as a result of environmental education. This is not to suggest that all environmental education results in positive change in environmental behavior, for this is a very complex issue and beyond the scope of this paper. It does, however, suggest that environmental education per se is the most effective method for producing an "environmentally literate" citizenry given the current limitations of the media. There is even some research (see for example Hounshell and Liggett, 1976; and Milson, 1975) which suggested that exposing uninformed subjects to "environmentally literate" individuals results in increased

environmental information leading to more positive attitudes as a result of information exchange and modeling.

The situation is perhaps best summarized by Hendrick, Snell and Hengeveld (1974) who concluded, "While such things as newspaper headlines may indicate a severe ecological problem, it is education which often introduces the positive stimulus in helping students to understand the interrelationships of organisms to the environment." (p. 20) So education can have a significant impact on the problem, but is the educational system in fact having such an impact on the general American public, or on the students of this nation?

In 1969-70 when the media and the general public "discovered" the environmental crisis, Corrado (1970) reported that there was ". . . no truly interdisciplinary approach (to ecology) or 4-year curriculum at any American college." (p. 18) Similar findings are reported by Chin (in Perkes, 1973) who in a 1971 survey of "Far West" and "Great Lakes Region" secondary schools found that only 9.4 percent had instituted a separate course in conservation or environmental education. Havlick (1969), in a survey of American colleges and universities, found that "The majority of schools under observation had three or fewer courses which qualified as comprehensive environmental education offerings." (p. 22) The study also failed to find one environmental education course at the graduate level. These findings led Havlick to conclude, "The resolution of physical problems of America's urban and non-urban environments will continue in an ineffective, ad hoc basis until more and better programs in environmental education can be provided at the university level." (p. 23) So in general, it seems that our educational institutions had not "discovered" the

environmental crisis before 1970 either.

By 1973, however, Corrado, in a more recent study, was led to conclude, "The institutionalization of the environmental movement has been most noticeable in the governmental and education establishments." (p. 1) He then went on to state, "It would appear . . . that in the long run, the most crucial institutionalization of environment must be in the schools."

In an excellent analysis of trends in environmental education, sampling 777 teacher institutions of education and all state boards of education between 1970 and 1975, Trent (1976) demonstrated that the educational institution has made significant gains, yet much remains to be done. For example, the percentage of colleges offering a course in methods of teaching environmental education went from 18.7 percent to 42.5 percent; colleges offering an environmental science curriculum leading to a teaching major went from 3.7 percent to 21.2 percent; colleges having an environmental studies board, center, or department went from 30.1 percent to 37.8 percent.

The state departments of education have also made progress in terms of environmental education, but once again much still remains to be done. As of 1975, 50 percent of the states had developed a state plan for environmental education. Although many such plans, including Michigan's, have yet to be implemented in any significant manner, 36.8 percent provided some state funding for environmental education. However, 79.5 percent of the states reported the funding was "poor" or nonexistent. Also, approximately 20 percent of the nation's school systems had provided some type of inservice or pre-service instruction in methods of teaching environmental education

to approximately 30 percent of their teachers. While these figures do not describe anything remotely approaching an ideal situation, they do represent significant improvements over the all but nonexistent programs of 1970.

Perhaps the situation in higher education is best summed up by Harrison (1975) when he states, ". . . the college experience ideally should produce a greater "environmental" impact on its product (the students) than has been the case to date." (p. 149) Schoenfield (1970) concurred and provided an outline for improving education's "environmental impact." He stated, "In the final analysis, environmental quality management will proceed only as far and as fast as public opinion will sanction. The university can assist in three ways in the achievement of a mass conservation literacy. First, in its undergraduate education it can confront all students--not just career majors--with the kinds of resource management conflicts about which as citizens and voters they will render crucial judgements; it can attempt to instill a desire for constructive change; it can suggest biosocial standards of values, and it can offer practical guidelines to action. Second, the university can assist the public schools in the development of K-12 scope and sequence concepts and materials that will lift conservation education out of any rut of irrelevant or inadequate approaches and techniques. Third, the university can assist 2-year terminal technical institutions in developing sound curricula for field aides who must increasingly be produced to fill sub-professional positions in resource management agencies of many types." (p. 117)

CHAPTER III

STUDY DESIGN AND PROCEDURES

Overview

In the previous chapter it was established that increased environmental information generally results in more positive attitudes toward environmental issues and more concern for the solution to environmental problems. It was also asserted that while the mass media, particularly the broadcast media, are the major sources of environmental information for most Americans and do often increase concern over environmental problems, they do not assist the individual to develop an understanding of how environmental issues are related, how the individual may contribute to the problem, or how the individual might act to improve the situation. Nor does the mass media provide any incentive to take such positive remedial action.

The preceding chapter also demonstrated that the higher education experience per se does little to increase the student's level of environmental information, and as a consequence, fails to affect his/her attitudes or behavior concerning same.

It was further seen in Chapter II that some evidence exists to indicate that the level of the instructor's environmental information and concern has an effect on the students he/she comes in contact with, resulting in the students' acquiring more favorable attitudes

toward environmental issues from instructors with relatively high levels of information and concern. This is probably the result of the modeling provided by the instructor.

Finally, it was asserted that cognitive dissonance is operative in the area of environmental information and attitudes, in that an awareness of some environmental problem without any knowledge of how to act so as to reduce the problem could result in a protective reaction which results in apathy or a reduction of the importance of the problem.

To empirically test these assertions the following hypotheses will be tested using basic social science students at Lansing Community College:

1. Students who receive a 2-3 week unit on current environmental concerns will show significant gains in environmental information.
2. Students who receive a 2-3 week unit on current environmental concerns will show significant gains in environmentally positive attitudes.
3. Students who receive a 2-3 week unit on current environmental concerns will show significant gains in willingness to engage in environmentally positive behaviors.
4. Students who are exposed to more mass media, including news media, will not differ from those exposed to less media in environmental information, environmental attitudes, or willingness to engage in environmentally positive behaviors.
5. Students who have sophomore standing will not differ from those with freshman standing in environmental information, environmental attitudes, or willingness to engage in environmentally

positive behaviors.

7. Students who are instructed in steps that they can take to impact environmental problems will demonstrate more positive environmental attitudes and more willingness to engage in environmentally positive behaviors than will students not so instructed.

Institutional Perspective

Founded in 1957, Lansing Community College has steadily grown to an institution currently serving some 17,000 students drawn primarily from the five counties that comprise its service area, namely, Ingham, Eaton, Clinton, Shiawasee, and Livingston counties.

Since its inception LCC has maintained an open enrollment policy which includes a walk-in registration procedure which provides class offerings to anyone requesting them (see student demographic section). Because of this and because of the diversity of programs and class offerings provided by the college, the student body is made up of all segments of the community.

Lansing Community College is an accredited two-year college offering programs in a wide variety of areas. According to the 1976-78 catalog, "The college is committed to community service programs, college transfer programs, and career training programs." In addition, LCC offers a wide variety of courses designed to establish or upgrade specific skills, meet specific community needs, and provide general education in areas of demonstrated interests.

The college is administratively divided into the semi-autonomous divisions of Student Personnel Services, Learning Resources, Arts and Sciences, Business, and Applied Arts and Sciences.

All divisions offer coursework through their respective departments.

The community college as an institution is by its nature primarily a teaching and community service institution, and largely for this reason has not been the focus of a great deal of research of any nature. However, with the increasing proliferation of community colleges across the country in recent years, and with the greatly increased enrollment of these institutions, the community college has become one of the largest segments of the higher educational institutions of the nation. And it is certainly the most representative of the general population insofar as the students it enrolls.

Because of its unique relationship to the community it serves, the community college is in many ways the natural location for programs of an environmental nature, particularly as they relate to local community problems and concerns. For this reason many community colleges have undertaken programs of an environmental nature. For example, Lee Junior College at Jackson, Kentucky, has begun a curriculum entitled, "Man and His Total Environment: Focus on Southern Appalachia." The curriculum is designed to stimulate students to think about their heritage (a stated goal of LCC's, incidentally) and the particular region in which they live. Berkshire Community College has founded an environmental studies center. A group of students from five colleges in New York City, including Bronx Community College, conducted a complete ecology survey of the Bronx early in 1971. Numerous community colleges throughout the country have received support under Title I of the Higher Education Act of 1965 to offer community service programs dealing with environmental topics such as air pollution, urban renewal, and so forth. In addition, many

community colleges, including Delta Community College in Michigan, offer special public lectures and seminars in environmental concerns.

To date Lansing Community College has no cohesive environmental education program, although several courses with significant environmental/ecological content are offered in various departments. There is some movement among interested faculty to organize an effective environmental education program, but efforts to date could only be described as in the early planning stage.

Subjects

The mythical average student at Lansing Community College is a Caucasian, single male, twenty-seven years of age. He has a 2.92 cumulative g.p.a. in college, and is carrying 8 hours of credit. He graduated from a large urban high school with a graduating class of 500 or more, with an A or B average by self report. He claims himself as a dependent, he works 40 hours a week or more, he lives with his parents, he takes classes in the evening, he says he is not interested in student activities, he pays his own tuition and has a family income of \$12,000 or higher. The mythical average student is in college to prepare for a new skill or trade, and wants to earn an associate degree and then transfer. He selected Lansing Community College because it was close to home and he says he, himself, was the most influential person in making his choice of Lansing Community College. His father is a high school graduate in a professional job. His mother is also a high school graduate and is a housewife, and there are 3.4 individuals in his immediate family.

(Herder, 1977)

The mythical average student at Lansing Community College is also just that, i.e., mythical, and his description, while accurate, does not provide any overall picture of the LCC student body. Consequently, a brief description of the demographic characteristics of the LCC student body seems in order. The data reported here is based

on approximately 12,000 students who either applied for admissions or completed a student profile sheet during registration for Spring Term 1977.

Of those attending LCC approximately 44 percent plan to earn an Associate Degree, and 64 percent of these plan to transfer to another education institution upon completion of the Associate. Thirty-nine percent of the student body does not plan to earn a degree.

Most LCC students work. Approximately 26 percent of them work part time (from 1 to 39 hours per week), 40 percent work full time, and 29 percent are not currently employed.

The student body is 52 percent male and 48 percent female. Forty-four percent of the students are married, with a slightly higher percentage of married men than married women (28 and 20 percent respectively).

In terms of residence, 15 percent of the study body lives on farms or in a rural area, 34 percent live in the suburbs, and 45 percent live in the Lansing urban area.

Most LCC students pay their own fees (59 percent) and chose LCC because it was close to home (36 percent) and offered classes at lower tuitions (28 percent). Most report being A or B students in high school (50 percent) although 40 percent report they had a C average in high school. Forty-nine percent of these students attended high schools whose graduating classes were 300 to 500 or more students.

Fathers' occupations are reported as 12 percent professional, 12 percent skilled industrial, and 12 percent as either retired or disabled. The remainder are scattered through a number of categories with approximately 9 percent listed as craftsmen or foremen, 11 percent

clerical or sales, and 8 percent unskilled labor.

Fathers' educational levels are reported as 28 percent with less than a high school education, 36 percent with a high school education, 9 percent with two years of college, 12 percent with a four-year degree, and 8 percent with a Masters degree or higher educational attainment. Mothers' educational levels are generally lower with 70 percent reported as having 12 years or less education, 10 percent with a two-year college degree, 9 percent with a four-year degree, and 3 percent with a Masters degree or higher.

Family incomes are reported by the students as 11 percent below \$2,400 a year, 35 percent between \$2,400 and \$8,999, 15 percent between \$9,000 and \$11,000, and 39 percent report family incomes in excess of \$12,000 per year.

Most LCC students carried less than 8 credits in Spring Term of 1977 (65 percent), while only 26 percent carried 12 or more credits.

The age composition of the student body is 20 percent between 16 and 20, 23 percent between 21 and 24, 23 percent from 25 to 29, 20 percent between 30 and 39, and 12 percent are 40 years of age or older.

Most LCC students have a high school education or some college. Only 8 percent report less than a high school degree, 35 percent report having graduated from high school, 44 percent report having some college, and 14 percent report holding a college degree.

The student body is roughly divided between attending day classes only (35 percent), night classes only (37 percent), or both day and night classes (21 percent).

Racially, the students are approximately 86 percent white, 5 percent black, and 5 percent other minority classifications.

Enrollment by curricular area is 32 percent in Arts and Sciences, 28 percent in Applied Arts and Sciences, 27 percent in Business, and approximately 5 percent in each of the Preprofessional and Undeclared classifications.

In short, the student body at Lansing Community College is fairly representative of the larger population in its service area.

Specific Hypotheses To Be Tested

The following hypotheses will be tested as a result of undertaking this study.

1. Social Science 101 students at Lansing Community College who receive a basic unit on current environmental concerns of approximately two to three weeks duration will demonstrate significantly more environmental information than Social Science 101 students not receiving the environmental education unit.

2. Social Science 101 students at Lansing Community College who receive the basic environmental unit will demonstrate significantly more positive environmental attitudes than controls.

3. Social Science 101 students at Lansing Community College who receive the basic environmental unit will demonstrate significantly more willingness to use more ecologically positive behaviors than controls.

4. Social Science 101 students at Lansing Community College who are high consumers of the mass media (news) will not demonstrate any more environmental information, positive environmental attitudes, nor express any more willingness to use more ecologically positive behaviors than will low media news consumers.

5. Among Social Science 101 students at Lansing Community College, those who have completed a greater number of courses (sophomores) will not demonstrate significantly different levels of environmental information, environmentally positive attitudes, nor express any more willingness to use more ecologically positive behaviors than will those who have accumulated fewer credits (freshmen).

6. Social Science 101 students at Lansing Community College who receive a specially designed presentation in which the instructor demonstrates his concern for environmental problems by modeling ecologically positive behaviors will demonstrate more positive environmental attitudes and more willingness to use more ecologically positive behaviors than will controls not receiving the presentation prior to the post test.

7. Social Science 101 students at Lansing Community College who receive a specially designed presentation which provides the student with numerous examples of environmentally desirable practices that he/she can realistically expect to perform will demonstrate more positive environmental attitudes and more willingness to use more ecologically positive behaviors than will controls not receiving the presentation prior to the post test.

Study Design

This study tested seven distinct hypotheses and used different procedures depending upon the conditions.

Hypotheses one, two, and three state that students who receive the nine-hour environmental education unit will demonstrate higher levels of environmental information, positive environmental

attitudes, and positive environmental behaviors respectively, than those who do not receive the instruction.

The tests employed for these hypotheses are based on a design described in Campbell and Stanley (1970) as "The Nonequivalent Control Group Design." They permit the inclusion of groups that assemble naturally, such as collectives in classrooms. In this design, the assignment of the treatment to one group or the other is assumed to be random and under the experimenter's control. This design controls for the main effects of history, maturation, testing, and instrumentation.

In addition, checks were made to insure that different recruitment to the experimental and control classes was not an important factor. Despite the fact that this has not been evident in previous terms, a questionnaire was administered the second day of class which asked students for various demographic information, and included a question on why the student was enrolled in that particular course, with that particular instructor, at that particular time. Several categories of possible reasons were suggested as possible responses, including:

- (1) The course fit my schedule
- (2) A friend recommended the instructor
- (3) I knew about the content of the course and was interested in learning more about it
- (4) Other (which the student was asked to describe)
- (5) The course was required for my curriculum.

The student was asked to include all reasons for enrolling in the course.

Out of 153 students sampled, only 7 indicated that they had knowledge of the course content, and none mentioned wanting to know more about the environmental content of the course. Most students

indicated the course was required and fit their schedules. A small group, approximately 15 to 20 percent, indicated that the instructor (but not the course content) had been recommended by other students. Thus it can reasonably be concluded that problems associated with the interaction of selection and treatment were minimal.

In addition, differences between treatment and nontreatment groups were controlled by the use of ANCOVA with pretest scores being the covariant in all of the hypothesis testing.

To test the three hypotheses that experimentals would demonstrate higher scores on the dependent variables of environmental information, positive environmental attitudes, and positive behavioral intentions, nine Introductory Sociology and Anthropology classes, approximately 240 students, were used. Four classes were taught a three-week unit on current environmental issues (the experimentals), while five classes (the controls) did not receive the environmental unit. The experimentals received approximately nine hours of classroom instruction in environmental education. In all classes, all students were administered both the pretest and the posttest.

As can be seen this design controls for testing as main effect and interaction. Furthermore, the design insures student anonymity, an important consideration when the topic has socially desirable connotations, and when students in the experimental condition were urged to modify their current behaviors relative to the environment.

Hypotheses four and five stipulate that students with higher levels of media news consumption, or college credits earned to date, respectively, will not differ from others with lower media news

consumption or less credits, were tested using a one-way ANOVA on the dependent variables of information, attitudes, and behavioral intentions toward the environment obtained from the pretest administered to 240 students in Winter Term, 1978.

In the case of the fourth hypothesis, a scale for the degree of media news consumption was constructed from data gathered on the pretest and served as the independent variable. The scale consisted of five questions measuring the number of radio and television news programs heard each week, the number of news magazines read per week, the number of newspapers read each week, and the number of environmentally-oriented television programs (such as Wild Kingdom, Cousteau Specials, etc.) viewed each week. Each question had five possible responses, hence the scale had a range from five to twenty-five. Respondents were then classified as low consumers if they scored 5 through 10, medium consumers if they scored 11 through 15, and heavy consumers if they scored 16 through 25.

The testing of the fifth hypothesis was intended to determine the effectiveness of the junior college experience in developing a reasonably high level of environmental knowledge and positive environmental attitudes in its current students.

One approach to making such an assessment is a longitudinal study in which the entering freshmen are tested and then retested later as graduating sophomores. A second method is a cross-sectional study which compares the two groups at one point in time.

Each of these methods has advantages and disadvantages. The longitudinal approach may seem to be the more appropriate at first glance; however, this method leaves open the problem of ascertaining

the relative influence of the college experience and other factors, such as increased media coverage between observations, or a well publicized oil spill or nuclear reactor malfunction, and so forth; or an event such as the oil embargo, which could have a great effect on the students' everyday lives. In addition, this method would require a two-year design and would no doubt have serious problems with sample mortality.

The cross-sectional method has the advantages of being considerably shorter and minimizing the effects of outside influences by making a single comparison at one point in time. However, the design does not control for the possible differences due to maturational considerations. This problem, while not to be lightly dismissed, was not considered to be overly serious since the time between the pretest and the posttest was only three weeks.

With the fifth hypothesis a scale for the number of college credits the student had earned to date was employed on the pretest. The scale consisted of one questionnaire item requesting the student to report the number of college credits earned to date and scaled the responses as follows: (A) 0 to 15 credits; (B) 16 to 30 credits; (C) 31 to 45 credits; (D) 46 to 60 credits; and (E) over 60 credits.

Hypotheses six and seven, which state that students who have an instructor who models environmentalism, or who provides them with examples of positive environmental behaviors that they can employ in their own lives, respectively, were tested in Spring Term, 1978, using random assignment of one-half of the subjects to the respective experimental treatments. For hypothesis six, two classes were employed. In each of the two classes one-half of the students were randomly

assigned to an experimental group viewing a slide-tape presentation of the instructor modeling environmentally desirable behaviors and expressing his personal concern about environmental problems. The control group received the posttest prior to receiving the special presentation. All subjects were pretested and posttested.

The test for hypothesis seven uses the same design as that employed for hypothesis six except that in the latter case the experimental group received a special subunit, prior to the posttest, consisting of environmentally positive behaviors that the student could take to help lessen the overall negative effects of various environmental problems. The control group did not receive the subunit until after the posttest. For a more detailed description of the treatments for hypotheses six and seven, see Appendix C and D, respectively.

The design used to test hypotheses six and seven is known as the "Pretest-Posttest Control Group Design" in Campbell and Stanly (1970). It is considered a "True Experimental Design." The statistical procedure used was a one-way ANCOVA on the posttest (SEAT-A, SEAT-D, Ducat/Harrison Attitude Scale, and Ducat/Harrison Behavioral Intention Scale) with the pretest scores on these dependent variables acting as the covariants. This design controls for testing as main effect and interaction. Steps were also taken to insure complete student anonymity (the random assignment was performed by a third party and the investigator remained blind as to the assignment of individual students to either the experimental or control conditions), which is desirable in a situation where the subject under consideration is of the socially desirable sort described above.

Assessment Procedures

The first five hypotheses were tested in Winter Term, 1978. The pretest was administered in the sixth week of the term before any references were made to the environmental education portion of the course. In this manner the time between the pretest and posttest was minimized. As mentioned above, nine Social Science (Introduction to Sociology and Anthropology) classes were included in this phase of the study. Four were taught by the experimenter (the experimentals) and the other five by three other instructors. Two of these classes were taught evenings, and three were taught days, as were the experimental classes. Separate analysis was conducted for daytime controls and evening controls as an extra precaution, although this proved unnecessary as test scores proved remarkably similar for both groups, despite the demographic differences of the two student populations.

Hypotheses six and seven were tested Spring Term, 1978. Each hypothesis involved two classes, one day and one night class instructed by the experimenter, within which half of the students were randomly assigned to the experimental or control groups without the experimenter's knowledge. The pretest was conducted in the sixth week of the term and the posttest on the completion of the respective treatments in the ninth week of the term.

Since prior research in this area has indicated certain demographic factors may influence the possession of environmental information and/or positive environmental attitudes, information on the following demographic factors was collected for all subjects: age, sex, degree of mass media consumption, income, residence, grade point

average, race, earlier exposure to classes with possible environmental education content, total credits earned to date, curriculum, and family of residence.

Measures Used

Environmental information was assessed using the Syracuse Environmental Awareness Test, Level III, Form A (SEAT-A). See Appendix A and Table B2, Appendix B. This test is intended to provide a reliable measure of the respondents' knowledge of environmental problems and issues. It consists of 56 multiple-choice questions, each with four possible responses.

The SEAT-A was developed at Syracuse University with funds from a grant from the U. S. Office of Education and sponsorship from the Northeastern Environmental Education Development (NEED), i.e., a cooperative effort of the State Education Departments of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. The principal authors are Dr. David J. Kleinke and Dr. Eric F. Gardner, both of Syracuse University.

The SEAT tests were designed after a determination was made, through consultation with numerous educational authorities, as to the general content of a course in environmental education. It was determined that such a course would include segments on (1) pollution, including air, land, noise, and water pollution; (2) population; (3) science, growth, and technology, i.e., elements dealing with the unchecked and ecologically destructive growth of industry in our society; and (4) ecological relationships, i.e., the relationships

within and among environmental issues and concerns about biosystems and communities.

In addition an attempt was also made to include items which tapped the mental processes that would also be included in the goals of instruction for such a course. The total allocation of items to the cognitive test was as follows:

<u>Content</u>	<u>Cognitive Processes</u>			<u>Totals</u>
	<u>Knowledge of Facts & Items</u>	<u>Prin- ciples</u>	<u>Ability to Apply Principles</u>	
Pollution	17	4	3	24
Science, Growth, & Tech./Ecological Relations	9	5	2	16
Population	<u>8</u>	<u>4</u>	<u>4</u>	<u>16</u>
Totals	34	13	9	56

The items were prepared by Syracuse University professors and graduate students and high school teachers in relevant fields. They were then subjected to technical review by measurement specialists, reviewed for subject-matter accuracy by persons in appropriate substantive fields, and condensed into pretests.

In 1971 the items were pretested on nearly 4,000 eleventh grade students. In 1972 the final versions were administered in 49 randomly selected schools, in the nine states, to approximately 1,300 students in each of the four norming samples; and norms were developed for each of the nine states participating in the study with state samples stratified on the basis of state population and community size.

Test Forms A and B were found to be "virtually identical throughout the total-test score range," as was performance across the nine states participating.

Reliability of the tests was determined in two ways. First, internal-consistency estimates were computed using the Kuder-Richardson Formula 20 reliability coefficients, which were reported at .83 for Form A and .84 for Form B. Test-retest reliability estimates for subjects taking the same form one week apart were .79 and .76 respectively, leading the authors to conclude that the "particular time at which one takes a form of SEAT is of little consequence." Nor were second test scores any different from scores on the first administration of the same instrument.

The reliability score obtained (using LCC's KR-20 formulation) for the population used in testing the hypotheses of this study reported alpha equal to .799 ($N = 202$). (See Table B1, Appendix B.)

Environmental attitudes were assessed using a 33 percent stratified random sample of the items of the SEAT, Level III, Form D (see Appendix B, Questions 19-53). On January 12, 1978, the writer contacted Dr. David Klienke at Syracuse University concerning the advisability of modifying the scale. Dr. Klienke expressed his belief that the proposed 30 percent sample of items should be adequate to obtain a representative scale. He further advised the writer that the proposed idea of selecting those items with a "p-value" of approximately 40 to 60 (meaning that from 40 to 60 percent of the respondents chose the environmental option from the two options available) should prove to be better discriminators than items above or below these "p-values." He also stated that there was no need to randomize the

items, and advised that the researcher include an equal number of the best items from each subscale that met the "p-value" criteria above. This procedure was followed, and 35 items were selected for purposes of this study, five questions from each of the seven subscales of the instrument. The SEAT, Level III, Form D, is an attitude scale normally consisting of 105 two-option forced-choice items and is intended to measure overall level of concern for environmental problems, as opposed to concern for other social issues. The test contains an equal number of items on each environmental area discussed for Forms A and B, and was subjected to the same construction considerations as discussed above. Items were prepared at the Syracuse University Institute for Community Psychology, reviewed and tested as with Forms A and B, received a Kuder-Richardson Formula 20 reliability coefficient for internal-consistency of .95. (See Table B2 in Appendix B, also the Student Questionnaire Items 90-110 in Appendix B.)

With this high level of internal-consistency, the instrument should retain a very high reliability using a 33 percent sample of the items. This modified instrument did provide a reliable estimate of the level of concern for environmental problems as compared with other social problems and attained a KR-20 reliability of .862 and an alpha (using Michigan State University's SPSS Program) of .867 ($N = 181$). Furthermore, all items were found to display a fair to high intercorrelation as might be expected, and higher reliabilities could not be obtained by deleting those items with the lowest Corrected Item-Total Correlations, hence the scale was left intact for purposes of analysis (see Table B3, Appendix B, and Appendix B, items 90-110).

The other items of the attitude scale are intended to measure

the students' attitudes concerning more specific environmental issues. It consists of 52 items adapted from a questionnaire used by Dr. G. W. Harrison in his 1975 doctoral research at Michigan State University, which investigated the role of a private liberal arts college in fostering an environmental consciousness in its students (see Table B2 in Appendix B and Appendix B, items 55-89). This questionnaire was first reviewed and ambiguous or out-of-date items were omitted. Next, the remaining items were rewritten in such a manner that they would reflect the respondent's attitude toward only one attitude object per item. In addition, a number of items were reworded for easier comprehension. The remaining 35 items were included on the questionnaire and when reliability checks were made, eight items were deleted, one because the writer failed to include it on the questionnaire administered (item 62) and seven items because they were poorly correlated with the entire scale. These items were POL-1, POL-2, SW-11, NRU-2, SW-3, OPT-2, and SW-13, or questionnaire items number 57, 63, 73, 74, 79, 82, and 85, respectively. In no case did the Corrected Item-Total Correlation for these seven items exceed .049. The remaining 27 items formed the Ducat/Harrison Attitude Scale, which yielded an alpha of .779 (see Table B3 in Appendix B).

Observation of this scale suggests that the following kinds of areas are included. However, no cluster analysis, etc., was performed as these content areas were not used in any way as subscales:

1. Environmental Education/Information. Environmentalists maintain that environmental education is necessary on a nation-wide basis, hence the attitudes which support this belief will be assumed to be environmentally positive. So, for example, responding "strongly

agree" to "The public schools of our nation do not spend enough time in the teaching of ecology/conservation" will be assumed to reflect a highly positive environmental attitude.

2. Population. Most environmentalists maintain that the exponential growth of world population is one of our most serious ecological problems, hence attitudes reflecting a willingness and/or desire to limit population are assumed to be environmentally positive. Thus, a "strongly agree" or "very strongly agree" to a question such as "In the interest of population control a couple should not have more than two children even though they may be in a financial position to support a large number" is assumed to reflect a highly positive environmental attitude toward population control.

3. Pollution. Environmental experts hold that pollution, in all of its forms, is a very serious ecological problem that must be reduced. Hence attitudes favoring a reduction of various forms of pollution are assumed to be environmentally positive. Thus, a "yes, definitely" response to "Do you believe a government agency should have the right to order your community to cease dumping raw sewage into a nearby stream?" reflects an environmentally positive attitude.

4. Natural Resource Use. Environmental experts maintain that humanity in general, and the United States in particular, is consuming and wasting finite natural resources at an alarming rate, and that if steps are not taken soon to reduce consumption and/or recycle scarce resources, they will soon become completely exhausted. Hence attitudes favoring reduced consumption of natural resources and/or recycling natural resources are assumed to be environmentally positive. Thus, a "very strongly agree" response to "The size of automobiles should be

regulated by the Federal Government in order to conserve resources" reflects a positive environmental attitude toward resource use.

5. Energy. Environmentally aware Americans from the President downward in the governmental structure are deeply concerned about our demands for more energy (hence more waste and pollution) and dwindling supplies of many energy-producing resources such as natural gas and oil. Thus, attitudes favoring energy conservation and/or the development of alternative forms of energy, exempting nuclear power which poses serious environmental dangers, are assumed to be environmentally positive. Hence, a "very strongly agree" response to "One should be willing to curtail his travel by private automobile in order to conserve energy resources" reflects an environmentally positive attitude.

6. Endangered Species. Many environmentalists are alarmed at the rate at which both animals and plants are disappearing around the globe, both because they have value in and of themselves and because they represent links in food chains (webs) which man is dependent upon. For these reasons attitudes favoring the preservation of living natural resources will be assumed to be environmentally positive. Thus, an "I do not agree at all" response to "Well meaning but misguided people often become entirely too concerned about the loss of a few alligators or birds" is assumed to reflect a positive ecological attitude in this area.

7. Optimism/Pessimism. Closely linked to the seriousness of environmental problems is the belief on the part of the individual that remedial action can be successfully taken to correct them. Most environmentalists maintain that the solutions to many such problems are

not simple and will require sacrifices but that they can be solved given a determined effort. For these reasons it is assumed that the most environmentally desirable attitudes along this dimension are those that could be classified as guardedly optimistic. Thus, a "very strongly agree" response to "The possibility of solving the problems of human population increase by voluntary birth control is unlikely" is considered to be environmentally positive.

8. Basic Beliefs/Values. Environmentalists maintain that certain basic beliefs or values are at the base of much environmentally relevant behavior. For this reason subjects who reflect these beliefs will be assumed to possess the most positive attitudes. Thus, a "very strongly agree" response to "American beliefs and values have been a basic cause of our present pollution problems" is considered to be environmentally positive.

9. Environmental Costs. Ecologists agree that environmental reform will involve costs, both in terms of committing greater resources to environmental reform and in terms of changes in lifestyle. They also maintain that the individual who is aware of these necessary costs and willing to pay them has the most environmentally desirable attitude. Thus, a "yes, definitely" response to "Will you be willing to pay substantially higher taxes in the future to help cover the costs of improving the quality of the environment?" is considered to be an environmentally positive attitude.

10. Others' (Governmental) Action vs. Personal Action. Closely related to a knowledge of costs and willingness to make personal sacrifices to improve the environment are attitudes supportive of both governmental and personal actions which environmentalists indicate are

contributing to the solution of the environmental crisis. Caution must be exercised here, however, as supporting others (government) may indicate personal unwillingness to take positive action. In general, however, it is assumed that attitudes favoring governmental and/or personal environmental involvement are the most desirable or environmentally positive. Thus, a "very strongly agree" response to "Anti-littering laws should be consistently and strongly enforced" is desirable. Yet an "I do not agree at all" response is preferred to the question, "Government would satisfactorily solve most environmental problems if private pressure groups would refrain from getting involved."

The students' intentions to behave toward selected environmental issues were assessed using a scale developed by Dr. Harrison consisting of 21 items that require the student to state a behavioral position in regard to specific environmentally related issues or possible events, e.g., "Do you now or do you plan to begin to recycle your newspaper?" These items, since they did require such a response, were considered to represent a separate scale (or subscale) which was named the Ducat/Harrison Behavioral Intention Scale (see Appendix B, items 90-110). This scale obtained an initial KR-20 reliability of .770 ($N = 202$) and an SPSS alpha of .797. This scale was then subjected to the same editing procedure as employed above for the Ducat/Harrison Attitude Scale, and five items were found to have low Corrected Item-Total Correlations. These items were TI-4, POP-3, SW-7, OPT-3, and SW-15, or questionnaire item numbers 95, 101, 102 (which were dropped because they had zero variance), 107, and 108 (see Table B4 in Appendix B). When these items were deleted, the remaining 16-item

Ducat/Harrison Behavioral Intention Scale yielded an SPSS alpha of .813 (N = 196).

This scale was also used as part of a follow-up study conducted by this researcher to determine if the expressed behavioral intentions scores obtained on the posttest persisted over time. In the fifth week of the Spring Term a questionnaire was sent out to 10 randomly selected members of each of the four classes receiving the experimental unit in the previous term and the three classes receiving the basic unit in the Fall Term, a total of 70 students (approximately 30 percent). In addition to the 16-item Ducat/Harrison Behavioral Intention Scale, two open-ended questions were asked. The first requested information as to whether the respondent felt his attitudes toward environmental issues had changed and, if so, what specific factors effected this change in his/her judgment. The second question asked what (if any) actual behaviors toward environmental issues had changed.

The fourth hypothesis, which stated that there would be no difference in the dependent variables of environmental information, environmental attitudes, or behavioral intentions as a function of exposure to mass media news, was tested using the data derived from the instruments described above and the student's self-reported estimate of his/her exposure to media news as the independent variable.

The fifth hypothesis, which stated that there would be no difference in the dependent variables of environmental information, attitudes, or behavioral intentions, as a function of the number of college credits earned to date was tested using the same instruments used for hypothesis four, but included as the independent variable the

scores on a question on the demographic data portion of the questionnaire assessing the number of college credits the respondent had earned to date. The question requested the student to indicate if he/she had earned 0 to 15 credits, 16 to 30 credits, 31 to 45 credits, 46 to 60 credits, or over 60 credits.

Hypotheses six and seven will employ the same instruments described above for hypotheses one through five. In the case of hypothesis six, the independent variable is the presence or absence of a special one-hour slide presentation of the instructor modeling the behaviors he advocates the students practice. In the case of the seventh hypothesis, the independent variable is the presence or absence of a special one-hour presentation of practical steps the student could reasonably take to improve the environmental crisis (see Appendix D). In both cases the dependent variables are environmental information, attitudes, and behavioral intentions as measured by the SEAT, Level III, Form A; the Ducat/Harrison Attitude Scale; the SEAT, Level III, Form D; and the Ducat/Harrison Behavioral Intention Scale, respectively.

CHAPTER IV

RESULTS

This study was conducted in two phases. The first phase was conducted Winter Term, 1978, and utilized a total of nine Introductory Sociology and Anthropology classes at Lansing Community College, approximately 240 freshman and sophomore students. The first three hypotheses were tested using "The Nonequivalent Control Group Design" in which the students in all classes (four experimental and five control) were pretested for environmental information, environmental attitudes, and environmental behavioral intentions. Next, the experimental classes received a special nine-hour unit in current environmental problems and concerns, and the controls were taught the customary non-environmental content. All subjects were then posttested, and analysis of covariance was used to determine if experimentals demonstrated greater gains on the dependent variables of information, attitudes, and/or behavioral intentions.

During this phase of the study, information was also gathered on the pretest from all subjects to test whether students who had earned more credits (hypothesis four) or who consumed more mass media news (hypothesis five) scored higher on the dependent measures than students with fewer credits or less mass media news exposure. The statistical procedure used was one-way analysis of variance.

The second phase of the study was conducted Spring Term, 1978, utilizing four Introductory Sociology and Anthropology classes at Lansing Community College. Approximately 150 freshman and sophomore students participated in this phase. The design employed as the "Pre-test-Posttest Control Group Design." In each of the classes one-half of the students were randomly assigned to the experimental or control conditions. Two classes were used to determine if the students produced higher scores on the dependent variables of environmental information, environmental attitudes, and/or environmental behavioral intentions, as a result of a one-hour subunit in which the instructor modeled positive environmental behaviors in his own lifestyle. The other two classes were used to determine if students produced higher scores on these same dependent measures as a result of the instructor providing them with a special one-hour subunit in which specific and achievable alternatives to some currently undesirable environmental behaviors were presented. Both of these hypotheses were tested using one-way analysis of covariance on the posttest scores on the dependent variables while controlling for pretest scores.

Significance Levels

Throughout this study the significance levels employed were as follows. If groups were found to differ to such a degree that chance could only account for the difference one out of ten times (.100), the finding should be termed significant. While this was a departure from the custom of using .050 as the limit for significance, it is entirely reasonable to assert that a difference between groups which could only be attributed to chance one out of ten times, or less,

means that one cannot rule out the possibility that there was in fact a real difference between our comparison groups, and that it was presumably attributable to the effects of the treatment.

If groups were found to differ to such a degree that chance could account for the difference only one out of one hundred times (.010), the finding has been termed very significant. In this case the interpretation advanced is that not only was it possible that a real difference existed between the comparison groups, but that in fact it was highly probable that that was the case.

Finally, if groups were found to differ to such a degree that chance could have accounted for the difference one out of one thousand times (.001), the finding has been termed most significant. In that case the interpretation was advanced that it was very highly probable that a real difference existed between the comparison groups. That it was so probable that that difference has been assumed to exist in fact.

Hypothesis One

The first hypothesis stated that those LCC students who received the unit in current environmental issues and concerns would demonstrate significantly greater gains in environmental information, as measured by the Syracuse Environmental Awareness Test, Level III, Form A (referred to as SEAT-A), than would students in the control group.

The hypothesis was tested using one-way analysis of covariance on the posttest scores on the SEAT-A, with the pretest scores acting as the covariant. As indicated in Table 2, the experimental group had a greater gain in environmental information than did the control

group. The probability that this difference in gains was significant was .06. Hypothesis one is therefore accepted as possibly true. (See also Table E1, Appendix E.)

TABLE 2

ANCOVA RESULTS FOR ENVIRONMENTAL INFORMATION, ENVIRONMENTAL ATTITUDES (SEAT-D AND DUCAT-1), AND ENVIRONMENTAL BEHAVIORAL INTENTIONS, SEPARATELY AND COMBINED, BY STUDENT STATUS

Hypothesis	Test Instrument	Statistical Test Used	N	DF	F	Signif. of F
1	SEAT-A	ANCOVA	239	2	2.885	.058
2	Ducat-1	ANCOVA	239	2	7.546	.001
2	SEAT-D	ANCOVA	239	2	2.740	.067
3	BEHINT	ANCOVA	239	2	11.107	.001
1 thru 3	PTOTAL*	ANCOVA	239	2	5.386	.005

*PTOTAL is the term given the combined posttest instruments above.

Further analysis also demonstrated that the students' ages, incomes, curricula, and exposure to other courses with potentially significant environmental content were not significant factors in the outcome reported above (see Table 3).

TABLE 3

ANCOVA RESULTS FOR ENVIRONMENTAL INFORMATION, ENVIRONMENTAL ATTITUDES (SEAT-D AND DUCAT-1), AND ENVIRONMENTAL BEHAVIORAL INTENTIONS BY INCOME, CURRICULUM, AGE, AND PRIOR EXPOSURE TO COURSES WITH ENVIRONMENTAL CONTENT

Source of Variation	Scale	N	F	Signif. of F
Hypothesis One				
Income	SEAT-A	200	1.240	.267
Curriculum	SEAT-A	200	1.863	.174
ECOURSE*	SEAT-A	200	.008	.928
Age	SEAT-A	201	1.227	.302

Hypothesis Two				
Income	SEAT-D	200	2.172	.142
Curriculum	SEAT-D	200	1.424	.234
ECOURSE*	SEAT-D	200	.116	.734
Age	SEAT-D	201	.771	.546
Age	Ducat-1	201	.694	.597
Income	Ducat-1	201	.976	.423
Curriculum	Ducat-1	200	.773	.380
ECOURSE*	Ducat-1	200	.252	.616

Hypothesis Three				
Age	BEHINT	201	1.380	.244
Income	BEHINT	201	.730	.573
Curriculum	BEHINT	200	2.303	.131
ECOURSE*	BEHINT	200	.186	.667

*Stands for prior exposure to courses with a possible significant environmental content.

Hypothesis Two

The second hypothesis postulated that those LCC students who received the unit in current environmental issues and concerns would demonstrate significantly greater gains in positive environmental

attitudes, as measured by both the Syracuse Environmental Awareness Test, Level III, Form D (referred to as SEAT-D), and the Ducat/Harrison Environmental Attitude Scale (referred to as Ducat-1), than would controls.

The hypothesis was tested using one-way analysis of covariance on the posttest scores on these scales with the pretest scores acting as the covariant. As indicated in Table 2, the experimental group did have a greater gain in positive environmental attitudes than did controls. The probability that this difference in gains was significant was .06 on the SEAT-D and .001 on the Ducat-1. Hypothesis Two is therefore accepted as highly probable. (Also see Tables E2 and E3 in Appendix E.)

Further analysis also demonstrated that the students' incomes, curricula, and/or prior exposure to courses with potentially significant environmental content were not significant factors in the outcome reported above (see Table 3).

Hypothesis Three

The third hypothesis stated that those LCC students who received the unit in current environmental issues and concerns would demonstrate significantly greater gains in environmentally positive behavioral intentions, as measured by the Ducat/Harrison Behavioral Intention Scale (referred to as BEHINT), than would controls.

The hypothesis was tested using one-way analysis of covariance on the posttest scores on the BEHINT Scale, with pretest scores acting as the covariant. As indicated in Table 6, the experimental group did have a greater gain in positive behavioral intentions than

did controls. The probability that this difference in gains was significant was .001. Hypothesis Three is therefore accepted as most probable. (See Table 2 and Table E4 in Appendix E.)

Further analysis also demonstrated that the students' incomes, curricula, and/or prior exposure to courses with potentially significant environmental content were not significant factors in this outcome (see Table 3).

Hypotheses One Through Three

Before completing the statistical tests described above, a Pearson Correlation was performed on all of the dependent variables employed in testing the first three hypotheses discussed above. Pre-test scores on all scales employed correlated at or above the .001 level (see Table 4). That finding could indicate that all scales were measuring the same variable. That seemed unlikely, given that one scale was carefully constructed to measure the respondents' possession of environmental information, one was measuring how the respondent ranked environmental problems with other social problems (SEAT-D), another was measuring what actions he/she said he/she would employ on environmentally related issues, and one was measuring attitudes of a more general environmental nature.

A second possible interpretation of the correlation was that the three dependent variables, i.e., environmental information, environmental attitudes, and behavioral intentions toward the environment were very closely related. That in fact knowing one allowed one to accurately predict the other two. Pursuing the idea, it was decided to check posttest scores on the dependent variables to see if the

earlier relationship held, and it did. On posttest scores all of the dependent measures maintained a correlation with each other which was significant at or above the .001 level (see Table 5).

No matter which way one interpreted these findings, it could be argued that the sum of the changes from the pretest to the posttest on all scales could be used for testing the first three hypotheses together. When treated that way our hypothesis would read that those students receiving the experimental treatment would gain more in environmental information, would develop more positive environmental attitudes, and would say they would behave in ways more favorable to the environment than would controls. When this combined hypothesis was tested using one-way ANCOVA on the posttest scores on all instruments with pretest scores on all instruments acting as the covariate, a very significant difference was found in favor of the experimental group. The differences were significant at the .005 level (see Table 2 and Table E5 in Appendix E).

At this point it was decided to treat the first three hypotheses jointly and to combine all the scales employed in testing the first three hypotheses separately into a single variable. That combined measure was termed STOTAL (for the combined pretest scales) or PTOTAL (for the combined posttest scales).

Analysis was conducted to determine if student status groups differed significantly on any of the demographic variables on the pretest. If such were the case that might be affecting the results obtained.

Analysis of variance was performed on each demographic

variable (acting as the independent variable in this case) with student status acting as the dependent variable, with the following results: ECOURSE (prior exposure to courses with potentially significant environmental content) was found to differ significantly between the student status groups ($p = .041$); the same held true for place of residence ($p = .058$), family ($p = .003$), marital status ($p = .002$), income ($p = .043$), and age ($p = .001$); and differences between student status groups on the other demographic variables were not significant. They are curriculum ($p = .713$), sex ($p = .880$), grade point average ($p = .727$), and race ($p = .444$).

Since some, or potentially all of these differences between student status groups could be affecting the results obtained, it was decided to examine each of the demographic variables' effects on posttest scores (PTOTAL) while controlling for any differences due to pretest (STOTAL). The resulting analysis of covariance failed to show any significant differences on posttest scores for any of the demographic variables (see Table 6).

Hence we see that none of those variables can explain the results obtained. While it is true that attitudes are difficult to measure at best and that subjects do know the socially desirable responses (on both the pretest and the posttest) and could be reporting what the researcher wanted to hear, that seemed unlikely given the magnitude of the changes and differences between treatment groups. However, the possibility does always exist in such research.

TABLE 4
 PEARSON CORRELATIONS FOR PRETEST ENVIRONMENTAL INFORMATION,
 ENVIRONMENTAL ATTITUDES, AND ENVIRONMENTAL
 BEHAVIORAL INTENTIONS SCALES

	SEATA1	SEATD1	DUCAT1	BEHINT	POPSUB
SEATA1	*				
SEATD1	.8811 (240) S - .001	8			
DUCAT1	.8947 (240) S - .001	.9492 (240) S - .001	*		
BEHINT	.8541 (240) S - .001	.9229 (240) S - .001	.9471 (240) S - .001	*	
POPSUB	.8450 (240) S - .001	.9212 (240) S - .001	.9395 (240) S - .001	.6637 (240) S - .001	*

TABLE 5
 PEARSON CORRELATIONS FOR POSTTEST ENVIRONMENTAL INFORMATION,
 ENVIRONMENTAL ATTITUDES, AND ENVIRONMENTAL
 BEHAVIORAL INTENTIONS SCALES

	SEATA1	SEATD1	DUCAT1	BEHINT	POPSUB
SEATA1	*				
SEATD1	.9831 (240) S - .001	*			
DUCAT1	.9244 (240) S - .001	.9169 (240) S - .001	*		
BEHINT	.9011 (240) S - .001	.9022 (240) S - .001	.9175 (240) S - .001	*	
POPSUB	.9253 (240) S - .001	.9245 (240) S - .001	.9534 (240) S - .001	.9033 (240) S - .001	*

TABLE 6

ANCOVA RESULTS FOR ENVIRONMENTAL INFORMATION, ENVIRONMENTAL ATTITUDES (SEAT-D AND DUCAT-1), AND ENVIRONMENTAL BEHAVIORAL INTENTIONS COMBINED BY PRIOR EXPOSURE TO COURSES WITH ENVIRONMENTAL CONTENT, RACE, CREDITS EARNED TO DATE, AGE, SEX, CURRICULUM, FAMILY OF RESIDENCE, MARITAL STATUS, AREA OF RESIDENCE, INCOME, AND GRADE POINT AVERAGE

Source of Variation	Scale	N	F	Signif. of F
ECOURSE*	PTOTAL**	180	.537	.465
Race	PTOTAL	201	1.570	.198
Credit	PTOTAL	201	.331	.857
Age	PTOTAL	201	.537	.708
Sex	PTOTAL	201	1.264	.262
Curriculum	PTOTAL	200	.814	.518
Family	PTOTAL	198	.330	.719
Marital Status	PTOTAL	201	.129	.879
Residence	PTOTAL	201	.427	.653
Income	PTOTAL	201	1.010	.403
G.P.A.	PTOTAL	180	2.091	.103

*Stands for prior exposure to courses with a possibly significant environmental content.

**Stands for the combined posttest scores on the SEAT-A, SEAT-D, Ducat-1, and BEHINT scales (while controlling for the combined pretest scores).

Follow-Up Study

In the sixth week of the Spring 1978 Term a follow-up study was conducted on students who had received the experimental treatment the previous Winter and Fall terms. A questionnaire was mailed to 70 randomly selected students, ten from each class receiving the treatment (or approximately a 30 percent sample). The questionnaire was made up of the 16 item Ducat/Harrison Behavioral Intention Scale (to assess whether attitudes and behavioral intentions persisted over time) and the following two open-ended questions (which were designed to act as stimulus questions) to help to determine the causes for and consequences of, the attitude change demonstrated to result from the treatment:

1. If you feel that your attitudes toward environmental issues and problems changed as a result of taking Social Science 101, can you explain in your own words what caused this change? Can you remember any specific events, information, etc., that you feel were particularly influential in producing the change?
2. Since taking Social Science 101 have you begun to recycle paper, glass, etc., tried harder to conserve any resources, driven less, etc.? In other words, please identify any and all ways in which your actual behavior toward the environment has changed as a result of the class.

Of the 70 questionnaires mailed out, 59 were returned, or approximately 85 percent. This unusually high response rate was seen as a further indication of the students' high interest in the course and study, as well as his/her desire to assist in the further development of environmental education at LCC. Most of the nonrespondents were students who could not be reached because of a change of address.

In response to the first question, eleven students failed to indicate any substantial change in attitudes as a result of the treatment. However, of these, five students left the question blank, two claimed no change in attitudes but did indicate changes in environmental behaviors, one said his/her attitudes were not affected because he/she was already very pro environmentalism as a result of an eighth grade ecology class, and one student said that while his/her attitudes had not changed, he/she "thought about it (ecology) more."

Of the forty-eight students who indicated that their attitudes had changed as a result of receiving the treatment, the following reasons were given (note that some students listed more than one reason):

- 40 - students attributed the change to the general information presented.
- 8 - students cited the information presented relative to the depletion of natural resources.
- 3 - students attributed the change to the instructor's modeling of environmentally positive behaviors in his own lifestyle.
- 6 - students cited the text (Vance Packard's The Waste Makers) as being most influential in changing their attitudes.
- 2 - students cited the recommended text (Meadows and Meadows, The Limits to Growth) as the primary source of attitude change.
- 6 - students attributed their change in attitudes to fear, i.e., the material presented alarmed them.
- 3 - students cited the source of change as an understanding of the concept of the exponential growth of population and/or resource consumption.
- 6 - students attributed their change in attitudes to the instructor's persuasiveness.

In summary, there seems to be no clear-cut cause for the change according to the students' responses. Rather, the change in environmental attitudes seems to be a function of the total treatment. This is encouraging since the treatment's effectiveness does not appear

to be the result of the personality or teaching style of any single instructor, but rather the nature of the information presented.

In response to the second question concerning actual behavior changes as a result of the treatment, students reported the following:

- 15 - students reported that they now drive less.
- 14 - students said they have attempted to educate others regarding environmental issues or practices.
- 14 - students reported that they have lowered the thermostat in their homes.
- 5 - students said they have organized car pools.
- 8 - students reported they are avoiding the purchase of plastics and/or aerosols.
- 11 - students said they have started using alternate transportation.
- 11 - students reported recycling miscellaneous items for the first time.
- 12 - students reported recycling glass for the first time.
- 15 - students reported recycling paper for the first time.
- 4 - students reported recycling aluminum cans for the first time.
- 17 - students claim to have taken serious steps to conserve electricity.
- 4 - students indicated they have started compost piles in preparation for more organic gardening practices.
- 2 - students reported they have sought out more environmental information on their own.
- 18 - students reported other changes which the researcher has classified as miscellaneous. Those include correcting people who litter, making more of their own foods, using a clothesline instead of a clothes dryer, buying a wood burning stove or economy car, starting a garden for the first time, avoiding processed foods where possible, one student reporting that he quit hunting, upgrading the insulation in the home, changing plans for a large family, starting a neighborhood clean-up campaign, and joining the LCC Ecology Club.

Finally, when cell mean analysis was performed on the experimental group for pretest, posttest, and follow-up study, the following means were obtained on the Ducat/Harrison Behavioral Intention Scale: pretest mean, 45.939; posttest mean, 53.878; and follow-up mean, 58.952.

For experimental subjects, not only were the gains on the posttest very significant, but the behavioral intentions scores seemed to continue to increase after the posttest for up to six months. Those findings are consistent with cognitive dissonance theory in that as behavioral intentions become more environmentally positive, the probability of more positive actual behavior increases (as demonstrated by the follow-up study) which in turn reinforces the individual's positive attitudes and behavioral intentions, and so on.

When these findings were considered, especially in the light of the findings on the follow-up study, all three hypotheses, as well as actual behavior change, appeared highly tenable.

Hypothesis Four

Hypothesis four postulated that those students who indicated they were large consumers of mass media news would not differ significantly from those students indicating they were small consumers of mass media.

To test this hypothesis a scale was constructed (labeled Mediapre) which incorporated all five items on the questionnaire relating to media consumption. For convenience the five items requested the respondent to report his/her average weekly consumption of television news broadcasts, newspapers, news magazines, radio news broadcasts, and television programs and/or specials with a substantial environmental content (such as Wild Kingdom, Cousteau Specials, etc.).

Analysis first indicated that there were no significant differences between treatment and control groups in overall media consumption on the pretest ($p = .146$, $N = 239$). See Table 7 below.

TABLE 7
ANOVA RESULTS FOR MEDIA CONSUMPTION BY STUDENT STATUS

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	3.598	2	1.799	1.941	.146
SSTAT	3.598	2	1.799	1.941	.146
Explained	3.598	2	1.799	1.941	.146
Residual	219.586	237	.927		
Total	223.183	239	.934		

Next, a scale was constructed for light, medium, and heavy consumers of the mass media with light consumption equal to a total score of 5 through 10, medium consumption equal to a total score of 11 through 15, and heavy consumption equal to a total score of 16 through 25 (each question that constituted the scale had five choices of levels of consumption of its respective media, arranged in ascending order from low to high, hence a score of 5 was the lowest possible and a score of 25 the highest possible (see Appendix B, Student Questionnaire Items 14-18).

The hypothesis was tested using one-way analysis of variance on the three dependent variables of information, attitudes, and behavioral intentions, with degree of media consumption acting as the independent variable. Analysis of 202 subjects produced the following results: the significance of the relationship between exposure to mass media news and environmental information was .521; the significance of the relationship between environmental attitudes (as measured by the

SEAT-D scale) and exposure to mass media news was .706; the significance of the relationship between exposure to mass media news and environmental attitudes (as measured by the Ducat/Harrison Attitude Scale) was .999; and the significance of the relationship between exposure to mass media news and environmental behavioral intentions was .898 (see Tables B5 through B8, Appendix B). Hence the data clearly supported the contention that analysis fails to reject the null hypothesis (see Table 8 and Tables B5 through B8, Appendix B).

TABLE 8

ANOVA RESULTS FOR ENVIRONMENTAL INFORMATION, ENVIRONMENTAL ATTITUDES (SEAT-D AND DUCAT-1), AND ENVIRONMENTAL BEHAVIORAL INTENTIONS BY MASS MEDIA NEWS CONSUMPTION

Variable	F	Probability
Environmental Information (SEAT-A)	.655	.521
Environmental Attitudes (SEAT-D)	.348	.706
Environmental Attitudes (DUCAT-1)	.001	.999
Behavioral Intentions	.108	.898

Further analysis was performed on the effects of each type of media consumption on each of the scales employed in the pretest. In no case, save one, did any type of media consumption have a significant effect on any score on any of the information, attitude, or behavioral intention scales. The exception was consumption of news magazines with environmental information and behavioral intentions. The analysis

revealed a curvilinear relationship in both of those cases with both very high and very low consumers of news magazines scoring significantly lower than moderate consumers in their possession of environmental information and their behavioral intentions toward environmental issues and concerns (see Tables 9 and 10). Those findings suggest that those individuals who read some news magazines are more aware and concerned than those who are very heavy readers or nonreaders. However, caution must be exercised here as there are very few subjects in the highest consumption category, and there is reason to suspect that they may not be altogether accurate/honest in their estimates of how many news magazines they read per week.

TABLE 9
ANOVA RESULTS FOR ENVIRONMENTAL INFORMATION
BY EXPOSURE TO NEWS MAGAZINES

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	632.392	4	158.098	2.974	.021
MEDIA3	632.392	4	158.098	2.974	.021
Explained	632.392	4	158.098	2.974	.021
Residual	10473.152	197	53.163		
Total	11105.545	201	55.251		

GRAND MEAN = 33.85

DEVIATIONS FROM GRAND MEAN BY CATEGORY:

Less Than One News Magazine Per Week	.68
Between 1 and 2 Per Week	-.46 (Neg)
Between 3 and 4 Per Week	.46
Between 5 and 6 Per Week	1.15
7 or More News Magazines Per Week	-11.85 (Neg)

TABLE 10

ANOVA RESULTS FOR ENVIRONMENTAL BEHAVIORAL INTENTIONS
BY EXPOSURE TO NEWS MAGAZINES

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	1609.549	4	402.387	4.893	.001
MEDIA3	1609.549	4	402.387	4.893	.001
Explained	1609.549	4	402.387	4.893	.001
Residual	16201.030	197	82.239		
Total	17810.579	201	88.610		

GRAND MEAN = 53.30

DEVIATIONS FROM GRAND MEAN BY DEGREE OF EXPOSURE TO
NEWS MAGAZINES:

Less than one per week	-.48
Between one and two	1.51
Between three and four	.01
Between five and six	3.70
Seven or more per week	-18.55 (Neg)

Hypothesis Five

The fifth hypothesis asserted that there would be no significant differences in environmental information, environmental attitudes, and/or environmental behavioral intentions between students who were just beginning their college education and those who had completed one or two years of instruction.

In the demographic section of the pretest questionnaire information was collected as to the number of college credits the student had earned to date. The criteria were as follows: (A) 0 to 15 credits; (B) 16 to 30 credits; (C) 31 to 45 credits; (D) 46 to 60

credits; and (E) over 60 credits. The hypothesis was tested using one-way analysis of variance on the dependent variables of information (SEAT-A), attitudes (SEAT-D and Ducat/Harrison Attitude Scales), and behavioral intentions (Ducat/Harrison Behavioral Intention Scale) with the number of credits earned to date acting as the independent variable. Analysis yielded the following results: the significance of differences in college credits earned to date on the SEAT-A (information) Scale was .576; the SEAT-D (attitudes) Scale was .608, the Ducat/Harrison Attitude Scale was .164, the Behavioral Intentions Scale was .033, and all scales combined yielded a significance of .795 (see Table 11 and Tables B9-B13 in Appendix B).

TABLE 11
ANOVA RESULTS FOR ENVIRONMENTAL INFORMATION,
ENVIRONMENTAL ATTITUDES (SEAT-D AND DUCAT-1),
AND BEHAVIORAL INTENTIONS BY CREDITS EARNED TO DATE

Variable	F	Probability
Information (SEAT-A)	.724	.576
Attitudes (SEAT-D)	.678	.608
Attitudes (DUCAT-1)	1.648	.164
Behavioral Intentions	2.684	.033
All Scales Combined (PTOTAL)	.418	.795

While it would appear that the number of college credits a student has earned to date does have a significant impact on his/her intentions to behave toward environmental issues, the findings are not directional, i.e., those students with more credits did not have more

positive behavioral intentions. Cell mean analysis supported this interpretation as follows:

Grand Mean = 53.30	Deviations from Grand Mean by credits earned:		
0 to 15 credits	- .01 (Neg)	N = 98	
16 to 30 credits	.19	N = 43	
31 to 45 credits	3.86	N = 24	
46 to 60 credits	-5.58 (Neg)	N = 18	
Over 60 credits	.01	N = 19	

Thus the data clearly indicated a failure to reject the null hypothesis.

Hypothesis Six

The sixth hypothesis predicted that subjects who received a special one-hour treatment in which the instructor expressed his personal concern about environmental problems and modeled environmentally positive behaviors would demonstrate more positive attitudes, and more positive behavioral intentions (see Appendix C).

The hypothesis was tested using one-way ANCOVA on the combined posttest measures (PTOTAL) while controlling for the scores on the combined pretest measures (STOTAL). The test did demonstrate higher scores for experimentals, but these differences were not significant ($S = .637$, see Table 12). Further analysis, controlling for various demographic variables as well as pretest, modified the results reported above, but in no case was a significant difference reported between student status groups. Thus the data dictated that hypothesis six be rejected.

While the hypothesis had to be rejected, the researcher believes it is necessary to explain that several factors may have had

an adverse effect on the objectivity with which this test was conducted. When testing this hypothesis it was very difficult, in fact impossible, to conceal personal feelings about current environmental problems. Hence both experimental and control subjects knew that the instructor was greatly concerned. In addition, on several occasions examples were used to explain points raised in class which resulted in the students discovering that the instructor did in fact attempt to incorporate positive environmental practices into his lifestyle. For example, when a student in one class asked a question regarding the most desirable woods to use for home heating, the writer responded that he always tried to get oak or hickory for his stove; or when a student in another class asked where she could recycle glass, the writer responded that he took his to the recycling station at a nearby supermarket.

TABLE 12

ANCOVA RESULTS FOR ENVIRONMENTAL INFORMATION,
ENVIRONMENTAL ATTITUDES (SEAT-D AND DUCAT-1),
AND ENVIRONMENTAL BEHAVIORAL INTENTIONS
COMBINED BY INSTRUCTOR'S MODELING

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariates	37.329	1	37.329	.098	.755
STOTAL	37.329	1	37.329	.098	.755
Main Effects	85.811	1	85.811	.226	.637
SSTAT	85.811	1	85.811	.226	.637
Explained	123.140	2	61.570	.162	.851
Residual	17080.839	45	379.574	GRAND MEAN = 333.52	
Total	17203.979	47	366.042		
DEVIATIONS FROM THE GRAND MEAN ADJUSTED FOR COVARIATES:					
Control Group - 1.27 (Neg) Experimentals - 1.50					

Hypothesis Seven

The seventh hypothesis predicted that subjects who received a special one-hour treatment in which the instructor provided students with numerous specific examples of environmentally desirable practices that he/she could realistically expect to be able to perform, would demonstrate more positive environmental attitudes and more willingness to use more ecologically positive behaviors than would controls not exposed to the special treatment prior to the posttest (see Appendix D).

The hypothesis was tested using one-way ANCOVA on the combined posttest measures (PTOTAL) while controlling for the scores on the combined pretest measures (STOTAL). The test did demonstrate higher scores for experimentals but these differences were not significant ($S = .755$, see Table 13). Further analysis, controlling for various demographic variables as well as pretest, modified the results reported above, but in no case was a significant difference reported between student status groups. Thus the data dictated that hypothesis seven be rejected.

It should be mentioned, however, that in the testing of this hypothesis, problems similar to those discussed above for hypothesis six may also have been present. The type of "slips" discussed for hypothesis six not only alerted the students to the instructor's concern/modeling, they also pointed to means of altering environmental practices in a positive manner. In addition, means of effecting positive environmental change were discussed in a general way in several of the handouts and readings comprising the main treatment received by both experimental and control subjects (see Appendix E). It is entirely possible, and well worth researching further, that some type

of "ceiling effect" might be operative in the testing of these hypotheses. It is possible that beyond some minimal level, increased modeling and/or presentation of possible meaningful alternative behaviors, especially within a very limited time span, lose their ability to foster increasingly higher test results.

TABLE 13

ANCOVA RESULTS FOR ENVIRONMENTAL INFORMATION,
ENVIRONMENTAL ATTITUDES (SEAT-D AND DUCAT-1),
AND ENVIRONMENTAL BEHAVIORAL INTENTIONS COMBINED
BY PROVISION OF SPECIFIC ALTERNATE BEHAVIORS

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariates	378.113	1	378.113	.927	.341
STOTAL	378.113	1	378.113	.927	.341
Main Effects	40.089	1	40.089	.098	.755
SSTAT	40.089	1	40.089	.098	.755
Explained	418.202	2	209.101	.513	.603
Residual	17131.798	42	407.900	GRAND MEAN = 333.67	
Total	17550.000	44	398.864		
DEVIATIONS FROM GRAND MEAN ADJUSTED FOR COVARIATES:					
Control Group - .92 (Neg) Experimentals - .97					

Variations in Environmental Awareness By Curriculum Categories

Question 10 on the "Student Questionnaire" asked the student to indicate the general curriculum in which he/she was enrolled. The options on this closed questionnaire item were as follows: (A) Arts and Sciences; (B) Applied Arts and Sciences; (C) Business;

(D) Preprofessional Education; and (E) Undeclared.

When all instruments were combined (the resulting variable was called STOTAL and included pretest information scores as measured by SEAT-A; both attitude scales, i.e., the SEAT-D and the Ducat/Harrison attitude scale; and the Ducat/Harrison Behavioral Intention Scale) and a cell mean analysis was performed, the following results were obtained:

Total Mean for the Entire Population	232.46	(N = 201)
Arts and Sciences	241.96	(N = 46)
Applied Arts and Sciences	232.57	(N = 23)
Business	221.13	(N = 46)
Preprofessional Education	231.87	(N = 45)
Undeclared Major	235.98	(N = 41)

As can be seen, the highest scores were found in those students enrolled in the Arts and Sciences, which is consistent with other studies of this nature. The lowest scores were found among students enrolled in Business, which is also consistent with other studies' findings, and probably suggests both a lack of exposure to environmental education as well as some selective perception (discounting or avoidance or both) of the information that the student is exposed to. This interpretation, while not original, is consistent with the general cognitive dissonance theory.

The other categories were generally quite similar in scores on the pretest. This data would suggest the following:

1. Overall scores were reasonably low (as there were 371 points possible); in fact, approximately 62.5 percent, below failing in the writer's classes.
2. Business and Preprofessional Education majors could benefit most from environmental education courses (although all students could benefit).

Posttest scores show the following gains for experimental subjects: average gain, 53; Arts and Sciences gain, 30; Applied Arts and Sciences gain, 17; Business gain, 81; Preprofessional gain, 39; and undeclared major gain, 59. Hence we see that those students with the least prior exposure (i.e., the lowest pretest scores) had the greatest gains as a result of the treatment.

Those results are probably due to the effects of other demographic variables such as age, sex, etc., operative within the respective curriculum categories. It is, however, gratifying to see that Business majors made such dramatic gains. The writer is at a loss to explain the relative small gains made by Applied Arts and Sciences majors, unless this finding represented an overly optimistic assessment of the ability of technology to effect cures for environmental problems.

In the future, researchers in this area might consider a closer examination of the reasons for such differential gains and whether or not such gains persist over time for each of the groups equally. If this were so, it might provide some very helpful insights into the most profitable curriculum areas to stress more environmental education.

Variations in Environmental Awareness by Courses Previously Taken Which Potentially Contain Substantial Environmental Content

Questions 11, 12, and 13 on the "Student Questionnaire" asked the student to indicate any (and all) of the courses he/she had taken of the following: (1) Rocks and Stars; (2) Biology; (3) Zoology; (4) A Course on Energy; (5) Mother Earth; (6) Living with Nature; (7) Living

World; (8) The Curious Naturalist; (9) Environmental Photography; (10) Any other conservation or ecology course; (11) High School Biology; (12) High School Zoology; (13) High School Conservation; (14) High School Ecology; and (15) High School General Science.

Analysis of cell means was performed on the pretest data obtained Winter Term with the following results (note: some categories were not checked at all and other contained one or two students, hence only those categories checked by five or more students were reported):

Total Mean for All Subjects	196 (N = 240)
Rocks and Stors	238 (N = 39)
Biology	228 (N = 30)
Zoology	232 (N = 10)
A Course on Energy	254 (N = 14)
Living with Nature	222 (N = 7)
Living World	231 (N = 20)
Other (College) Courses	216 (N = 16)
High School Biology	224 (N = 30)
High School Zoology	220 (N = 5)
High School Conservation	221 (N = 7)
High School Ecology	215 (N = 8)
High School General Science	220 (N = 28)
Those not taking any of the above courses	167 (N = 141)
Those taking the Experimental Treatment (posttest score)	291 (N = 125)

As can be seen, those who had not taken any courses with potential environmental content scored much lower than those who had. It is also worthwhile to note that the majority of the students had not taken such a course in either high school or college (approximately 67 percent).

Care must be exercised in interpretation of these results, especially with those courses with a small number. However, it can be seen that all have some positive effect. The reader should also be

aware that some students will have checked two or more courses, hence the resulting means could at least partially reflect the combined effects of multiple courses with possible environmental content.

Even observing these cautions, several general conclusions can be made.

1. Exposure to environmentally related courses does improve environmental awareness.

2. Most students (approximately two-thirds) had not received such exposure prior to enrolling in Social Science 101 at Lansing Community College.

3. Exposure to environmental information seems to affect information and attitudes over time. This can best be observed in the higher mean scores for those taking high school environmental courses and in the follow-up study discussed in detail above.

Variations in Pretest Environmental Awareness by Demographic Characteristics

Demographic information was collected by the first 13 questions on the "Student Questionnaire." Each student reported his/her sex, marital status, age, race, number of credits earned to date, grade point average, area of residence, family income, composition of family of residence, curriculum, and courses previously taken which might have substantial environmental content. Cell mean analysis was performed on all pretest scores for all demographic variables by category with the following results (see also Table 14).

1. Grade Point Average. There was no difference in pretest scores by grade point average.

TABLE 14

SUMMARY OF CELL MEAN GAINS OR LOSSES IN TOTAL SCALE SCORE FOR EACH DEMOGRAPHIC VARIABLE
BY STUDENT STATUS GROUP, BETWEEN PRETEST AND POSTTEST

Variable Name	Pretest Control #1 & #2	N	Pretest Exp.'s	N	Posttest Exp.'s	Exper. Gain	Posttest Controls	Control (#'s 1 & 2) Gain
G.P.A., Totals	226	61	237	120	290	53	213	-13
1 - 2.00	226	10	233	8	279	46	160	-66
2 - 3.00	226	26	232	56	285	55	173	-53
3 - 3.49	227	15	243	42	306	63	293	66
3.5-4.00	222	10	240	14	267	27	250	28
SEX, Totals	224	77	237	125	284	53	224	0
Male	221	42	236	69	263	27	226	5
Female	228	35	239	56	311	72	221	-7
AGE, Totals	224	77	237	125	284	53	224	0
16-20	225	34	239	89	291	52	202	-23
21-24	223	16	227	17	282	55	227	4
25-29	226	16	226	10	200	-26	260	34
30-39	232	7	258	8	306	48	188	-44
40 & older	209	4	255	1	354	99	308	99
RACE, Totals	224	77	237	125	284	53	224	0
White	227	64	239	115	292	53	219	-8
Black	211	9	209	3	217	6	288	77
Spanish Amer.	197	1	210	5	198	-12	322	125
Other (Foreign)	214	3	233	2	182	-51	109	-105
RESIDENCE, Totals	224	77	237	125	284	53	224	0
Rural	229	15	242	44	259	17	233	4
Suburban	225	25	243	37	292	49	217	-8
City	222	37	228	44	303	75	224	2

INCOME, Totals	224	77	237	125	284	53	224	0
Under \$5,000	223	11	241	13	270	29	207	-16
\$5-\$10,000	223	20	241	13	287	46	239	16
\$10-\$15,000	220	10	246	23	275	29	188	-32
\$15-\$20,000	225	13	226	21	224	-2	251	26
Over \$20,000	227	23	237	55	314	77	219	-8
FAMILY, Totals	224	75	237	124	284	53	225	1
Self	230	19	238	19	276	38	240	10
Self & Spouse	226	20	231	14	219	-12	255	39
Parents	221	36	238	91	295	47	201	-20
CURRICULUM, Totals	225	76	237	125	284	53	227	2
A & S	231	18	249	28	279	30	235	4
AA & S	227	7	235	16	252	17	186	-41
Business	218	22	224	24	305	81	183	-35
Preprofessional	230	17	233	38	272	39	285	55
Undeclared	219	12	243	29	302	59	236	17
ECOURSE*, Totals	188	92	201	148	291	90	239	51
None	161	55	171	86	297	126	242	81
Rocks & Stars	229	13	243	27	261	22	221	-8
Biology	217	10	234	17	314	80	252	35
Zoology	230	10	235	6	330	95	232	2
Energy	256	2	254	9	230	-24	170	-86
MSTAT**, Totals	224	77	237	125	284	53	224	0
Single	225	47	237	101	294	57	203	-22
Married	224	19	235	13	209	-26	268	44
Divorced	221	11	242	11	284	42	233	12
CREDITS, Totals	224	77	237	125	284	53	224	0
0-15	224	38	238	60	281	43	244	20
16-30	220	14	239	29	303	64	155	-65
31-45	233	9	248	15	312	64	186	-47
46-60	222	8	217	10	222	5	232	10
Over 60	226	8	235	11	273	38	281	54

*Stands for prior exposure to courses with potentially significant environmental content.

**Stands for marital status.

2. Sex. There was very little difference in pretest scores by sex, although females do score slightly higher than males.

3. Age. Few clear patterns could be detected in the data for age differences, although the 30 to 39 age group did score higher than others.

4. Race. Whites scored significantly higher than non-whites. That finding is consistent with other research of this nature.

5. Residence. No clear patterns emerged for this variable.

6. Income. No clear patterns emerged for this variable.

7. Curriculum. See separate discussion above.

8. Prior exposure to courses with potential environmental content. See separate discussion above.

9. Marital Status. No clear patterns emerged for this variable.

10. Number of college credits earned to date. No clear patterns could be detected in the data. However, students with 45 to 60 credits scored the lowest (perhaps due to their avoidance of SS101 at some prior time which suggested lower interest in the subject matter of the course).

11. Family of Residence. No clear patterns could be detected from the data.

Differential Effects of Treatment by Demographic Characteristics

Identical demographic information was also collected on the posttest for all subjects, thus allowing pretest/posttest comparisons of the treatment effects (the data reported below is for Winter Term

Experimental Subjects only, N = 125).

1. Grade Point Average. While gains were made by every G.P.A. category, those students with moderate G.P.A.'s made the most substantial gains. That is no doubt partly due to the fact that those students began with lower scores, and was probably affected also by the interaction of other demographic characteristics.

2. Sex. While gains were made by both sexes, females made significantly greater gains than males. That result might have been due to the interaction of other demographic variables such as age, marital status, family, and prior exposure to courses with environmental content. The fact that the treatment was presented by a male instructor may have had an impact. However, the pattern was not repeated in the Spring Term data.

3. Age. All categories showed similar gains from pretest to posttest except the 24 to 29 year olds (N = 10). Those students actually declined 26 points. While this researcher is at a loss to pinpoint the reason for that effect, several possibilities should be considered. First, the result might have been due to the interaction of other demographic variables such as race, marital status, family, or number of college credits earned to date. Second, that age group was the group which was, in all probability, just beginning to become established and begin a family, and so forth, and as such might have been the most threatened (hence the most resistant) to some of the content of the treatment. That could be especially true of the content involving consumption, pollution, and limitation of family size.

4. Race. This is perhaps one of the most significant findings of that section of the study. As can be seen whites made

significant gains from pretest to posttest but nonwhites made either very small gains or significant losses. While caution must be exercised here due to the small number of nonwhite subjects (this pattern was, however, repeated in the Spring Term data), several possibilities should be considered. First, it is possible that the result was due to the interaction of other demographic characteristics such as age, marital status, or family. Second, it is possible that those groups are the most immediately threatened by environmental reforms and hence most apt to resist those values. This latter interpretation is consistent with others' findings and speculations and should most certainly be considered when designing an environmental education course to be taught to a group with substantial minority composition. In such a case, care should be taken to place a greater emphasis on the beneficial effects (especially financial and employment related effects) of environmental reform.

5. Residence. While all groups made gains from pretest to posttest, the greatest gains were made by those students who resided in the city. That is probably due to the fact that negative environmental conditions are most readily apparent in the city, and students who reside there were most immediately affected. This interpretation has support in the literature, and also gains support when the overall pattern is considered; i.e., rural residents' gains are the lowest, followed by suburban and city residents.

6. Income. As can be seen, all income groups showed gains from pretest to posttest except the \$15,000 to \$20,000 income group (N = 21). No doubt some interaction with other demographic characteristics influenced that finding, e.g., age, marital status, family, etc.

That is probably also the same group discussed earlier, which was in the process of trying to become established financially and hence most apt to resist some of the content and attitudes advocated in the treatment. Those with the highest incomes showed the greatest gains.

7. Curriculum. See separate discussion above. It is also interesting to note that the lowest gains were made by Applied Arts and Sciences majors, who may place a greater psychological investment in technological solutions to environmental problems, and that the greatest gains were made by business majors. The writer finds the latter observation both very encouraging in general and believes such a finding speaks very favorably for the probability of the success and popularity of environmental education courses both within the Business Department and the larger business community. Active environmentalism is good business (in the long term and in many cases in the short term as well) and those students seemed to be very receptive to this reality.

8. Prior exposure to courses with potential environmental content. See separate discussion above. It is also interesting to note that by far the greatest gains were made by students with no prior exposure to environmental courses. This finding is consistent with other research findings on the relationship between environmental information and attitudes/behavioral intentions.

It is also worthwhile to note that students who had previously taken courses with potential environmental content also showed significant gain scores. This suggests that courses such as biology and zoology do provide the student with concepts and information which can be valuable in assisting him/her to readily grasp environmental concepts. It does not, however, argue strongly for these courses as

prerequisites for a course in environmental education, given the gains made by students who had not taken such courses.

Finally, it should be noted that while students who had taken courses in biology, zoology, etc., did have somewhat higher pretest scores (but not significantly so, as hypothesis five indicated), great improvement occurred as a result of the treatment. That reinforces the finding that if educational institutions want to produce environmentally literate students, they must teach courses specifically aimed at this objective. By and large, environmental concepts do not "rub off" in non-environmental education courses, nor do students arrive at such concepts as a result of integrating concepts learned in other related courses or disciplines.

9. Marital Status. While single and divorced or separated students showed significant gains from pretest to posttest, married students actually declined on posttest scores. That outcome was, no doubt, partly the result of the interaction of other demographic characteristics such as family, age, and income. It was also probably partially due to the fact that, once again, those young marrieds were members of that group discussed above who were struggling to establish themselves financially and thus were more resistant to some of the content and values inherent in the treatment.

There may be another process which played a role in the result as well. While the writer cannot substantiate this interpretation, it occurred to him that the spouse of the married student might detract from the positive impact of the treatment for various reasons, e.g., to "protect" the spouse, to justify unecological personal practices or occupational choice, etc.

10. College credits previously completed. All groups showed significant gains except those with 46 to 60 credits, who gained five points from pretest to posttest. Interpretation of that finding would include the interaction of other demographic characteristics such as marital status, family, and age. One could also postulate that students taking Social Science 101 after accumulating that number of credits were more likely to have a lower interest in the course and were taking it to "get it out of the way for graduation."

11. Family. Students living alone or with their parents showed significant gains from pretest to posttest; those living with a spouse actually decreased on their posttest scores. Again, the writer believes that result is partially due to the interaction of other demographic characteristics such as age, income, marital status, etc., and partially due to the reasons discussed above for marital status and income; i.e., the group of young marrieds may have been deeply committed to establishing themselves financially at that point in their lives, and as a result may have been more resistant to the treatment.

The above study also lends support to the contention that the operation of cognitive dissonance may be instrumental in motivating and supporting new environmental behaviors, as well as opposing the acquisition of new environmental attitudes and behaviors in other circumstances, especially among minorities and young marrieds.

In the first case, new information was accepted by the individual, which brought old information and/or old attitudes and behaviors into a dissonant relationship with the new information and/or attitudes. No doubt a number of factors affected how well the student

accepted the new information. Probably how the student perceived the instructor (his credibility) was one such factor. Other factors predisposing the student to accept the new information seemed to include higher parental income, age (i.e., the younger student living at home with her/his parents seemed to be most strongly influenced), average to slightly above average scholastic ability, and a number of other factors which taken together seemed to add up to a low level of prior information about environmental issues and problems. No doubt still other factors such as the students' affective orientation toward the instructor, his/her peer group orientation, etc., were also important. This is perhaps one area in which much useful research could be done, i.e., to identify those variables which and to the impact (legitimacy, credibility) of environmental information being communicated in a classroom environment.

Cognitive dissonance was also operative in the opposite case, i.e., in rejecting the new positive environmental attitudes. The results of that study pointed this out most clearly in the reaction of one group of students whose overall environmental attitude and behavioral intention scores actually dropped as a result of exposure to more information. Not surprisingly, this group was largely made up of minorities and young marrieds who had recently entered the labor market and might have been starting families. No doubt part of their resistance to the new attitudes advocated in the classroom was the result of competing messages from spouse and peers. That group would appear to have reduced the dissonance created by the new environmental information by reducing the importance of the new elements and perhaps strengthening the importance of the old elements as well. It would be

interesting to see if those students also began to ascribe less credibility to the instructor and other environmental "authorities" as well.

For a group such as that, new techniques must be developed which would reduce this "backlash" effect. Such techniques might include a greater focus on employment and economic opportunities inherent in environmentalism, models closer to those students' ages and choices of lifestyles, models from among those students' subcultural "heroes," etc. This is another area where additional research could prove highly valuable, i.e., means to tailor environmental education for maximum impact for specific target populations.

CHAPTER V

SUMMARY AND CONCLUSIONS

This investigation has attempted to determine the effectiveness of an experimental treatment in environmental education at a public junior college aimed at changing the level of environmental information, and the character of environmental attitudes and behavioral intentions, of freshman and sophomore students.

The treatment was observed to significantly increase environmental information, environmental attitudes, and behavioral intentions. It was further demonstrated that neither increased exposure to mass media news nor increases in college credit hours successfully completed resulted in any significant increases in any of the dependent measures. It was also demonstrated that neither the instructor's modeling of environmentally positive behaviors nor the provision of specific environmentally positive alternate behaviors by the instructor were significant factors in the outcomes reported above.

The cognitive dissonance theory was utilized to provide a framework within which to view the probable effects of the introduction of new environmental information. In general terms, it was argued that as students' knowledge about environmental problems increased, dissonance would occur between the new information and old attitudes and/or behavior patterns. Much of this dissonance could be reduced by

adopting more favorable environmental attitudes, which would in turn increase the probability that the subjects would also modify their actual behavior toward the environment thus keeping dissonance at a minimum.

The findings of the follow-up study seemed to clearly support this construct. In addition, these three variables (environmental information, attitudes, and behavioral intentions) were so highly correlated that over 75 percent of the variance on one dimension could be predicted by the individual's score on either of the others (see Tables 4 and 5). This is a highly significant finding and clearly indicates that at least one major obstacle to a higher environmental consciousness in the population sampled was the absence of information providing any coherent framework for assessing current environmental issues and problems. Students themselves confirmed this interpretation as a majority (72 percent) of them indicated on the pretest that they did not feel that they had adequate knowledge of environmental issues and most (67 percent) indicated that they would enroll in a course which dealt exclusively with such subject matter if it were available.

In a follow-up study conducted with students three and six months after receiving the experimental treatment a subsample of students not only demonstrated the retention of the new attitudes and behavioral predispositions, but most also cited actual changes in their behavior toward environmental issues (approximately 88 percent). These changes ranged from driving less in order to conserve energy to organizing a neighborhood clean-up campaign. If these self-reports can be considered basically accurate, there is little doubt that attitude changes produced in the classroom did give rise to new, environmentally

positive, behaviors.

This finding is particularly important because the literature concerning the nature of the relationship between environmental attitudes and actual behavior is largely mute on this most important linkage. This study is, to the best of the researcher's knowledge, the first study to establish such a clear connection between these variables. Not only do the results of the study indicate that environmental information is highly correlated with environmental attitudes (a well-documented finding in research of this nature), but it also demonstrates that how the respondent reports thinking and feeling about environmental issues (i.e., his/her attitudes) are excellent predictors of how he/she says he/she will act toward the environment. Furthermore, if the students' anonymous self-reports can be considered basically valid, the students' behavioral intentions (i.e., how they say they will act toward the environment) are excellent predictors of the students' actual behavior three to six months later.

Theoretically, the findings of this study are also important because they add support to the conception of an attitude as affecting the probability of the occurrence of a behavior. While not all of the students receiving the treatment adopted new, environmentally positive behaviors, the vast majority did do so. Furthermore, while demographic differences did not significantly affect the findings on the testing of the hypotheses, there were some consistent differences in the treatment's effects on some groups.

It was also asserted that if raising the environmental consciousness of the citizenry is a desirable goal in this country, as nearly everyone seems willing to agree it is, then this goal is not

being accomplished by merely attending institutions of higher education. When students who had not taken courses with any substantial environmental content were compared with those who had, the differences were dramatic, amounting to more than a 40 percent difference in average pretest scores in most cases. Those students who had the most environmental knowledge were the same students who had the most favorable environmental attitudes and behavioral intentions. Such information is rarely presented in courses other than those that deal directly or indirectly with ecology or conservation in some significant way, i.e., courses aimed at environmental education. If we as a society really do wish to raise the environmental consciousness of the citizenry, environmental education can be very effective, simple education would seem to be much less effective.

In a similar fashion it was also asserted that the mass media, even mass media news programs, were not significantly raising the public's environmental consciousness, at least not beyond broadcasting the impression that there are serious environmental problems. So while the mass media probably have contributed to this minimal awareness, they may have done little or nothing of an environmentally positive nature beyond this. They may, in fact, have done much of a negative nature in the content of news and non-news programming. This may be the case in their advertising appeals to overconsumption and waste. It may be equally the case with many nonadvertising themes such as a glorification of large families, a fostering and legitimization of a general permissiveness, etc. Even the news would seem to contribute to this negative environmental impact through such means as failing to provide its audiences with any understanding of how they

contribute to the problems and issues presented, how the problems and issues presented are related to other issues and problems, and what the individual can do to assist in the solution to the problem.

The findings of this study lend support to the contention that the mass media do not make significant positive contributions to the environmental education of their audiences. Television, radio, newspapers, the most widely attended media, do not appear to make any significant contributions to raising environmental consciousness in the population studied. It seems reasonable to speculate that this is probably due to the factors cited earlier, e.g., fragmentation of events, failure to provide alternatives, failure to link causes and consequences with an environmental issue/problem, etc. Only in the case of news magazines were any significant differences found between high and low consumers.

In this case, analysis demonstrated a curvilinear relationship between news magazine consumption and information and behavioral intentions. Those individuals with the highest and lowest consumption of news magazines scored lowest in their possession of environmental information and positive behavioral intentions. Conversely, moderate news magazine consumption correlated with higher scores. Caution must be exercised in the interpretation of these findings, however, as there were only four students in the highest news consumption category. If those four individuals were removed from the study, analysis failed to demonstrate significant differences between high and low consumers of news magazines. Perhaps the most important aspect of this finding is that either way one interprets these results, news magazines do not increase the readers' environmental information or behavioral

intentions in any significant way. It is possible that this may be because readers are simply overwhelmed by the number and severity of problems presented for which no solutions are proposed or discussed.

These latter findings, i.e., those regarding the effectiveness of the mass media in raising environmental consciousness, are of particular importance because this is the first scientific study to demonstrate them on any population. Many writers and environmental authorities have asserted that the mass media are not doing, and perhaps cannot do, the job of raising environmental consciousness, given current limitations, but to the best of the writer's knowledge, this assertion has never before been tested. In all fairness to the media, this researcher believes it is possible to say that they may have made their audiences more aware of some environmental issues and problems, and perhaps this is a first step for behavior change for those who have the background knowledge of ecological interrelationships or the motivation to acquire same. However, this is no doubt a very small segment of the media's audience. In any case, for the population sampled, the media have not been instrumental in significantly raising environmental consciousness or altering environmental behavior in any positive way.

Finally, it was asserted in this study that the way in which students were taught environmental information would affect attitudes and behavioral intentions. Specifically, it was argued that if the instructor modeled environmentally positive behaviors in his own lifestyle and/or provided students with realistic alternative behaviors of an environmentally positive nature, students would demonstrate positive environmental attitudes and behavioral intentions. The data failed

to support these contetions as tested.

One additional way in which this study may have value is that it also appears to offer insights into some differential treatment effects. For example, young marrieds, no doubt struggling to establish themselves financially, and minority and foreign students would appear to strongly resist this "traditional" approach to environmental education. This finding is consistent with the implications of other studies in this subject area, and in terms of dissonance theory would suggest that these groups either discount the new information or strengthen the old attitudes and/or behaviors to reduce dissonance. In either case more of a focus on such elements as the occupational and financial opportunities/benefits inherent in environmental reform could result in greater attitude and behavior change among these target populations. Certainly, continued research aimed at investigating such possibilities should prove most worthwhile.

Summary of Treatment Effects by Selected Questions

1. "(Do) the public schools of our nation spend enough time in the teaching of ecology/conservation?" (Question 54) Pretest scores indicated that 53 percent of the students did not believe they do. This figure climbed to 72 percent on the posttest, indicating that as students came to better understand the complexity and seriousness of current environmental problems, they also supported more educational efforts to inform and educate the citizenry concerning these problems and issues.

2. "American beliefs and values have been a basic cause of

our present pollution problems." (Question 75) Pretest scores showed that 38 percent of the students strongly or very strongly agreed with that statement, while only 6 percent did not agree at all. On the posttest, only 3 percent did not agree at all with the statement, and the percentage who strongly or very strongly agreed increased to 63 percent. This would appear to indicate that as students gain in awareness, they also begin to better understand many of the underlying causes for decreased environmental quality.

3. "Lansing Community College should make a conscious effort to develop positive environmental attitudes in its students." (Question 83) On the pretest, 87 percent of the students either agreed (31 percent), strongly agreed (22 percent), or very strongly agreed (34 percent) with this statement. This figure climbed to 96 percent on the posttest, with students indicating that they agreed (17 percent), strongly agreed (29 percent), or very strongly agreed (50 percent) with the statement.

Two points should be made in connection with these findings. First, even before exposure to the experimental treatment, the vast majority of LCC students believed that the institution had a responsibility to educate the student body in an environmentally positive manner. Secondly, after receiving the treatment, more students held this position and they held it even more strongly. It would appear that the implication and the mandate are clear enough.

4. "Do you believe that Lansing Community College now offers enough environmental education to provide most of the students with an adequate understanding of today's environmental issues?" On the pretest only 28 percent of the students indicated that they believed

LCC did offer enough environmental education, 47 percent were undecided, and 24 percent believed that LCC did not offer enough environmental education courses. On the posttest the percentage who believed the college did not offer enough environmental education increased to 44 percent, while 32 percent remained undecided. (See Question 95.)

5. "Do you feel that you have adequate knowledge about environmental issues?" (Question 102) Pretest data indicated that 72 percent of the students felt that they did not and 14 percent were undecided. Even after the experimental treatment, 54 percent believed that they did not have adequate environmental knowledge, and another 16 percent were not sure that they did. That finding certainly suggests that the student body perceives environmental education as an area they want to know more about, or feel deficient in, even after the treatment.

6. "If given the opportunity, would you enroll in a college course which deals specifically with the environmental crisis?" (Question 106) On the pretest, 57 percent of the respondents indicated they would enroll in such a course (22 percent said they definitely would), while 25 percent indicated they were not sure. That is an important finding since it indicates that only 18 percent of the students would not enroll in such a course (17 percent said that they probably would not and only 1 percent, actually only one student, indicated that he/she definitely would not enroll). Such a finding is most encouraging for the potential success of expanded course offerings in the area of environmental education.

Posttest scores are even more encouraging as only

6 percent of the students who received the treatment indicated an unwillingness to enroll in additional environmental education courses, 25 percent remained undecided, and 67 percent indicated that they would enroll in such courses if offered (30 percent said they would definitely enroll). This would seem to indicate that not only is there a very good potential for expanded course offerings among unexposed students, but that this potential actually expands with more exposure to the subject matter.

7. "Government would solve most environmental problems if environmental groups would leave them alone." (Question 68) It is significant that 90 percent or more of the respondents did not agree at all with that statement on either the pretest or the posttest. In other words, they did not look to governmental agencies to take the initiative to solve environmental problems. Were they themselves then willing to do so?

8. "Do you feel that you have an obligation to become actively involved in helping to solve environmental problems in your home community?" (Question 104) On the posttest 35 percent of the students responded that they definitely did (as opposed to 20 percent on the pretest) and the combined percentage of respondents who felt they definitely or probably have such an obligation reached 82 percent on the posttest.

9. "I can affect the environmental decisions made in my city." (Question 87) On the pretest 18 percent of the respondents did not agree at all, and only 11 percent indicated they strongly or very strongly agreed. On the posttest the percentage who did not agree at all dropped to 3 percent and the percentage who strongly or

very strongly agreed increased to 41 percent.

10. A similar pattern emerged in response to Question 89, which stated, "I have a responsibility to make other people aware of environmental problems." Here the percentage of respondents who indicated they strongly or very strongly agreed increased from 29 percent on the pretest to 56 percent on the posttest.

11. "People in the U.S. shall have to be satisfied with a lower standard of living in the near future." On the pretest 31 percent of the respondents did not agree at all with this statement, and another 24 percent only slightly agreed. The combined percentage of those who strongly agreed or very strongly agreed was 17 percent. (See Question 58.)

On the posttest the percentage of those who strongly agreed or very strongly agreed rose to 42 percent and those who did not agree at all dropped to 11 percent. That suggests that approximately one third of the subjects significantly modified their position in regard to the advisability of the continuation of current American consumption patterns.

12. "Are you willing to maintain a lower standard of living than that presently enjoyed by many Americans in order to conserve scarce natural resources?" (Question 98) Those who indicated that they definitely would be willing rose from 19 percent on the pretest to 37 percent on the posttest. It would appear that many students receiving the experimental treatment not only saw an increased need to alter their lifestyle, but also expressed a willingness to actually do so.

To summarize, it would appear that students exposed to the treatment not only more accurately perceived environmental problems and saw the need to further educate themselves and others to these problems, but also expressed an increased willingness to work toward solutions to these problems and to make personal sacrifices to improve environmental conditions. It should also be noted that increased awareness and willingness to make personal contributions and sacrifices occurred despite an increase in skepticism in regard to our ability to solve such problems. This is perhaps best expressed by a decrease from 40 percent on the pretest to 27 percent on the posttest of the respondents who indicated that they were ". . . reasonable convinced that we shall be able to solve our environmental problems." (See Question 108.)

CHAPTER VI

REFLECTIONS AND SPECULATIONS

This study was in effect an attempt to document the necessity for a greatly increased emphasis on environmental education in this nation and elsewhere. It advances the argument that as individuals learn of the elements and magnitude of current environmental problems and issues they will become more favorably predisposed to engage in ways more favorable to the natural environment. It also attempts to call into question the notions that simple and/or more exposure to mass media news will result in producing these results. The findings of this study seem to support these contentions.

So where do we go from here? In this chapter the researcher has briefly outlined what he considers to be some of the more important, although untested, implications coming from this study.

Implications for Theory and Suggestions for Further Research

The concept of cognitive dissonance would seem to be a useful conceptual tool in discussing environmental education and its impact on target audiences. It may be responsible for the increase in attitudes and behavioral intentions in the original study and in the follow-up study conducted later. In the latter case this would suggest that, once sensitized to environmental problems, the students probably begin

to attend to these issues more and to take some initial steps, probably those with little cost to themselves, to try to have a greater positive impact on the environment. This in turn may make continuing to act in a more positive manner more valuable in their eyes as they already have something invested in this direction. As a result still more favorable attitudes and behaviors may result. This concept needs to be subjected to closer examination and the conditions that hinder or facilitate it need to be identified and researched.

It has been the experience of this researcher that the public is generally willing to pay lip service to the idea that environmental problems are serious, yet most seem to avoid attending to such issues and concerns. Many times when asked about an environmental issue that has been widely publicized in the mass media, only one or two students out of a class of forty will have any knowledge of the issue. Perhaps this avoidance is due to the fact that if the public does attend to these issues, they must question many other cherished ideas; e.g., does business really want to serve the customer, do they in fact even consider the needs or of those they produce goods and services for, is technological "progress" always desirable, can and/or should our standard of living continue to rise or even hold its own? To call these and similar questions into serious consideration could produce substantial cognitive discomfort. Under these circumstances, not attending to what is happening right under our noses becomes increasingly attractive because it supports the status quo for the individual and the social order, which is certainly more secure and comfortable.

If this assessment is correct, it could also help to explain why those individuals tied more closely to the present social and

economic order, i.e., the older, married, and upwardly mobile segment of the population studied were the most resistant to the treatment. It would also help to explain why media news consumption fails to influence environmental information and attitudes, i.e., consumers simply "tune it out" or fail (refuse?) to see clear trends indicating that the crisis is deepening. If such is the case, environmental education that presents the larger picture in a coherent and integrated manner is even more necessary than thought previously. So is continued research to determine the most effective methods for positively impacting various groups and target populations who differ in their attachment to and/or dependence upon the status quo.

If this assessment is correct, it also argues for an evaluation of the effectiveness of environmental education programs with younger students and programs for older persons which approach the subject from the more positive standpoint of solutions and opportunities, and benefits inherent in environmentalism. How can the value of positive environmentalism be elevated for these populations? What means are available for reaching this goal and which of them are the most effective with particular target populations? It is the view of this researcher that much needs to be done in this area if environmental education is to be truly effective.

This study considered only one approach, a problems/basic concepts approach, to environmental education. There are many other equally valid approaches such as an examination of corporate contributions/responsibilities to and for environmental problems and reform, a governmental approach, etc. These types of approaches need to be examined both in terms of their overall effectiveness and in

comparison with each other with various target populations.

Nor did this study investigate which of the concepts or materials presented may have had the greatest impact on students' attitudes and behaviors, or which had the greatest impact in producing cognitive dissonance in either a positive or a negative environmental direction. Much work needs to be done in this area as well. This researcher is inclined to believe that the two concepts that may be most influential are the concept of the exponential growth in the basic elements of population, resource depletion and pollution, as well as the concept that the chain is only as strong as its weakest link (or Liebig's Law of the Minimum, if you prefer) applied to human existence. If the learner really grasps these concepts and becomes interested enough to look at the objective evidence of his/her senses, continued apathy and/or inaction become increasingly difficult, especially when the adequacy of government's response to the situation is considered.

If several such key concepts can be identified, then incorporating them into environmental reporting and environmental education could revolutionize the state of environmental consciousness in the American public.

Upon examination of the study results pertaining to the effects of the treatment for various segments of the student body, this researcher is led to question the results for those students whose posttest scores actually declined or remained unchanged, i.e., those students who were married, employed, and roughly 24 to 29 years old, worked in occupations or had closer associations with peers or others who held more anti-environmental or negative environmental

attitudes. The effects of such situations and influences on the expression of environmental attitudes needs to be investigated in much more detail if environmental education can gain the effectiveness to change deeply imbedded attitudes and values. Also, those attitudes and their support structures need to be identified and studied.

The fact that more and more accurate information is the number one correlate of positive environmental attitudes would seem to be environmental education's strongest argument, because when those who knew the most about the subject were the most concerned, it speaks a need that must be addressed immediately and as effectively as possible.

Implications for New Course Development

In considering new course development, the following points appear pertinent:

1. There were generally low levels of environmental awareness on the part of students on the pretest.
2. The lowest pretest scores were among business and pre-professional education majors, and the highest scores were among arts and sciences majors.
3. Two-thirds of the student body had not been exposed to any environmental education prior to their enrollment in the experimental treatment (many of these students had completed one or two years of coursework at this institution).
4. Minorities had much lower levels of environmental awareness than whites and did not respond as well to the approach employed in this experimental treatment.

5. Environmental education (as taught in this treatment) was least apt to produce positive results with those students who were married, financially establishing themselves, and between the ages of 24 and 29 years old.

6. Prior exposure to environmental education courses, or courses with ecological and/or conservation content, enhanced rather than detracted from further environmental education.

7. Most students did not believe public educational institutions in general, or Lansing Community College specifically, were offering enough environmental education.

8. Most students (96 percent) believed that LCC was responsible for promoting positive environmental attitudes in its students.

9. Most students (72 percent) did not feel they had adequate knowledge about environmental issues.

10. Most students (67 percent) indicated they would enroll in a college course which dealt specifically with the environmental crisis.

11. The successful environmental education course did not seem to depend on the personality characteristics of the instructor but rather on the nature and completeness of the information provided.

12. Environmental education produced behavioral changes in students which most of the public would consider very desirable.

On the basis of these facts I would make the following recommendations for undergraduate environmental education.

1. A significant expansion of course offerings in environmental education. Such courses should minimize any prerequisites. If large segments of the students enrolling in such courses are

nonwhite, non-American, or just beginning to establish families and financial independence (naturally, learning this would require the collection of such information at the beginning of the course), the course should devote a significant block of time and other resources to the financial and employment opportunities inherent in environmental reform. In fact, in any environmental education course these aspects should be covered to some degree.

2. The creation of environmental education courses within the "continuing education" segment of the student population. One such course could focus on the financial rewards of environmentalism. It should have appeal to small businessmen as well as to middle class and lower middle class families looking for ways to cut costs (currently a large target audience, and one that most environmental experts expect to increase further).

3. Continuing assessment of the effectiveness of programs in environmental education at all levels. The results might be used both to promote instructional research and document socially relevant outcomes of the programs.

4. The provision of inservice education for faculty interested in incorporating environmental education themes, concepts, and examples in existing courses. This practice could serve a dual purpose. First, it could enhance the existing course by adding material which students report that they want to know more about (thus enhancing student interest in the course and providing an interdisciplinary approach at the same time). And secondly, it would stimulate the student to enroll in courses specifically designed as ecology and/or environmental courses.

5. The inclusion of courses/units in environmental education within the business and preprofessional education curricula (or their equivalent). Such courses should of course be tailored to meet the needs and interests of their respective students.

6. Efforts to establish and promote interdisciplinary approaches to the subject matter should be immediately initiated and supported at all levels.

APPENDICES

APPENDIX A

ENVIRONMENTAL INFORMATION QUESTIONNAIRE

PLEASE NOTE:

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These consist of pages:

136-139

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SYRACUSE ENVIRONMENTAL AWARENESS TESTS

Level III Form A

Eric F. Gardner
David J. Kleinke

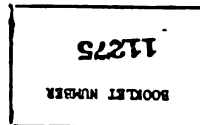
Syracuse University, Syracuse, New York 13210



The development of this test has been funded by the Northeastern Environmental Education Development, a cooperative effort of The State Education Departments of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont under a grant from the United States Office of Education (ESEA Title 5-Sec. 505). Inquiries regarding this organization should be sent to:

Northeastern Environmental Education Development
New York State Education Department
Division of General Education
Albany, New York 12224

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Open this booklet and read the general directions on the inside front cover.

DO NOT BEGIN THIS TEST UNTIL TOLD TO DO SO.

Appendix A

Environmental Information Questionnaire

General Directions

This test consists of 56 questions. Read each question carefully, then decide which answer is best for that question. Then on your separate answer sheet, fill in the space which has the same number as the answer you have chosen. Be sure your marks are heavy and black. Erase completely any answer you wish to change. Do not mark on this test booklet.

You may answer a question even if you are not perfectly sure your answer is correct. When the examiner gives the signal, begin work.

DO NOT BEGIN UNTIL TOLD TO DO SO.

Cog. A-4

1. Which country creates the greatest amount of pollution?
 1. India
 2. China
 3. Union of Soviet Socialist Republics
 4. United States
2. Which pollutant is released by burning coal?
 1. mercury
 2. lead
 3. sulfur dioxide
 4. phosphates
3. Which body of water is most severely polluted?
 1. Lake Erie
 2. Chesapeake Bay
 3. the Gulf of Mexico
 4. the St. Lawrence Seaway
4. In the United States, the most common air pollutant is (are)
 1. ammonia
 2. nitrogen oxides
 3. particulates
 4. carbon monoxide
5. What is the best way to prevent the washing away of topsoil?
 1. building canals
 2. planting grasses
 3. having cattle graze the land
 4. building stone fences at the edges of fields
6. Lake-polluting algae grow most rapidly in water whose temperature is best described as
 1. cold
 2. cool
 3. warm
 4. hot
7. To an environmentalist, which is the least desirable effect of the Interstate Highway System?
 1. Good roads produce a desire for more privately-owned automobiles.
 2. Building the roads produces more jobs, at least temporarily.
 3. The roads permit easy travel from place to place.
 4. Using gasoline taxes to finance the construction discriminates against the individual motorist.
8. "Black lung" is a disease associated with
 1. cigarette smoking
 2. coal mining
 3. living in cities
 4. working in an oil refinery
9. If the amount of light reaching a body of water is reduced, the quantity of algae in that water will
 1. increase, year round
 2. decrease, year round
 3. increase in the summer but decrease in the winter
 4. increase in the winter but decrease in the summer
10. A decibel is a measure of the amount of
 1. organic pollution in water
 2. inorganic pollution in water
 3. particulate matter in air
 4. noise
11. Rachel Carson's book, *Silent Spring*, brought public attention to
 1. the dangers associated with nuclear power plants
 2. causes of pollution in the Great Lakes
 3. misuse of pesticides
 4. increased carbon monoxide levels in the air
12. Does exposure to noise pollution (loud noises) have any effects on the body other than on the hearing?
 1. Yes, it raises blood pressure.
 2. Yes, it causes increased production of antitoxins.
 3. Yes, it decreases heart rate.
 4. No.
13. What has been called "the water crisis" in the United States is primarily due to
 1. poor water management
 2. a general water shortage
 3. government interference
 4. a long-time drought
14. Which practice adds to land pollution?
 1. allowing the ground in a forest to go unmaintained
 2. introducing new varieties of wildlife in a meadow
 3. collecting litter from open fields and depositing it in dumps
 4. collecting litter from open fields and burning it
15. In the United States, the greatest source of air pollution is
 1. industrial activities
 2. solid waste disposal
 3. burning of fuel to heat buildings
 4. motor vehicles
16. Which pollutant adds the greatest amount of nutrients to United States waters?
 1. oxides
 2. sulfates
 3. chlorides
 4. phosphates
17. Over the past twenty years, the biggest source of pollutants in Southern California smog has been the
 1. processing of crude oil at refineries
 2. burning of gasoline in automobile engines
 3. operation of jet airplanes
 4. burning of solid wastes
18. Which material is easiest to recycle?
 1. glass
 2. wood
 3. ceramics
 4. plastics
19. In humans, the biochemical effects of DDT are compounded by its action on the
 1. liver
 2. heart
 3. stomach
 4. bones
20. Which of the following sources adds the greatest amount of phosphates to lakes?
 1. the processing of metal
 2. plastic manufacturing
 3. fertilizers
 4. DDT spraying
21. Which best describes a temperature inversion?
 1. a drop in temperature during the daytime
 2. a rise in temperature at night
 3. a rise in temperature during the winter
 4. a layer of cold air covers a layer of warm air
22. Which kind of pollution are nuclear power plants most likely to cause in normal operations?
 1. air
 2. noise
 3. thermal
 4. land

23. A poison similar to a gas used during World War I to blind or kill humans can be produced by

1. burning certain plastics
2. inefficient operation of sewage treatment plants
3. an atomic energy plant's having a "conventional explosion"
4. spraying farmland with pesticides

24. Eutrophication occurs in

1. lakes
2. the atmosphere
3. soils
4. oceans

For questions 25 through 27, select the word from the list below that correctly describes the species. You may select a word more than once.

1. common
2. endangered
3. extinct

25. American bison

26. whitetail deer

27. California condor

28. Which accumulates in harmful amounts in fish?

1. calcium
2. iron
3. mercury
4. strontium

29. Pollution was less a problem in rural areas of the United States 150 years ago than it is today, even on a per capita basis. This is mainly because

1. agriculture was limited to the Eastern Seaboard
2. people were more careful with their waste products
3. much of the trash was burned and therefore not allowed to accumulate
4. natural systems could absorb the waste of a smaller population

30. The most serious environmental threat posed by off-shore oil drilling in the Gulf of Mexico is

1. damage to shrimp and oyster beds
2. salt water contaminating the oil
3. air pollution from offshore fires
4. depleting the offshore oil reserves

31. Which recreational improvement does the least harm to the environment?

1. an asphalt tennis court
2. a chair lift for downhill skiing
3. an artificial-ice rink for skating
4. a bicycle route designated on city streets

32. Which characteristic of DDT makes it environmentally dangerous?

1. it lasts a long time in the air or on the ground.
2. it causes high death rates among farmers.
3. it rarely controls the pests for which it was intended.
4. it lowers the resistance of certain insects to other poisons.

33. The main threat to the survival of the Everglades comes from

1. an overabundance of alligators
2. animal poachers
3. the introduction of exotic plant and animal species
4. the decrease in available water

34. What is the current total world population of whooping cranes?

- (1) none
- (2) 1-500
- (3) 501-5,000
- (4) more than 5,000

35. Birds such as the brown pelican and the peregrine falcon are near extinction because DDT causes

1. their eggs to have shells that are too thin
2. the birds to lose their desire to breed
3. baby birds to have no appetite
4. immediate death in these birds if they eat food with DDT in it

36. Population growth in which country is most immediately harmful to the world's supply of natural resources?

1. China
2. India
3. United States
4. Bolivia

37. A senator who is concerned with the environment would most likely support a bill to

1. develop large transport airplanes
2. improve the efficiency of long-distance railroad transportation
3. prohibit a long-distance truck to tow more than one trailer at a time
4. add to the existing Interstate Highway System

38. Which gas is a product of fermentation?

1. oxygen
2. helium
3. water vapor
4. carbon dioxide

39. The greatest total number of calories (heat energy) is required to produce a pound of which food?

1. beef
2. rice
3. clams
4. potatoes

40. Is the clearing and farming of tropical rain forests environmentally sound?

1. yes, in order to provide food for the world's population
2. no, because of the energy that would have been produced
3. no, because the ground would harden and not support crops
4. no, because the displaced native peoples would move to urban areas

41. Over the long range, the most effective way to increase the amount of food available to each person in the world is to

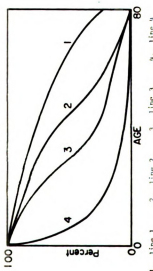
1. improve hydroponic (without soil) agricultural methods
2. increase the number of people working in agriculture
3. irrigate desert areas
4. reduce the world's population

42. Which taxation practice encourages people to have large families?

1. allowing a tax exemption for each person in a family
2. charging a sales tax for goods and services
3. raising money through a tax on real estate
4. allowing an income-tax deduction for charitable contributions

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43. In the United States in the early 1900's, did the typical family want
 (more) children?
 1. few, because food supplies were limited
 2. few, to make it easier to migrate westward
 3. many, because of the need for farm labor
 4. many, since children were looked upon as sources of labor
44. A vaccination is performed on _____ for the purpose of allowing them to _____
 (children) _____
 1. men ... father
 2. men ... avoid fathering
 3. women ... avoid bearing
 4. women ... avoid having
45. Which custom in certain primitive societies effectively serves, to their
 population, as a means of limiting their growth?
 1. having women the final heads of families
 2. storing all of a village's food in a common storeroom
 3. requiring that all women have certain sexual requirements before they
 4. making some occupations strictly for men and the others strictly
 for women
46. How many immigrants enter the United States each year?
 1. fewer than 2,000
 2. between 2,000 and 500,000
 3. between 500,000 and 1,000,000
 4. more than 1,000,000
47. What is the most serious reason why population growth in developing
 nations is a problem?
 1. "pushovers" are growing at a slower rate than the population.
 2. The nations are running out of room.
 3. Political revolutions result from poverty.
 4. Increased population leads to increased pollution.
48. In the accompanying graph, which line best represents the relative number
 of people of each age in an undeveloped nation?



1. line 1 2. line 2 3. line 3 4. line 4

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49. The "moulin rate" of a human population is the
 (rate) _____
 1. number of children born to a woman at the birth of their first child
 2. number of children born to a woman at the birth of their second child
 3. number of children born to a woman at the birth of their third child
 4. average time between marriage and the birth of the second child
50. In the United States, who has the shortest life expectancy?
 1. white males
 2. white females
 3. non-white males
 4. non-white females
51. When comparing the problem of population increase with other environmental questions, ecologists tend to feel that population increase
 1. is the most serious problem
 2. would be no serious problem if there in the developed nations were
 willing to lower their standard of living
 3. could be stopped
 4. is the most serious environmental problem and should receive
 highest priority
52. Spoken for some black groups, oppose government-sponsored birth
 control programs because they feel that these programs
 1. would divert money from public assistance programs
 2. would encourage a public solution in poverty
 3. would be a government infringement on personal religious beliefs
 4. represent an attempt on the part of whites to eliminate blacks
53. In 1970, the population of the world was most nearly
 (1) 2 billion (2) 3 billion (3) 6 billion (4) 8 billion
54. Which food is the major part of the diet of most people in the world?
 1. red meat 2. fish 3. rice 4. potatoes
55. In the 1970 census, there were reported to be fewer 35-year old people
 in the United States than either 45-year-olds or 40-year-olds. This was
 most probably the result of
 1. decreased immigration
 2. decreased immigration
 3. increased immigration
 4. decreased immigration
56. Currently, world population is growing how much each year?
 1. less than one percent
 2. about one percent
 3. about six percent
 4. about eight percent

TABLE A1

SINGLE ITEM CHARACTERISTICS (PERCENT DIFFICULTY, INDEX OF DISCRIMINATION, CORRECTED ITEM-TOTAL CORRELATIONS, AND ITEM IDENTIFICATION) FOR THE ENVIRONMENTAL INFORMATION (SEAT-A) Scale

SEAT A1 Question #	Diff Perc	Index Disc	Corrected Item-Total Correlation	Item Identification
1	11.8	.109	Not possible for this scale.	worst polluter
2	18.3	.472		coal pollution
3	17.3	.200		worst polluted lake
4	22.7	.109		common US air pollution
5	15.8	.309		prevent erosion
6	28.3	.163		algae growth
7	30.6	.563		Interstate Highway effects
8	13.8	.254		Black lung
9	43.5	.163		light effect on algae
10	19.3	.400		decibel is
11	61.3	.345		Silent Spring effects
12	30.1	.309		noise pollution effects
13	40.5	.436		water crisis due to
14	46.0	-.036 Neg		produces land pollution
15	44.5	.327		air pollution source
16	46.0	.363		adds nutrients to water
17	30.6	.490		source of Calif. smog
18	33.1	.127		easiest to recycle
19	45.0	.400		DDT effects
20	57.4	.418		adds phosphates to water
21	44.5	.109		temperature inversion is
22	46.0	.490		nuclear power pollution
23	54.9	.472		poison gas
24	78.7	.272		Eutrophication is
25	37.1	.418		American bison
26	30.1	.309		whitetail deer
27	43.5	.254		Calif. condor
28	6.4	.218		heavy metal in fish
29	25.7	.436		growing rural pollution
30	34.6	.327		off-shore oil drilling
31	33.6	.345		recreational improvement
32	33.6	.418		danger of DDT
33	52.9	.363		Everglades threat
34	50.9	.272		whooping cranes
35	45.0	.491		DDT effects on birds
36	48.0	.363		population growth effects
37	33.6	.472		environmental legislation
38	43.5	.400		fermentation produces
39	47.0	.418		takes most calories
40	58.9	.145		clearing rain forests
41	43.5	.413		increase food
42	10.3	.309		tax for large families
43	19.3	.236		US family size in 1800
44	16.8	.327		who/why of vasectomy
45	34.1	.436		limits primitive populations
46	52.4	-.036 Neg		US immigration
47	38.1	.290		population growth in UDC's
48	50.0	.454		age distribution in UDC's
49	44.0	.563		doubling rate
50	33.6	.381		US life expectancy
51	37.1	.563		population increase effects
52	67.3	.236		blacks & birth control
53	74.7	.163		world population in 1970
54	64.3	.418		diet composition
55	41.0	.345		why more 35 year olds
56	81.1	-.090 Neg		population growth rate
Pretest Mean(s) Experimentals - 35.0 Controls - 31.4 All - 33.8				
Pretest Standard Deviations Exp.- 6.92 Controls - 7.27 All - 7.41				
Posttest Mean(s) Experimentals - 33.4 Controls - 33.2 All - 37.2				
Posttest Standard Deviations Exp.- 7.13 Controls - 8.63 All - 7.77				

APPENDIX B

STUDENT QUESTIONNAIRE AND
MISCELLANEOUS STATISTICAL TABLES

Appendix B

Student Questionnaire and Miscellaneous Statistical Tables

STUDENT QUESTIONNAIRE

Directions: The information which you provide on this questionnaire will be kept completely confidential. No one will see your answers except the researcher. Reports will be made with aggregate data, and no one person will be identified with his or her data. It is very important that you answer all questions and that you attempt to answer as honestly as possible.

1. My sex is:
A) Male
B) Female
2. My marital status is:
A) Single
B) Married
C) Divorced or separated
3. My age is:
A) 16 to 20 years of age
B) 21 to 24 years of age
C) 25 to 29 years of age
D) 30 to 39 years of age
E) 40 years of age or older
4. My racial designation is:
A) White
B) Black
C) Spanish American
D) Other
5. To date I have earned the following number of college credits:
A) 0 to 15 credits
B) 16 to 30 credits
C) 31 to 45 credits
D) 46 to 60 credits
E) more than 60 credits
6. My college grade point average is (leave blank if you have no college GPA):
A) Below a 1.00
B) Between a 1.01 and a 2.00
C) Between a 2.01 and a 3.00
D) Between a 3.01 and a 3.50
E) Over a 3.51
7. I currently live in the following type of community:
A) Rural
B) Suburban
C) City

8. My family's annual income is: A) Below \$5,000 per year
B) \$5,001 to 10,000 per year
C) \$10,001 to 15,000 per year
D) \$15,001 to 20,000 per year
E) Over \$20,000 per year
9. By "family" in the above question I mean: A) Myself only
B) Myself and my spouse
C) My parents & their children
10. I am enrolled in a curriculum in: A) Arts & Sciences
B) Applied Arts & Sciences
C) Business
D) Preprofessional Education
E) I have no declared curriculum yet
11. Please indicate all of the following courses (if any) that you have taken in college: A) Rocks & Stars
B) Biology
C) Zoology
D) A course on energy
E) Mother Earth: 1978 & Beyond
12. Please indicate all of the following courses (if any) that you have taken in college: A) Living with Nature
B) Living World
C) The Curious Naturalist
D) Environmental Photography
E) Any other conservation or ecology course
13. Please indicate all of the following courses (if any) that you have taken in college: A) Biology
B) Zoology
C) Conservation
D) Ecology
E) General Science

PLEASE NOTE: For questions 14 through 18 each single/separate newspaper or news program, etc., counts as one paper, TV show, etc.

14. I watch approximately this number of TV news broadcasts weekly (include local and/or national news programs) A) Less than one
B) Between 1 and 2
C) Between 4 and 6
D) Between 7 and 9
E) 10 or more per week
15. Each week I read approximately this number of newspapers: A) Less than one
B) Between 1 and 2
C) Between 3 and 4
D) Between 5 and 6
E) 7 or more per week

16. Each week I read approximately this number of news magazines (such as Time or Newsweek):
- A) Less than one
B) Between 1 and 2
C) Between 3 and 4
D) Between 5 and 6
E) 7 or more per week
17. Each week I listen to approximately this number of radio news broadcasts:
- A) Less than one
B) Between 1 and 4
C) Between 4 and 8
D) Between 9 and 12
E) 13 or more per week
18. Each week I watch approximately this number of environmentally oriented TV shows (such as Cousteau specials, Wild Kingdom, etc.):
- A) Less than one
B) Between 1 and 2
C) Between 3 and 4
D) Between 5 and 6
E) 7 or more per week

PLEASE NOTE: This portion of the questionnaire consists of 35 paired statements. Please indicate on your answer sheet which of the two statements you consider to be the more important. Do not omit any items.

19. I would rather sign a petition complaining about
- A) burning trash at the city (town) dump
B) narcotics abuse in my community
20. I would rather go door-to-door to convince people to
- A) avoid using plastic containers
B) vote for a specific political candidate
21. I would rather watch a television program about
- A) noise pollution
B) war
22. I would rather circulate a petition calling for
- A) limits on the amount of water a company can use
B) stronger auto safety regulations
23. I would rather sign a petition which deals with
- A) the problems of population in America
B) drug abuse
24. I would rather volunteer to phone people about
- A) reducing the growth of industry
B) joining the Committee for Peace
25. I would rather donate a large part of the money I earn to
- A) an ecology society
B) disaster relief

26. It is more important to me to provide funds
 - A) for drug rehabilitation centers
 - B) to reduce land pollution
27. I would rather telephone people in my area about
 - A) air pollution
 - B) the need for a narcotics treatment center
28. I would rather sign a petition to
 - A) reduce the noise level in my area
 - B) change policy on educational spending in my area
29. It is more important to me to
 - A) fight pollution in the Great Lakes
 - B) reduce federal income taxes
30. I would rather donate 10% of my income to
 - A) The Lighthouse for the Blind
 - B) a group for preservation of endangered species.
31. I would rather circulate a petition about
 - A) the dangers of technological growth
 - B) civil rights
32. I would rather make a speech calling for stricter
 - A) laws controlling pollution from automobile exhausts
 - B) drug laws in my community
33. I would rather read a leaflet about
 - A) avoiding land pollution
 - B) stronger auto safety regulations
34. I would rather listen to someone who calls on the phone to tell me about
 - A) a local political problem
 - B) noise pollution
35. I would rather donate 10% of my income to a
 - A) drug rehabilitation program
 - B) clean water association
36. I would rather make a speech
 - A) in favor of banning welfare cuts
 - B) urging people to have no more than two children
37. I would rather listen to someone who telephones about
 - A) the dangers of technological growth
 - B) inflation
38. I would rather donate some money to
 - A) medical research
 - B) preserve vanishing species of wildlife

39. I would rather stand on a corner to get signatures
 - A) for a petition advocating my position on education
 - B) in support of anti-noise legislation
40. I would rather make a speech in favor of banning
 - A) racial discrimination
 - B) strip mining that ruins the land
41. I would rather watch a television program about
 - A) urban renewal
 - B) air pollution
42. I would rather sign a petition calling for
 - A) a new sewage treatment plant
 - B) reduced taxes
43. I would rather write my congressman about my position on
 - A) war
 - B) pollution problems
44. I would rather write to my congressman
 - A) asking for changes in Defense Department spending
 - B) about the dangers of technological growth
45. It is more important to me to
 - A) restore the ecological balance in the Great Lakes
 - B) maintain a strong national defense
46. I would rather boycott a company which
 - A) violates laws against discrimination in hiring
 - B) severely pollutes the air
47. I would rather make a speech in favor of banning
 - A) strip mining which ruins the land
 - B) education cuts
48. I would rather picket a government agency to stop
 - A) overspending
 - B) construction of an airport near a populated area
49. I would rather watch a television program about
 - A) war
 - B) water pollution
50. I would rather volunteer to work Saturdays
 - A) to promote my views about war
 - B) at Planned Parenthood
51. I would rather donate 10% of my income to a
 - A) drug rehabilitation center
 - B) group starting a recycling operation

52. I would rather watch a television program about
A) war
B) mercury poisoning from fish
53. I would rather go to a film that describes the tragic results of
A) overpopulation
B) war

PLEASE NOTE: Please answer question 54 through 89 by checking the one box of the answer sheet that best describes your feelings about the question. Use this key:

- A) I do not agree at all
B) I slightly agree
C) I agree
D) I strongly agree
E) I very strongly agree

54. The public schools of our nation spend enough time in the teaching of ecology/conservation.
55. The use of private autos should be considerably restricted in major population centers.
56. Snowmobiles should be outlawed except for emergency use.
57. A community should be permitted to dump raw (untreated) sewage into a nearby stream if the majority of its citizens feel the community cannot afford to build a sewage treatment plant.
58. People in the U.S. shall have to be satisfied with a lower standard of living in the near future.
59. The government should impose lower speed limits on autos & trucks in order to conserve gasoline.
60. Peoples in the developing nations will have to be satisfied with a lower living standard than Americans now have because there will not be enough natural resources.
61. In the interest of population control a couple should not have more than two children even though they could financially care for a larger number.
63. Since rivers have been effective recipients of municipal & industrial wastes for generations, much of the current concern for cleaner rivers is unwarranted.
64. Some pollution problems are of such a nature that government must help because private citizens cannot cope with them effectively.
65. Well-meaning but misguided people often become entirely too concerned about the loss of a few alligators or birds.

66. Present day endangered species should be nothing to be concerned about because animal species have been disappearing throughout the history of the earth.
67. The G.N.P. (Gross National Product) is a good measure of a country's wellbeing.
68. Government would solve most environmental problems if environmental groups would leave them alone.
69. One should be willing to curtail his travel by private auto in order to conserve energy resources.
70. People should be willing to adjust to lower room temperatures in the winter in order to conserve energy resources.
71. We need not worry about higher population as new food resources will be developed to ensure enough for all.
72. Anti-littering laws should be consistently and strongly enforced.
73. In order to have a free society, the rights of the individual must be considered to be more important than social responsibilities.
74. The oceans represent an almost limitless source of food and resources for the future.
75. American beliefs and values have been a basic cause of our present pollution problems
76. The so-called "energy crisis" is primarily a scare tactic to enable producers to raise prices.
77. Many people in the U.S. are deprived of the environmental qualities that enrich life because of high population density.
78. Given limited resources, international conflicts will likely increase as long as populations increase.
79. The possibility of solving the problems of human population increase by voluntary birth control is unlikely.
80. The problem of world overpopulation is a new phenomenon.
81. The individual citizen can have a much greater impact on the environment in his local area than he can on a national level.
82. The U.S. faces an almost impossible situation in attempting to clean up polluted rivers and lakes.
83. LCC should make a conscious effort to develop positive environmental attitudes in its students.

- 84. I bear some personal responsibility for our present state of pollution.
- 85. Plants & animals should be primarily for man's use and enjoyment.
- 86. We should eliminate the use of pesticides to ensure the health & safety of all living things, even though this will result in poorer crops.
- 87. I can affect the environmental decisions made in my city.
- 88. Mankind is the only form of life possessing rights.
- 89. I have a responsibility to make other people aware of environmental problems.

PLEASE NOTE: Please answer the remaining questions using the following scale:

- A) Yes, definitely
- B) Yes, probably
- C) Undecided or do not know
- D) No, probably not
- E) No, definitely not

- 90. Do you now or do you plan to begin to recycle your newspaper?
- 91. Do you now or do you plan to maintain your home at a temperature of 68 degrees or less this winter in order to conserve energy?
- 92. Do you now or do you plan to investigate the environmental voting records of candidates you consider voting for?
- 93. Do you now or do you plan to subscribe to an environmentally oriented newsletter or magazine in the next year?
- 94. Do you belong to or plan to join some environmentally oriented club or organization in the next year?
- 95. Do you believe that LCC now offers enough environmental education to provide most of the students with an adequate understanding of today's environmental issues?
- 96. Would you be willing to substantially forego the use of private autos in favor of public transportation in order to conserve petroleum?
- 97. Will you be willing to pay substantially higher taxes in the future to help cover the costs of improving the quality of the environment?

98. Are you willing to maintain a lower standard of living than that presently enjoyed by many Americans in order to conserve scarce natural resources?
99. Would you voluntarily agree to travel less in order to conserve energy resources?
100. If you were building a house today, would you include air conditioning?
101. Would you agree to an abortion in your family if you already had two children?
102. Do you feel that you have adequate knowledge about environmental issues?
103. Would you voluntarily present an environmental program to a group of elementary school children if the opportunity should arise?
104. Do you feel that you have an obligation to become actively involved in helping to solve environmental problems in your home community?
105. Do you believe that western sheep ranchers should be prosecuted for illegally killing bald eagles, some of which may be killing young lambs?
106. If given the opportunity, would you enroll in a college course which deals specifically with the environmental crisis?
107. A government agency should have the right to order your community to cease dumping raw sewage into a nearby stream?
108. Are you reasonably convinced that we shall be able to solve our environmental problems?
109. Would you be willing to undergo sterilization after having two children?
110. Would you be willing to pay \$10.00 a year to protect endangered species?

TABLE B1

SINGLE ITEM CHARACTERISTICS (PERCENT DIFFICULTY, INDEX OF DISCRIMINATION, CORRECTED ITEM-TOTAL CORRELATIONS, AND ITEM IDENTIFICATION) FOR THE ENVIRONMENTAL ATTITUDE (SEAT-D) SCALE

SEAT D1 Question #	Diff Perc	Index Disc	Corrected Item-Total Correlation	Item Identification
19	55.4	.509	.30586	petition trash/narcotics
20	56.4	.351	.25756	door-to-door plastics voting
21	48.0	.490	.29787	TV program noise/war
22	64.5	.563	.35535	petition water safety
23	52.4	.654	.43317	petition population drugs
24	62.3	.400	.26626	phone industry/peace
25	60.5	.509	.36381	donate ecolog./disaster relief
26	41.0	.672	.48699	donate drug rehab./land pollution
27	41.0	.763	.55997	telephone air pollution narcotics
28	61.5	.290	.21852	petition noise/education
29	27.7	.454	.33237	importance pollution/taxes
30	51.9	.527	.35559	petition technology/civil rights
31	39.6	.527	.36212	donate blind/endangered species
32	44.5	.672	.44251	speech air pollution/drug laws
33	33.1	.654	.40416	read land pollution/safety
34	51.4	.563	.40399	listen to political/noise pollution
35	40.5	.654	.52098	donate drug rehab./clean water
36	36.6	.418	.32071	speech welfare/population
37	45.5	.561	.42506	listen technology/inflation
38	61.8	.472	.33855	donate medicine/endangered species
39	54.9	.454	.31063	petition education noise
40	47.5	.509	.41023	speech race/strip mining
41	44.0	.351	.29721	TV urban renewal/air pollution
42	54.4	.509	.35560	petition sewage treatment/taxes
43	49.5	.581	.38978	write war population
44	57.9	.327	.24792	write defense/technology
45	33.1	.490	.41204	importance ecolog./defense
46	37.6	.563	.43359	boycott discrimination air pollution
47	45.5	.454	.35142	speech strip mining/education
48	53.4	.400	.24823	picket overspending/airport
49	32.1	.545	.44083	TV war/water pollution
50	22.7	.236	.20873	volunteer war population
51	44.0	.654	.51312	donate drug rehab./recycling
52	28.7	.490	.37178	TV war/mercury poisoning
53	36.1	.454	.35074	film overpopulation/war

Pretest: Mean(s) Experimental: -19.9 Controls: -10.2 All: -18.7
Standard Deviations -7.01 -7.20 -7.14

Posttest: Mean(s) Experimental: -27.6 Controls: -18.5 All: -24.8
Standard Deviations -6.35 -6.56 -7.74

TABLE B2

SINGLE ITEM CHARACTERISTICS (PERCENT DIFFICULTY, INDEX OF DISCRIMINATION, CORRECTED ITEM-TOTAL CORRELATIONS, AND ITEM IDENTIFICATION) FOR THE ENVIRONMENTAL ATTITUDE (DUCAT-1) SCALE

DUCAT/HARRISON ATTITUDE SURVEY (DUCAT 1)				
Question #	Diff Perc	Index Disc	Corrected Item-Total Correlation	Item Identification
54	48.5	.472	.26849	teach enough ecology
55	91.5	.200	.34297	res. ric. auto use
56	95.0	.127	.29080	outlaw snowmobiles
57	2.4	.054	.07784*	dump raw sewage
58	92.5	.181	.32506	lower standard of living in US
59	94.5	.090	.15479	lower speed limits
60	92.0	.254	.10493	lower standard of living non-US
61	75.7	.454	.33220	only two children
62	Question Omitted from questionnaire			
63	23.2	.272	.04950*	overconcern with water pollution
64	71.2	.563	.35264	government must help
65	42.0	.545	.14976	overconcern with endangered species
66	15.3	.200	.21117	overconcern with endangered species
67	71.2	.400	.14753	GNP good measure of wellbeing
68	13.3	.200	.12165	government will care for us
69	90.5	.236	.37864	limit auto use
70	53.1	.345	.34915	lower thermostates
71	21.7	.345	.12129	overconcern with overpopulation
72	48.5	.616	.28905	enforce anti-littering laws
73	58.4	.236	.06938*	individual rights vs. responsibilities
74	79.2	.236	-.08349*	limitless food in oceans
75	76.2	.472	.38161	US beliefs & ecology crisis
76	53.9	.327	.17642	overconcern with energy crisis
77	84.6	.436	.43906	overpopulation lowers quality of life
78	73.2	.545	.39874	resources & war
79	91.5	.200	.02679*	voluntary birth control works
80	96.0	.072	.19398	overpopulation is new
81	77.2	.472	.32042	greatest impact at local level
82	60.3	.400	.04756*	water pollution hopeless
83	68.8	.709	.44091	LCC teach for positive attitudes
84	86.6	.327	.40812	I am responsible for pollution
85	51.4	.254	-.09043*	other life for man's use
86	94.5	.145	.19395	eliminate pesticides
87	89.1	.254	.30455	I can have impact
88	25.7	.309	.15509	only man has rights
89	84.6	.345	.39032	I should educate others

* Indicates this item was deleted from the final scale employed.

Pretest Mean(s)	Experimentals-11.1	Controls-12.2	All-11.7 **
Standard Deviations	-4.10	-5.07	-4.76
Posttest Mean(s)	Experimentals-10.2	Controls-11.5	All-13.9
Standard Deviations	-6.57	-6.97	-6.97

** All statistics based on a right wrong basis. i.e., partially "correct" answers such as strongly agree or disagree are not weighted as such.

TABLE B3

SINGLE ITEM CHARACTERISTICS (PERCENT DIFFICULTY, INDEX OF
DISCRIMINATION, CORRECTED ITEM-TOTAL CORRELATIONS, AND ITEM
IDENTIFICATION) FOR THE ENVIRONMENTAL BEHAVIORAL INTENTIONS
SCALE

DUCAT/HARRISON BEHAVIORAL INTENTIONS SCALE (BEHINT 1)

<u>Question #</u>	<u>Diff Perc</u>	<u>Index Disc</u>	<u>Corrected Total-Item Correlation</u>	<u>Item Identification</u>
90	65.8	.509	.40393	recycle newspaper
91	50.4	.618	.30809	lower thermostat
92	91.0	.218	.40346	investigate voting records
93	87.6	.400	.46933	get environmental news magazine
94	92.0	.218	.41219	belong environmental organization
95	92.0	.181	.20356*	LCC has enough environ. ed.
96	83.1	.381	.42110	use public transportation
97	86.6	.363	.47593	pay higher taxes for cleanup
98	83.6	.418	.52943	maintain lower standard of living
99	83.6	.454	.40375	agree to travel less
100	50.1	.381	.29850	get air conditioning
101	86.1	.218	.13636*	agree to abortion
102	81.1	.218	Omitted, question had zero variance. *	
103	74.2	.563	.46712	teach elementary students
104	79.2	.472	.53068	have local obligation to help
105	56.4	.636	.37541	prosecute eagle hunters
106	61.6	.418	.45226	enroll in ecology course
107	28.7	.490	.20522*	government prevent sewage
108	94.5	.000	.12335*	can we solve environmental problems
109	80.6	.400	.31832	voluntary sterilization after 2
110	48.0	.745	.44290	\$10/yr. for endangered species

*Indicates this item was deleted from the final scale employed.

<u>Pretest Mean(s)</u>	Experimentals-5.20	Controls-5.00	All-4.90**
<u>Standard Deviations</u>	-3.51	-3.77	-3.45
<u>Posttest Mean(s)</u>	Experimentals-6.80	Controls-5.10	All-6.00
<u>Standard Deviations</u>	-4.25	-3.99	-4.09

** All statistics based on a "right/wrong" basis. i.e., partially "correct" answers such as yes, probably or no, probably not, are not weighted as such.

TABLE B4
ANOVA RESULTS FOR ENVIRONMENTAL INFORMATION
BY EXPOSURE TO MASS MEDIA

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	72.624	2	36.312	.655	.521
MEDIAPRE	72.624	2	36.312	.655	.521
Explained	72.624	2	36.312		
Residual	11032.920	199	55.442		
Total	11105.545	201	55.251		

TABLE B5
ANOVA RESULTS FOR ENVIRONMENTAL ATTITUDES (SEAT-D)
BY EXPOSURE TO MASS MEDIA

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	36.911	2	18.455	.348	.706
MEDIAPRE	36.911	2	18.455	.348	.706
Explained	36.911	2	18.455	.348	.706
Residual	10538.990	199	52.960		
Total	10575.901	201	52.616		

TABLE B6
ANOVA RESULTS FOR ENVIRONMENTAL ATTITUDES (DUCAT-1)
BY EXPOSURE TO MASS MEDIA

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	.259	2	.130	.001	.999
MEDIAPRE	.259	2	.130	.001	.999
Explained	.259	2	.130	.001	.999
Residual	29807.765	199	149.788		
Total	29808.025	201	148.299		

TABLE B7
ANOVA RESULTS FOR ENVIRONMENTAL BEHAVIORAL INTENTIONS
BY EXPOSURE TO MASS MEDIA

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	19.230	2	9.615	.108	.898
MEDIAPRE	19.230	2	9.615	.108	.898
Explained	19.230	2	9.615	.108	.898
Residual	17791.349	199	89.404		
Total	17810.579	201	88.610		

TABLE B8
ANOVA RESULTS FOR ENVIRONMENTAL INFORMATION
BY CREDITS EARNED TO DATE

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	160.974	4	40.244	.724	.576
CREDIT	160.974	4	40.244	.724	.576
Explained	160.974	4	40.244	.724	.576
Residual	10944.570	197	55.556		
Total	11105.545	201	55.251		

TABLE B9
ANOVA RESULTS FOR ENVIRONMENTAL ATTITUDES
(SEAT-D) BY CREDITS EARNED TO DATE

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif.
Main Effects	143.667	4	35.917	.678	.608
CREDIT	143.667	4	35.917	.678	.608
Explained	143.667	4	35.917	.678	.608
Residual	10432.234	197	52.956		
Total	10575.901	201	52.616		

TABLE B10
ANOVA RESULTS FOR ENVIRONMENTAL ATTITUDES (DUCAT-1)
BY CREDITS EARNED TO DATE

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	965.283	4	241.321	1.648	.164
CREDIT	965.283	4	241.321	1.648	.164
Explained	965.283	4	241.321	1.648	.164
Residual	28842.742	197	146.410		
Total	29808.025	201	148.299		

TABLE B11
ANOVA RESULTS FOR ENVIRONMENTAL BEHAVIORAL INTENTIONS
BY CREDITS EARNED TO DATE

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	920.367	4	230.092	2.684	.033
CREDIT	920.367	4	230.092	2.684	.033
Explained	920.367	4	230.092	2.684	.033
Residual	16890.212	197	85.737		
Total	17810.579	201	88.610		

TABLE B12

ANOVA RESULTS FOR PRETEST ENVIRONMENTAL INFORMATION,
ENVIRONMENTAL ATTITUDES (SEAT-D AND DUCAT-1), AND
ENVIRONMENTAL BEHAVIORAL INTENTIONS
COMBINED BY CREDITS EARNED TO DATE

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	31051.410	4	7762.853	.418	.795
CREDIT	31051.410	4	7762.853	.418	.795
Explained	31051.410	4	7762.853	.418	.795
Residual	3656662.436	197	18561.738		
Total	3687713.847	201	18346.835		

Grand Mean = 261.21

Deviations from Grand Mean by Credit Category:

0 to 15 Credits - 5.36
 16 to 30 Credits - 6.33 (NEG)
 31 to 45 Credits - 3.20
 46 to 60 Credits - 34.71 (NEG)
 Over 60 Credits - 15.52

TABLE B13

PEARSON CORRELATIONS FOR SEX, AGE, GRADE POINT AVERAGE, FAMILY OF RESIDENCE, RACE, INCOME, CURRICULUM, MARITAL STATUS, PRIOR EXPOSURE TO COURSES WITH ENVIRONMENTAL CONTENT, CREDITS EARNED TO DATE, AND FAMILY OF RESIDENCE

[illegible]

APPENDIX C
TREATMENT FOR TESTING HYPOTHESIS SIX

Appendix C

Treatment for Testing Hypothesis Six

The treatment for testing hypothesis six consisted of a 50-minute slide presentation which basically followed the format below.

The first series of slides were of contrasts between various scenic areas (unspoiled) and of local areas in which some type of pollution was evident. Major themes included land, water, and air pollution.

The second series of slides depicted wilderness areas that this writer has visited. When these slides were being viewed, the writer explained that he originally became aware of, involved in, and concerned about environmental issues and problems as a result of primarily recreational contacts with the natural environment through interests such as fishing, camping, etc. The writer also explained at this point that as he became more concerned about environmental problems, he began to investigate ecology in a more serious manner. This resulted in still more concern, and eventually led to a number of specific actions on his part.

The last series of slides depicted the writer's attempts to practice environmentally sound behaviors in his own lifestyle. The slides show the writer building his home with attention to energy savings (proper insulation, alignment of the house to obtain maximum solar heat, establishing windbreaks, weatherstripping, etc.); growing as much of his own food as possible (gardening, compost pile, cover cropping and mulching, etc.); attempting to recycle resources (glass paper, plastic bags, aluminum, etc.); supporting environmental

organizations and information sources; teaching environmental education; and trying to reduce waste in his own lifestyle (heating with wood, turning down the hot water heater, feeding food wastes to chickens and recycling their wastes for gardening, using an economy car, and so on).

APPENDIX D

TREATMENT FOR TESTING HYPOTHESIS SEVEN

Appendix D

Treatment for Testing Hypothesis Seven

The treatment for testing hypothesis seven consisted of a 50-minute presentation using the notes below.

In the handout labeled "Introduction" special emphasis was given to the idea that every positive environmental action has repercussions throughout the ecosystem; that each individual should attempt to find a way(s) to assist the overall problem in a manner that is comfortable for him/her; and to providing information as to the places where a concerned individual can contact environmental agencies to report a suspected problem or seek additional environmental information.

In the section entitled "The Politics of Ecology" special emphasis was given to learning how students' representatives and/or senators had voted on important environmental issues, and then using this information in their decision to support or oppose this official in future elections; to discussing several of the bills outlined and who had introduced the legislation; and to where the student could go for additional information on environmental legislation and/or voting records.

In the handout labeled "Greater Lansing Recycling Centers" special emphasis was given to the idea that numerous recycling centers were available locally for glass, papers, and metals; that recycling everything possible is desirable environmentally; and to trying to develop a mental set for finding new items/ways of recycling finite resources.

In the section entitled "For Further Involvement" special emphasis was given to the idea that there are numerous environmental organizations in this area, each with a somewhat different focus; that the student can obtain accurate and timely environmental information from such groups as the Sierra Club, Lansing Energy Affairs Network, the Cousteau Society, etc.; and that the media could not be relied upon to provide accurate and timely environmental information.

APPENDIX E
MAIN TREATMENT

Appendix E

Main Treatment

The main experimental treatment, as has been mentioned previously, consisted of approximately 5 hours of classroom instruction (exclusive of pre- and post-testing) and began with discussions of the memo from the Dean of the College of Human Ecology at Michigan State University and the article "Spacecraft Earth is Overloaded." In the case of the first handout the major objective was to demonstrate to the student that he/she cannot judge living conditions around the world by conditions in the U.S., and that as a people we (Americans) are extremely wasteful.

In the "Spacecraft Earth is Overloaded" handout, special emphasis was given to the concept of the exponential growth of population, i.e., what is meant by exponential growth and what are the implications of the exponential growth of population for the future.

The "Limits to Growth" handout is a summary or outline of the book of the same name by Meadows and Meadows. This text was a recommended reading for the course.

The format of the discussion of the study generally follows the outline as presented. Special emphasis was given to the conclusions of the study, the interrelationships of the major elements discussed in the text, examples of various types of pollution and the exponential increase of same, and the study's recommendations on means for achieving environmental "equilibrium." In the case of this last point, students were asked how they could contribute to the goal of

meeting each of the six conditions presented and their ideas were generally discussed and critiqued.

It should be added that emphasis was also given to the idea that the "Equilibrium State" achievable by meeting these conditions has a good deal to recommend it in terms of quality of life. The students were also informed that the authors of the book had undertaken a second study, published under the title of Mankind at the Turning Point, and about the major discrepancies and similarities between the two reports.

The handout entitled "Summary Notes from Packard" followed. That is an outline of the text, The Waste Makers, by Vance Packard, which was a required text for the course.

The discussion of the material basically followed the outline. Special emphasis was given to the costs (environmental, social, political, and economic) of the current American "way of life"; to the advertising strategies presented in the text and Packard's recommendations for counteracting same; to the implications of continued resource wastage; and to Packard's recommendations for counteracting overconsumption and waste.

The experimental unit concluded with a discussion of the handout, "Conservation in Your Own Home." The discussion followed the handout (with additional material of a similar nature) and stressed positive environmental action within the capabilities of all normal individuals.

we have just recently come to understand that the earth has limited resources - and the planet's population is already pressing against those limits.

Fifteen years ago, Dr. Louis B. Leakey discovered the jawbone of a previously unknown hominid creature. This find seems to have stretched man's lineage back some 16 million years.

Five years ago, Neil Armstrong stood on the moon and looked back at earth, where that ancient bone had lain. Gazing at our planet, Armstrong reflected: "Although it is very beautiful, it is very remote and small. We have all been struck by the similarity to an oasis, an island. More important, it is the only island we know that is a suitable home for man."

Just as we did not suddenly spring full bloom from the ranks of the lower animal kingdom, so we would be foolish to assume that our present magnificent form is the crowning end of evolution. We have been from the beginning, and still are, inseparable from our mother, the earth, and our brother creatures, who also have changed their forms and shared our journey through time. Round together and dependent on each other and the earth, we face a collective future.

Our No. 1 problem today - standing alone at the head of the list and underlying most of the others - is the staggering growth of the human passenger load on this limited spacecraft.

It has been estimated that in 8000 B.C. the total world population was five million people. By A.D. 1650 - a span of 9650 years - it had increased to 500 million. In 1850, only 200 years later, it reached one billion, and by 1930 the world passenger load had increased to two billion - a doubling of the total world human population within only 80 years.

This population-doubling will again occur in just 35 years. In other words, of all the people who have ever lived on this planet, one out of 25 is now alive and demanding resource allocations.

The cyclical drought currently blighting Africa with famine adds painful pressure to our population dilemma. For the first time in 50 years, there is no one country in the world with sufficient food to save the starving hordes. There are no great reserves anywhere which can make a dent in the gathering African disaster. If drought hits South America, the Soviet Union or China, the limits of man in relationship to his food resources will quickly be reached.

America is not isolated from this population crisis. In 1900, the U.S. population was 76 million. By 1950, it had doubled to 152 million. By 1970, the total had increased to 205 million. It has been said that because of the United States' present low population growth rate of 1.1 percent annually, the problem is being resolved. This is a fallacy. Despite the fact that the current 1.6 percent birth rate of the United States is a record low, it has not approached the annual death rate, which is only 0.9 percent.

The prime factor in such population explosions is the number of youths, and out of every three North Americans one is under 15 years of age. This suggests a predictable population surge in the United States within the coming decades.

The American people cannot continue their accelerating growth binge. Sooner or later, even without our intervention, limiting factors will halt the growth. The major question is whether or not control of the growth syndrome will be the result of rational, carefully planned human action or of chance.

What has happened? I suspect that the American dream, based as it is on the concept of unlimited space and resources, is withering away. The earth as a place to live has a limited amount of air, water, soil, minerals, such and other natural resources - and today we are pressing hard on our resource base. We are finally waking up to the awed truth that as a people we have been living high-on-the-ho without regard to the long-range consequences of achieving our short-term goals.

• from Reader's Digest, Condensed from New York Times, Nathaniel P. Reed, Assistant Secretary of the Interior for Fish and Wildlife and Parks.

Each day now, we are assaulted by the spectacle of decaying cities, garbage-strewn countryside, tasteless strip developments, filth-laden streams and lakes, irritating transportation snarls, choking air, incessant noise, and the all-too-frequent disregard for the other organisms that share our planet. As a dynamic, inventive, aggressive people, we have not accepted kindly any restriction on our old national credo that growth has no limits. But when the world looks at us, what does it see?

We are the world's greatest extractor, greatest consumer and greatest discarder. Last year alone, we discarded 40 million tons of paper, 200 million tires, 76 billion containers, 38 billion bottles, 78 billion cans, 7 million junked cars.

The 210 million people in the United States use more energy than the combined 500 million people in other leading industrial nations, including Germany, Great Britain, Japan and the Soviet Union. By one estimate, the United States wastes 25 percent of the energy it produces. In effect, the American people squander as much energy as 107 million Japanese consume. How much longer will the rest of the world permit one neighbor to live so lavishly?

The main problems of environment do not arise from temporary and accidental malfunctions of existing economic and social systems. On the contrary, they arise out of a profound incompatibility between deep-rooted beliefs in continuous accelerated growth and the damning recognition that the earth is not unlimited in its resources and is vulnerable to thoughtless mishandling.

Will we be able to vastly scale down or redirect our commitment to growth and to effect fundamental changes in our economy? The implications of such changes are huge. Not only will they affect industry, labor, business, government, all income groups, minority groups and international relations; they will affect the very way we think, the way we relate to each other, and the way we relate to the finite resources of Mother Earth.

J. Ducat
SS 101

I. The Limits to Growth

A. Introduction

- 1) The Club of Rome - an informal organization, began in 1968, composed of 30 individuals from 10 countries who banded together to examine the problems facing humanity.
- 2) Phase One of the project on the predicament of mankind began at a two-week conference in Cambridge, Massachusetts (M.I.T.) where professor Jay Forrester presented a global model that allowed a number of the elements of the predicament of mankind to be identified and analyzed.

a. Phase One conducted research which examined the 5 factors that determine, and therefore, ultimately limit, growth on this planet - i.e., population, agricultural production, natural resources, industrial production, and pollution.

- 1) The M.I.T. project team is composed of experts from the U.S., Turkey, Iran, Germany, India, and Norway.
- a) They composed a model to examine the 5 factors (trends) of global concerns mentioned above and their inter-relationships over a long time span.

- 3) The conclusions that the M.I.T. arrive at are generally as follows:

a. "If the present growth trends in world population, industrialization, pollution, food production and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next 100 years.

The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity.

b. It is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable far into the future.

The state of global equilibrium could be designed so that the basic material needs of each person on earth are satisfied and each person has an equal opportunity to realize his individual human potential.

c. If the world's people decide to strive for this second outcome rather than the first, the sooner they begin working to attain it, the greater will be their chances of success." p. 29.

B. The Nature of Exponential Growth

- 1) All 5 basic elements, i.e., population, food production, industrialization, pollution, and consumption of non-renewable natural resources are increasing at an exponential rate.
- 2) "A quantity exhibits exponential growth when it increases by a constant percentage of the whole in a constant time period." For example, a colony of yeast cells in which each cell divides into two cells every 10 minutes is growing exponentially. The amount added each 10 minutes is not constant; it continually increases as the total accumulated amount increases. $2-4-8-16-32-64-128-256-512$, etc.
- a. all factors exhibit exponential growth and each affects the others.
- b. world population for example, $1650 = 1/2$ billion; $1700 = 3/4$; $1800 = 1$ billion; $1900 = 1-3/4$ billion; $1950 = 2-2/3$ billion; $2000 = 6$ billion.

The Limits of Growth (cont'd.)

2.

- 1) In addition to exponential growth, population also demonstrates a positive feedback loop, i.e., longer life span and lower death rate.
- c. Economic Growth Rates - See figure 7, p. 47.
- 1) Widening the gap between rich and poor nations because different countries have different growth rates.
- a) See table #2 and #3, pp. 49 and 50.

C. The Limits to Exponential Growth

1) Man has both physical needs (air, water, food, etc.) and social needs (peace, social stability, etc.) - If we assume social environment will remain ideal, then what limits does the physical environment pose?

2) Food -

a. primary resource to produce is land - there are about 7.86 billion acres of potentially suitable for agriculture (about 1/2 of this now being farmed).

1) Even if everything goes perfectly (no erosion loss, etc.) there will be a desperate land shortage before the year 2000.

a) Symptoms will appear before this, however food prices will rise so high that some people will starve (it is happening now).

- 1) about 10-20 million die of malnutrition yearly (1972) - this year will be much higher.

b) Adding last half of available land will take tremendous resources and cost. Farming the sea, etc., would require even greater amounts of non-renewable resources.

3) Non-renewable Resources - see Table 4 - pp. 64-67.

a. Point: There are not enough of many critical elements to industry to last 100 years at current exponential rates of use.

- 1) positive feedback loop of more people using them and each person using more.

4) Pollution - (a factor of population growth, industrial growth, and resource depletion). Also growing exponentially.

a. "Many people...are concluding on the basis of mounting and reasonably objective evidence that the length of life of the biosphere as an inhabitable region for organisms is to be measured in decades rather than hundreds of millions of years. This is entirely the fault of our own species."

1) Example: Figure 15 (p. 79). CH_2 in atmosphere.

2) To complicate matters, there is usually a long delay between the release of a pollutant into the environment and the appearance of its negative effects on the ecosystem.

a. Example: DDT (Figure 22, p. 90) - there is an 11 year gap between the time you stop using it to the time it begins to decline in fish (longer for man).

b. "In other words, any pollution control system based on instituting controls only when some harm is already detected will probably guarantee that the problem will get much worse before it gets better."

- 1) If there are 7 billion persons by 2000 A.D., who live like present day Americans, the total pollution load of the environment will be at least 10 times that of today.

2) While we don't know how much pollution the environment can take, many people already believe we have done irreversible damage to large natural systems.

a. Example: Aerosol cans and freon causing more ultraviolet radiation.

- 3) Growth in the world system - Various computer runs were done assuming different conditions.
- In standard run - p. 129, assuming no major changes, resources will fuel industrial growth until approximately 2000, then the bottom will fall out - with it will go food production!
 - Numerous other runs are made assuming double the known reserves of natural resources (pollution ends it by approximately 2050), assuming unlimited nuclear power (same as last one); assuming double resources and strict pollution control by 1975 (food shortage causes collapse by 2050); assuming unlimited resources, pollution controls (reducing 75% of pollution), increased food production (double yields), and perfect birth control (the collapse occurs approximately 2100 due to pollution and food shortage); etc.
- To make a long and complicated story short and simple, there seems no way to prevent overshoot and the collapse of civilization before 2050 (at the latest) unless some very basic ideas are changed.

D. The State of Global Equilibrium.

- The only answer the M.I.T. team could find to the problem (Note! Technology cannot solve it because technology is limited to using available resources and no matter what technology comes up with, you cannot have unlimited growth in a finite (limited) system), is one of balance.
 - population equalized so that the number of children born in the world equals the number of deaths each year.
 - industrial growth equalized so that the rate of investment equals the rate of depreciation of existing industrial equipment.
 - resource consumption per unit of industrial output is reduced to one-fourth of its 1970 value
 - pollution generation per unit of industrial and agricultural output is reduced to one-fourth of its 1970 value.
 - capital is diverted to food production even where this is deemed "uneconomic" by present standards. Also soil enrichment and preservation is given high priority.
 - high priority is given to designing all industrial capital and consumer products for durability and easy repair.

Point: In this system, a stable world population (only slightly larger than today's) can be maintained at about half the present U.S. level for a long time into the future. This would give technology and industry a chance to adjust to changes in resource availability and would give people a chance to consider alternative courses of action (like lower population/higher living standards, etc.). However, if we wait until the year 2000 A.D. and then meet all of the above conditions, the equilibrium state is no longer sustainable (too many people).

- The Equilibrium State - while this state does mean strict controls on population, industrial output, agricultural production, pollution, and non-renewable resource consumption, it does not mean stagnation.
 - Such activities as art, music, religion, basic scientific research, athletics, and social interaction (all activities not using large amounts of resources or destroying the environment) could grow indefinitely.

- What this really means is a change in the values of the societies of

the world. A change from growth to equilibrium, from planned obsolescence to durability, from gross inequality between nations and individuals to a closer approximation to equality; from waste (conspicuous consumption) to conservation; from death to life.

- I. The Waste Makers
- A. Review idea of limited resources--all are finite: land, water, metals, fertilizers, etc.
- B. City of the Future--up until the present time, the vast majority of Americans, as well as business and government, see progress as economic growth. For products, more waste.
- CH. 1
1. We have 6% of world's population, use 50% plus of its natural resources
 2. "A charge of rape could be sustained by any adult when consent or cooperation has been given."

- C. The Hanging Prospects of Saturation--
- CH. 2
1. We consume twice as much as we did before 1911 in U.S. today. 40% of average Americans' possessions are luxury items.
 2. Our technology has driven our production higher each year (about 3%). Hence in order to keep people working, Americans must consume more each year.
 - a. We have also developed a growing dependence on Fed. Govt. to finance programs to support the economy.
 - b. As automation replaces more jobs (esp. lower skilled), now population growth produces more workers for the already swelled labor market.
 - c. Our major problem is how to sell what we can produce.

- D. Growthmanship--
- CH. 3
1. Nearly all Americans, labor, political parties, business, etc. see growth as the major economic goal.
 2. "Our unreasonably productive economy . . . demands that we make consumption our way of life; that we convert the buying and use of goods into rituals, that we seek our spiritual satisfactions, our own satisfaction, in consumption . . . in need things consumed, burned up, worn out, replaced, and discarded at an ever increasing rate."
 3. As a result, 9 strategies were developed to foster growth and increase consumption.

- II. In response, nine strategies
- CH. 4
- A. There's Always Room for More--The idea that each consumer should be induced to buy more of each product than he had been buying. "The way to end slut was to produce gluttons."
1. His and her divorcés, snobs, etc.--color matching accessories--2 homes--
 2. Buy more by making products blipper and more complex, hence more modern and more expensive.

- B. Progress through the Throw-Away Spirit--
- CH. 5
1. Advertising began promoting throw-away everything--
 - a. Paper clothes, use once cans, bottles, meats in their throw away pans, ball-in bats, TV dinners, aerosol cans, etc.
 - (1) "More than a hundred million cans of squirtable whipped cream being sold a year."
 - (2) Annual cost of purchasing 525 million--or \$500 per family per year.
 - (3) The disposable razors, watches, camping equipment and even the color-coded potato peelers.

- C. Progress Through Planned Obsolescence--
- CH. 6
1. Types--Obsolescence of function--of quality--of desirability (styling)--
 - a. The deliberate shortening of a products' life.

- CH. 7
1. Change basic color-degree of ornamentation--the profile (all in cars and clothes).

- CH. 8
1. How to Outmode a \$4,000 vehicle in 2 years--

1. "The Big 3 of Detroit were spending more than a billion dollars a year to put new dress on their cars each year." (in 1969)
2. Main idea is that by changing styles, colors, options, etc. every year you can create obsolescence in style-conscious Americans.

- CH. 9
1. Along with the obsolescence of style-conscious Americans

- a. In 1966, car life 3 years shorter than in 1940's.
- b. Between 1967 and 1968, had 1 million more cars but 5-1/2 million more motor car breakdowns!

- c. Cars rust out faster (paint quality reduced)--tires, also mufflers, etc--despite the fact that for just 8¢/car a lead-coated steel is available that would protect muffler for the life of the car!

- CH. 10
1. Whole gist is the idea that home products built to break down. Worst offenders--washing machines, refrigerators, drivers, TV, ranges, air conditioners, freezers.

- a. Nat'l. average on washers/dryers: 2-3 repair calls/yr.
- (1) Manufacturers make more \$ on repair business than on sales!

- CH. 11
1. Idea is obsolescence of desirability thru color design, gadgets and etc.

- CH. 12
1. The Repairman's Paradise

- a. 100% increase in repairmen 1945-1960, bills increasing rapidly--432 billion in 1975!
- a. More things to go wrong.
- b. Replacement parts cost more.
- c. Worn parts increasingly inaccessible.
- d. Part hard to obtain (Kodak camera)
- e. Push to replace--not repair.

- CH. 13
1. Progress through planned chaos

1. No correlation between price and quality.
2. Value observed by trade-in furs, "birdskins on a strong", planned chaos of names (like 1st line, second line, etc.), price fixing, etc.
3. In short, the idea is to increase sales and ignore the customer by confusing him he is getting a bargain.

- CH. 14
1. Selling on the Never-never.

- a. Mostly thru easy and instant credit plans.
- Reduces psychological barriers of customers because it's less final (Victrola funny-money)
- Customers pay more when they don't have to pay for it immediately.

- K. 2. "During the 1950's consumer indebtedness rose 3 times as fast as personal income."

- a. People want everything right now.
- b. Credit cards symbols of status--given to all, high interest
- c. (1) TV program on bankruptcy
- d. Auto credit rose 80% (1947-57--high interest)
- e. Open-end mortgage--pay a little, borrow more
- f. Packaged mortgage--house pays everything
- g. Average American family 3 months from bankruptcy

L. Hedonism for the Masses

1. Americans have shifted from their Puritanical past to a live for the moment--don't deny yourself--hedonism
- a. Causes (2) Industrialism, urbanism, stress, and of course advertising!
2. Symptoms--preoccupation with the newest/the latest
- a. A national impatience--ready to wear, use, etc.
- (1) All the more expensive of course
- b. "Hupont found impulse buying in supermarkets had increased 33% between approx. 1950-60."

M. Progress Through Proliferation of People--

1. Main idea--"A Bonanza for Industry--Babies"
2. This prediction did not come true as more people stayed in School longer, married later, and had smaller families--especially upper and middle classes (i.e., "the rich get richer and the poor get children").
- a. Still advertising encouraged large families
- b. See "Score Card" pg. 151--take off--
- c. Advertising sought to make good consumers of the young-- train them (YOU) right.
- (1) By 1960, American kids bought \$15 billion worth of toys a year.
- Boys age 15 had 15-20 toy guns.
- (2) Teen age credit, magazines, etc.

III. Implications

A. Ever-mounting Consumption?

1. The U.S. system has produced the highest standard (note: not quality) of living the world has known.
2. The work force--1 out of 4 works for Fed. or State Govt.--1 out of 6 for auto industry.
3. Costs--
- a. The world is starting to get wise to U.S. consumption, i.e., we look very bad.
- b. U.S. industrial wastefulness has made foreign products more competitive--they're also often better.
- c. The growing dependence on advertising lends toward business oligarchies.
- d. U.S. industrialism will have created a new style of life in U.S., i.e., wasteful, destructive, etc. (in the sense of quality of life.)
- (1) Pollution, urban sprawl, social ills, etc.
- (2) Social services costs--esp. in cities (New York)
- (3) Curtailment of individual liberty

Point: Are the costs for our standard of living worth the benefits?

The Vanishing Resources--

1. "We have used more resources in the years between 1914 and 1954 than all men had in the 1,000 years of recorded history before that time."
- a. Indiv. in U.S. uses 10 tons of materials per yr. (10 times the raw materials as people of rest of free world).

- (1) We consume much more than we produce
- (a) We, the U.S., running out of many essential raw materials: copper, aluminum, oil, etc.

Implications?

- (b) What we use continues to be used wastefully
- (2) U.S. does not have food surpluses today--
- (a) Nutrients in soil depleted 33% since 1860's
- (3) Our reserve of timber is what it was in 1920's
- (4) Water needs of average American doubled since 1900
- (5) Ftc., etc., and sodium
2. We can recycle materials (solution in part)
- a. Other nations becoming industrialized starting to use much greater amounts of natural resources (just as we did in our industrialization).
- (1) Leads to more scarcity, higher prices (rich get richer, poor starve)

C. The Commercialization of American Life--

1. Main point: Ever increasing commercialism in America--lower quality of life.

- a. Typical family exposed to 1,518 selling messages in the course of an average day! (Not counting the \$190 mil/yr it costs you for 3rd class mail, i.e., ads.)
- (1) Consumer orientation--rising demands--social unrest--price on everything thinking, etc.

- b. The quality of advertising messages themselves has degenerated (sex, divorce, etc.)
- (1) Drug Co's spend 4 times as much for advertising as for research--higher cost (for ads)

D. The Changing American Character--

1. Effects of pressures to consume?

- a. Hedonistic people--we spend more on smoking, drinking & gambling than on education, more on tickets for recreation than on foreign aid, more on jewelry & watches than on either books or basic research, etc.
- (1) Main pleasures from consumption, not production--apathy.
- (2) People as consumption items? (family effects)
- (3) Consumption as a right?
- (4) American youth very materialistic (and at higher level of expectation) than other cultures.
- (a) Crime rates/Ages
- (b) What should/can be done?

- a. Think in longer terms than now!

IV. Some suggested Courses--

A. Restoring Principle in Prudence--

1. "The unorganized consumer must resist blind conformity to the group and to the commercial persuader. Education is central to his resistance."
- a. You have to not think best psychological minds in advertising.
- (Subliminal man)

THE WHITE MAKERS (cont'd)

Page 5

- b. Consumer protection legislation/groups/information (see p. 224-28)
2. Active consumerism--i.e., take back the driver's seat.
 - a. Stress function, not fashion--don't let them bullshit you! Buy basic products (less to go wrong).
- B. Restoring Pride in Quality--
 1. Rerod quality standards in order to make intelligent choices. (Resisted by industry)
 - a. British Standards Institution (Consumer Reports)
 2. General Idea--learn to ignore emotional advertising, demand facts and performance!
 - a. Truck antenna--Sears--etc.
- IV. C. Respecting the Eternal Balance--main idea: Is just that!
 1. Renting products with trouble-free guarantees.
 - a. Learn about and accept consequences
 2. Recycling--city level, state level, etc.
 3. Population control--(Japan & abortions)
 - a. Tax laws
 4. Education for low-resource leisure--lower working hours
 5. Control use of technology by THOUGHT (same for advertising)
 6. Basic research & education
 - a. Shift from production to service economy.
 7. Other--
 - a. Education for low-resource leisure--lower working hours
- D. Facing the Unmet Challenges
 1. A re-examination of priorities--values
 - a. Restructuring challenges to environmental concerns.
 - b. Education. We now spend 16 on education for every \$1 spent on defense! (1) and mass media
 2. Our place in the family of nations
 - a. Achieving an Enduring Style of Life
 1. The quality of our present existence seems to lack much, despite of (and in some cases due to) the superabundance in quantity of material goods.
 - a. Our industries' productive power threatens to subordinate our culture to our economy.
 - b. Encourages people to consider consumption (rather than production, achievement, interpersonal relations, etc.) as the basis for our feelings of significance or personal worth.
 2. "If Americans are to become masters of their destiny in terms of style of life, they must come to terms with their machines." (Future Shock)
 - a. Luck, pushing us toward ever higher consumption (production)
 - b. "The second massive obstacle standing in the way of any significant shift in the American style of life is the all-pervading commercialism of the environment."
 - c. Average family sees 38 1/2 hrs. of TV per week (6 hrs. of commercials).
 1. Take control over program content away from advertisers (Guns of Autumn).
 2. License TV networks on terms that require them to strive for a better balance of public-service programming.
 3. Set up counterbalance to existing networks (P.A.C.) or pay TV.
 - b. Gallup poll showed most Americans hadn't read a book in the past year.
 3. The central challenge seems to be to live with abundance without being forced to impoverish the spirit by being damned fool about it."
 - a. Criteria for living priorities, pp. 285.

John Jucut
SS (n)

The following is a reprint of a memo from the Dean of the College of Human Ecology at S.U., to his departmental staff, November 1975.

"If all the world were reduced to a town of 1,000 people, in the town would be 60 Americans. The remainder of the world would be represented by the other 940 persons. The 60 Americans would have half the income of the entire town, the 940 would share the remainder of the town's income. 150 people in the town would be classified as Christians, 60 would not. At least 50 towns-people would be practicing Communists, that more than our whole nation. 70 others would be under Communist domination.

White people would total 303, while non-whites would number nearly 700.

The 60 Americans would have 15 times as many possessions as the average of all the rest of the people in the village.

The 60 Americans would produce 15 percent of the total town's food supply. Although they eat 60 percent more than the extra daily food requirement, they would either eat most of what they grow or store it for the future at enormous cost. Since most of the 940 non-Americans would be hungry most of the time, it could lead to serious problems toward the 60 Americans, who would appear to be monstrously rich and feel to a point of sheer disbelief by the majority of the other townspeople.

Of the 940 non-Americans 300 would have malaria, 20 would have schistosomiasis, 3 would have leprosy, 45 will die this year from malaria, cholera, typhus and other infectious diseases. Some 150 will die from starvation and malnutrition. Some of the 60 Americans will ever get these diseases and will probably never even worry about them.

The 60 Americans would each spend 27 a year on liquor and tobacco, but less than 25 for the drugs needed for the finest medical care in the world, and they would be loudly proclaiming that medicine costs too much. They're a very interesting people.

Kinda makes you think, doesn't it???

2.

- Reduce the Volume of Noise in the Home: Playing the radio and phonograph at loud levels can cause hearing defects and is irritating to others.
- Limit Family Size: Population growth is our most frightening problem. If we are to survive as a species, such growth must be slowed, stopped, and eventually reversed.

CONSERVATION IN YOUR BACKYARD

- Grow a Garden Plant Native Trees and Shrubs: You will gain a better understanding of the natural world and bring your children "closer to the land." Grow some of your own food and enable green plants to contribute to your environment.
- Do Not Burn Leaves or Garbage: This is illegal in most metropolitan areas and is a waste of organic matter.
- Start and Maintain a Compost Heap: You can reduce or eliminate the need for waste picking by putting all organic matter into a compost heap.
- Use a Shredder: If you have a bigger than average yard, use a shredder to speed up your composting process.
- Ignore Leaf-Chewing Insects: Don't be concerned about caterpillars and other native leaf-chewing insects when they attack trees.
- Learn About and Use Natural Insect Controls: There are many controls in nature for pests. These worked before nature's balance was upset, and they are available and work today.
- Dispose of Unused Pesticides only in an Approved Manner: Make certain you don't do more harm than good when you get rid of pesticides you have on hand.
- Fertilize only when necessary: Fertilize according to need. The need is not necessarily seasonal.
- Mow the Yard by Hand: Use a push-mower and hand tools when health and conditions permit.
- Check the Weather Before You Mow: Read the weather report before you mow and look for rain.

SENSIBLE SHOPPING HANDBOOK

- Avoid Buying Plastic: It seems that they are generally not being recycled. Reusable glass and metal containers are preferable.
- Use Washable Markers, Pencils, and Diapers: Throwaway paper products add to our garbage disposal problem and again reduce our natural resources.

1.

CONSERVATION IN YOUR HOME

- Save Electricity: You can save great amounts of energy and thereby help power companies reduce air and water pollution at no sacrifice in comfort.
- Conserve Water: Water is one of our vital natural resources. Use it wisely and without waste.
- Develop Intelligent Heating and Cooling Habits: Plan ahead and use good house-keeping sense to save much of the output of your heating and cooling system.
- Save All Metal for Reuse: Cans bring only a fraction of a penny a piece, but the cans you sell or donate for recycling create a real profit; they save precious natural resources.
- Save All Glass for Reuse: Broken glass is needed in the manufacturing process of new glass and other products.
- Send Old Appliances, Furniture, and Clothing to Be Reused: If all our goods can be used twice as long, we can save half of our natural resources.
- Use the Nearest Recycling Center: If your community doesn't have one, take steps to start it.
- Avoid Excessive Use of Phosphates: Phosphates used in washing clothes end up in our rivers and lakes and are a major source of water pollution.
- Develop Good Food Storage Habits: Rethink your use of paper, plastic, and metal foil wraps.
- Reduce or Eliminate the Use of Household Pesticides: Many of the pesticides used in the home are more dangerous to you than to the pests.
- Conserve Paper: Comprehensive use of paper, if practiced by a majority of our two hundred million people, will save immense forests from needless cutting.
- Recycle Paper: You can save about 10 ten trees per year if you see that all reusable paper is returned for recycling.
- Avoid the Use of Plastics: Until biodegradable plastics are available it is best to avoid them entirely.
- Justify the Use of a Car: Disposal: Use as little as possible; not at all if you have garbage collection or if you have a compost heap.
- Can I Recycle This? Look at anything you are about to discard and ask how it can be reused.
- Don't Waste Gas: Since most gas appliances are using fuel with high frequency, be sure they are working efficiently.

3.

- Use Returnable Bottles: We survived happily before the days of throwaway bottles and cans and we can do it again.
 - Reuse Coat Hangers: Save your coat hangers and return them to the cleaners.
 - Save Grocery Sacks: Return grocery sacks and ask that your order be placed in them instead of in new sacks.
 - Repair vs. Replacement: Don't throw away something that can be fixed.
 - Buy Organically Grown Foods: Shop for the increasing number and variety of health foods.
 - Buy in Bulk: Reduce pollution that comes from the manufacture and disposal of many mail packages.
 - Analyze the Products: Analyze each thing you buy. If it is in any way hazardous to the environment, avoid it in the future.
 - Buy Durable Products: Much of our waste and trash results from products that are short-lived.
- CONSERVATION WITH YOUR CAR**
- Consider Engine Efficiency: There are many ways in which most cars can be operated more efficiently.
 - Avoid Engine Idling: It's harmful three ways: Hard on your engine, wastes gas, and adds more pollution than when the car is in motion.
 - Use Low or No-Lead Gas: If and when your car can operate properly on low or no-lead gas, by all means use it.
 - Encourage Proper Filling of Your Gas Tank: Don't permit service station attendants to overrun your tank.
 - Consider Switching to Propane Gas: Propane is a form of gas which is less polluting than gasoline.
 - Maintain Engine Condition: A clean and properly tuned engine is more efficient, gets better mileage, saves gas, and reduces air pollution.
 - Drive Intelligently: Driving safely saves gasoline and reduces exhaust emissions.
 - Learn About That New Car: If you are really interested in protecting the air, make that a factor in car selection.
 - Use Public Transportation: If you are not a regular public transit rider, try to use public transportation to get to where you need or want to go at least once a week.
 - Ride A Bicycle or Walk: For your own health and the health of the environment.

4.

Conservation with your car, cont....

- Investigate Smaller Cars: For local running around and even for long-distance driving, consider a small four or six cylinder model.
- Recycle the Oil from Your Engine: The oil from your car can be recycled for further use.
- Recycle Your Car: To avoid adding to the unsightliness of junked cars on the landscape, make certain old cars go to the auto junkyard or auto shredder.

CONSERVATION WHILE YOU TRAVEL

- Use Disposable Diapers Sparingly: Make sure this traveling convenience does not defile the environment.
- Watch out for Wildlife: Give consideration to all living things you see crossing the road.
- Don't Burn Lights Unnecessarily: It's a temptation because it's included in the bill, but not a good reason for wasting electricity.
- Use Soap Completely: Carry your own from home or from a previous hotel stop.
- Carry Reusable Cups: Avoid 11-oz and waste that result from throwaway cups.
- Share Your Newspaper: Leave your newspaper, neatly folded, where others can find and use it.
- Save Food: Don't order food you don't plan to eat.
- Don't Litter: Leave necessary wastes in containers provided for travelers across the country.
- Don't Be an Ad Collector: Avoid the habit of picking up brochures because they are free.
- Don't Collect Plants and Pets: Leave vegetation and animal life where you find it. Buy your pets at the pet store.

CONSERVATION IN YOUR SCHOOL

- Teach and Practice Ecology in Schools: Develop environmental awareness by example and by classroom teaching.
- Make School Buildings Ecologically Sound: Make environmental responsibility a part of building planning and maintenance.
- Prevent Runoff: Roof and parking lot runoff can be returned to the ground instead of the sewer.
- Plant Vegetation to Conform to Land Use: Make plantings to coincide with the school's educational program.

5.

- Reduce School Trash: Much can be reused or reduced to useful components on the school grounds.
- Consider Air Pollution: Depending on the system, investigate ways of eliminating air pollution.
- Let Your Compost Be an Educational Project: Teaching by doing and allow the practice to spread through the community.
- Outlaw Idling Buses: One of the worst forms of pollution to the air can be reduced by simple rules.
- Plant School Gardens and Maintain Model Yards: Let the school beautification be a part of classroom learning.
- Watch for Unnecessary Waste in Planning School Events: Parades, science fairs, sports events and the like often waste materials needlessly.
- Devote Class Time to Environmental Study: Make environmental matters a part of many courses where the subject augments an existing course.
- Keep Live Animals and Plants in the Classroom: Use living things to develop a respect for life.
- Make School Camping a Part of the Course: Take advantage of school camps, nature centers, and museums to augment environmental teaching.

PERSONAL COMMITMENTS

- Don't Litter: Do not scatter paper, cans, bottles, or unwanted material over the countryside.
- Help Save Our Endangered Animal Species: Overhunting and killing for profit are hastening the extinction of many wild animals.

INTRODUCTION

"There's no such thing as a free lunch." Nearly everyone has had occasion to hear that slogan before. With the late 'sixties and early 'seventies came the advent of widespread environmental consciousness in America. Americans began to take matters of ecology a little more seriously. The final shock was the oil embargo of 1973-74 which slowed down society and caused many Americans to reassess some of their values. The automobile industry began to see a shift in demand to smaller sized cars, and the government eventually reduced the highway speed limits in an effort to conserve energy. But unfortunately, once the oil scare had subsided somewhat, American society as a whole began to move as fast as it ever had.

But that slogan is still kicking around, if only in classrooms and committees. It is recognized in the scientific community as a law, a fact of ecology. Man cannot touch or alter a single area of the environment, without affecting another.

The information compiled and presented on the following pages is designed to help the reader become more aware of the ecology problem; and to offer alternative means for alleviating it to some extent, by individual or community level involvement.

Although dwindling energy supplies are a major concern to environmentalists, politicians, and virtually all other citizens;

it is not the only issue one should be concerned with today. There really is "no free lunch," everything on this spaceship we call Earth is connected. For example, the gasoline one pumps into his or her automobile not only diminishes that resource, it also releases pollutants into the air. Those pollutants don't vanish into nothingness either. They remain in the atmosphere, a common resource to all earthly life, and are washed back to the earth with every drop of rainfall.

The list of examples could go on endlessly. What is essential is for one to gain a better understanding of the total environmental crisis, of which the energy situation is only a part. Very briefly, the situation can be explained in the following way: Increasing population requires greater agricultural production. There are currently four billion people on earth, and projected figures for the year 2000 place eight billion people on the planet. With literally millions starving each year, it is doubtful if agricultural technology will advance fast enough to feed eight billion people; and if it does, will there be enough vacant land to cultivate? The rising population poses yet another problem in addition to agricultural production. Combined with the rapid technological change that has taken place in the last few decades, increasing population perpetuates the depletion of natural resources--resources that are finite. And finally, more people and higher technologies means more pollution.

The earth can only take so much harassment. If each individual does not attempt to make changes in his or her own life, mankind

POLLUTION

may well reach a point where the earth will hold no more people, supply no more food or water. But if individuals act now, then the collective future for all life on this planet may very well prove to be a positive and fulfilling one.

The following pages contain a wealth of information on means for ecological involvement. The reader should not be overwhelmed with the material, but rather seek a niche in which he or she feels most comfortable. That may be a whole-hearted attempt to recycle everything possible, or the reader may find a personal calling to get involved on the political level. Just as every abuse man makes against his environment is detrimental to the cause; every effort made by each individual to better the environment, no matter how insignificant it may seem, is a great contribution.

The world is presently experiencing pollution of the air, water, land, and also pollution from noise. Sources of pollution are as vast and complex as the resultant hazardous side effects. Following are some of the major pollutants to the air, land, and water; and the hazards they pose to the quality and quantity of life.

Not only is pollution physiologically harmful, it is aesthetically unappealing. Let us first examine water pollution. About two-thirds of water pollutants come from industrial wastes. The remaining one-third is distributed about equally from city government, and from private homes. When a body of water is polluted with nutrients from sewage or run-offs of agricultural fertilizer, growth of aquatic vegetation and microorganisms is stimulated. This increases the demand for oxygen in the water, and reduces the amount of oxygen available to the higher developed animals such as fish. Therefore, fewer fish survive, interrupting not only the aquatic food cycle, but also the amount of seafood available for consumption by terrestrial animals and humans.

If the body of water is polluted with toxic chemicals from industrial wastes, pesticides, or oil spills; many living organisms are killed, including birds and fish. This form of water pollution also disrupts the food chain of higher animals. According to experts, within the last forty years, oceanic life has decreased about 40 percent.

mainly attributable to pollution.

Not only does water pollution kill aquatic and terrestrial life, it carries diseases such as hepatitis, typhoid, and cholera. Drinking water in a high percentage of heavily populated U. S. cities is inferior according to Public Health standards, and several thousand cases of resulting diseases are reported every year.

The major contributor to air pollution is the automobile, and along with other transportation vehicles almost half of all air pollution originates from them. Other sources are home and commercial fuel burning, and industrial smoke.

Levels of air pollution in many industrial cities pose serious health hazards to citizens. Air pollution contributes to circulatory and respiratory disease, emphysema, and possibly cancer. Not only is air pollution detrimental to living organisms, however. Agricultural crop and livestock damage causes losses in the millions of dollars in the United States annually. Air pollution also increases the deterioration of buildings and other man-made objects, through acidic corrosion.

In terms of costs, the Environmental Protection Agency stated in 1976 that damage from air pollution in the United States amounted to 12.3 billion dollars. These costs are delegated to citizens through taxes, inflationary product costs, health costs, and so on.

There is also speculation that air pollution affects weather conditions, perhaps on a global basis. Weather extremes such as droughts, floods, tornadoes and hurricanes, and temperature alterations,

may be related to air pollution. Few definitive answers are established, but massive research is being done in this area.

The final aspect of environmental abuse to be discussed here, is the topic of land use. Improper land use through urban development, and solid waste disposal, along with erosion and flooding, often cause topographical changes that cannot be reversed. The impacts on the quality of the environment may have more lasting effects than those resulting from air or water pollution.

Approximately 75 percent of United States land is now used for agriculture, housing, and industry and commerce; in contrast to five percent usage 200 years ago. Such use can be agriculturally and economically productive. But each year more land is being converted from ecological productivity, to urban and commercial development. Random, unplanned urban and suburban development usually results in the loss of vital agricultural land. The reader may be familiar with the term "urban-sprawl," which refers to suburban expansion around a major urban area. In most cases, the suburban developments are scattered, requiring transportation routes connecting them to one another, and also to the main urban areas. These routes dissect the interlying lands, making them unsuitable for ecological or agricultural purposes, and often unsuitable for further commercial or urban development.

Another problem posed by urban sprawl, is the necessity to extend utility services to the outlying areas. This results in greater energy consumption and higher costs. Thus, land misuse not only destroys vital agricultural land, but also adds to the depletion of

of finite energy resources.

Other aspects of improper land use are strip mining, which compounds the natural geological erosion process and destroys agricultural lands; the filling-in of marshes and estuaries for development, destroying many species of wildlife that play important roles in the ecosystems of the particular area being developed; and accelerated cutting of national forests to expand timber production, forests that could be saved to some extent through recycling paper. Over-grazing and continuous farming without replacing nutrients to the soil is also harmful to the land. An extreme example of this type of land exploitation is seen in the desert regions of the middle east and north Africa. Once agricultural grasslands, these areas were excessively farmed to the point of desolation; and in some parts of those deserts today, virtually no life can be sustained.

Solid wastes and their disposal are also a threat to the land. In the United States today, about one ton of solid wastes are generated per person every year. These take the form of bottles, cans, paper, metals, plastic containers, and so forth. Many of these items can be recycled, a topic which shall receive further attention shortly.

About one-half billion American tax dollars are spent each year to clean up litter. And once collected, the problem exists of disposing of it in an ecologically sound way. If the refuse is dumped on open land, it creates and "eyesore." If it is burned, it adds to air pollution. If the waste is dumped in lakes, rivers, or the oceans, it further compounds water pollution. Some items of solid waste are

almost indestructible. These include cans and bottles, plastic and metal bottle caps, and several million junked automobiles each year.

If current trends continue, America may literally become buried in its own waste. Thus, it is necessary to reverse trends and philosophies from that of a throw-away spirit, to one of conservation and recycling or reuse. Most paper and metals can be recycled, also glass. Plastics are not recyclable, and require petroleum to produce. Therefore one should avoid buying items that are packaged in plastic. More information on recycling is detailed in the following pages.

To conclude the discussion of pollution, a citizen wishing to take action regarding a problem area may contact the Michigan Department of Natural Resources, (DNR). The DNR has an ENVIRONMENTAL HOTLINE which is open 24 hours a day, seven days a week. This number should be called to report and emergency situation only, or to initiate a complaint concerning a violation of pollution standards. The agency deals with the enforcement of pollution standards, and acts on the situation within hours.

For questions concerning the administration, amending, or introduction of a new law, political response to a situation dealing with pollution, or general information, the concerned citizen may contact the INFORMATION SERVICES CENTER (of the DNR), or the DIRECTOR'S OFFICE. The telephone numbers are as follows:

ENVIRONMENTAL HOTLINE: 517/373-7660,
INFORMATION SERVICES CENTER: 517/373-1220,
DIRECTOR'S OFFICE: 517/373-2329.

RECYCLING CENTERSMETALS

Summit Steel Processing Corporation
1900 W. Willow, Lansing, MI
517/372-6600

Summit Steel buys virtually all kinds of non-ferrous metals. They will accept them in any condition, and no packaging is required. Among the metals they buy are: sheet metal (from old cars, for example), galvanized metal, all steel, all cast iron, aluminum (including aluminum foil), copper, brass, zinc, etc. They will also accept beer and pop cans providing they are solid aluminum, containing no steel seams or tops. Summit Steel does not buy tin cans because of their unknown analysis, (that is, their composition is of many different metals, and no market exists in the Lansing area for recycling these materials).

Lansing Iron and Metal Company
1406 W. Larch, Lansing, MI
517/482-1301

Lansing Iron and Metal buys most kinds of metals. They will accept them in any condition. Among these are: copper, brass, aluminum, steel, and cast iron.

Friedland Iron and Metal Company
314 E. Maple, Lansing, MI
517/442-1668

Friedland will not accept any sheet metal or tin cans. Pop and

beer cans are accepted only if they are all aluminum, containing no sheet metal. Other metals they do accept are: steel, cast iron, copper, brass, aluminum, (including foil), etc. These metals are accepted in any condition, and no packaging is required.

Auto Salvage
2338 W. Grand River, Lansing, MI
517/321-0735

Auto Salvage will buy only junk cars and motors. The metals are then crushed and sent to a major metal recycling plant. No other metals are accepted.

PAPER

The Ingham County Drain Commission heads up the main paper recycling project in metropolitan Lansing. The Drain Commission is located in the county building in Mason, 407 W. Cedar, 517/696-9222. The project is on a voluntary drop-off basis, with several drop-sites throughout Greater Lansing. Types of paper accepted are: magazines printed on newspaper, paper bags, newspaper, corrugated cardboard, and any other paper that does not have a gloss finish. They do not recycle paper towels, wax paper, or miscellaneous refuse. They ask that the paper be banded, boxed, or bagged. Drop-sites are located at the following places:

- 1) Kalamazoo Middle School; Berchem and Abbott in East Lansing.
- 2) Marlette School; Berchem and Hagdorn in East Lansing.
- 3) Meridian Mall; Utensie,
- 4) Schmidt's Super Food Market; Okemos.
- 5) Prandor Shopping Center; Lansing.
- 6) Logan Shopping Center; Lansing.
- 7) The Kroger Company; W. Grand River, Lansing.

- 8) Baryames News Center and Cleaners; S. Waverly at Holmes, Lansing.
- 9) Meier Thrifty Acres; S. Pennsylvania, Lansing.
- 10) Four locations on MSU campus:
 - a) behind Burkey Hall,
 - b) Judging Pavilion,
 - c) Cherry Lane Apartments (laundry),
 - d) Spartan Village.
- 11) Village Townhouse Co-op; on Haverhill Dr. near Miller Rd., Lansing.
- 12) Mason Shopping Plaza; Mason.
- 13) Solid Waste Transfer Station; Williamston.

Collections from the last two drop-sites are donated to the

Boy Scouts of America. Also of interest, the project also recycles overruns from the East Lansing Town Courier, and the Ingham County News; along with commercial wastepaper from the county buildings and other office buildings in the area.

Friedland Iron and Metal Company
314 E. Maple, Lansing, MI
517/482-1648

In addition to metals, Friedland also recycles wastepaper.

Types accepted are: newspaper, corrugated office paper, magazines and paper bags. For convenience these may be bundled, although it is not required.

GLASS

There is not a large market for recycling glass. The composition of glass is primarily silicon, more commonly known as sand, and is considered to be a relatively inexhaustible resource. Also, because of variances in color, bottlers tend to pass up recycled glass in preference of the original product which may contain a more pure color.

However, there are drop-sites in Lansing for glass recycling.

One should keep in mind that the recycling of glass requires less energy

than the energy required to fabricate the initial product. This in itself is sufficient reason to recycle glass whenever possible, as energy is clearly not a renewable resource. Drop-sites are located at the Meier Thrifty Acres on:

- 1) S. Pennsylvania (box located near Shell station),
- 2) Grand River, Ukenos (box located near gas station),
- 3) W. Saginaw (located in parking lot near home improvement department).

MISCELLANEOUS

Other products to keep in mind for recycling (in their original form) are as follows:

- 1) Egg crates: Perhaps you know someone who raises chickens and sells their own eggs. Or if you shop at a market where you select your own eggs, take the old crates along with you.
- 2) Bottles and jars: Bottles can be passed along to someone who makes their own juice, wine or beer. Old jars should be saved for canning.
- 3) Clothing: If you tire of an article of clothing, (shoes included), don't throw it away. Give to a friend or relative, or donate to:

- a) The Salvation Army
317 E. North, Lansing, 517/482-0821 (pick-up number also).
1700 E. Kalamazoo, Lansing, 517/485-0483.
Donation basis only--drop-off or phone for pick-up service.
- b) Volunteers of America
117 Pere Marquette, Lansing, 517/486-4414 (warehouse, retail, and pick-up).
2322 S. Cedar, Lansing, 517/489-0678 (Theiftstore).
202 S. Grand River, Lansing, 517/489-0678 (retail).
Donation basis only--drop-off or phone for pick-up service.
- c) Other:
 - a) The Salvation Army also accepts furniture, books, appliances, kitchen utensils, etc.
 - b) Volunteers of America does not accept hardbound books, magazines, large appliances, or anything in need of repair.

They will accept paperback books, small appliances, furniture, toys, and so on.

e) If you are interested in selling your used goods, don't forget the many second hand stores located throughout the Lansing area, and also the classified ads in your community newspaper or the State Journal.

d) If you (or a neighbor) have a garden, rather than using a disposal for organic kitchen wastes, start a compost pile. You can also add dead leaves, and grass clippings as long as they contain no chemicals such as weed killer. A compost pile makes excellent organic fertilizer for your garden and poses no threat to the environment.

FOR FURTHER INVOLVEMENT

Clubs and Organizations

1) Lansing Chapter of the Audubon Society: Initially organized to promote the preservation of bird species, it now also deals with several aspects of achieving and maintaining a sound environment. Informational inquiries may be addressed to:

Fenner Arboretum Park
2020 E. Mount Hope
Lansing, Michigan 48910, or call:

Randy Killenwald, President
517/487-1425.

For membership write to:

Mrs. Betty Weaver
458 Rosewood
East Lansing, Michigan 48823

2) Lansing Energy Affairs Network
P.O. Box 265
East Lansing, Michigan 48823

This organization deals with energy related issues in the Lansing area.

3) Sierra Club, Mackinac Chapter
409 Seymour
Lansing, Michigan
517/487/8382

This club is concerned with all aspects of environmental exploitation, and encourages political involvement and pressure regarding relevant environmental issues.

- 4) Michigan United Conservation Clubs (MUCC)
P.O. Box 30235
Lansing, Michigan 48909
517/571-1041
The "MUCC is devoted to advancing the cause of conservation in all its phases, including outdoor recreation, natural resource management, environmental education, enhancement of fish and wildlife populations, and prevention of environmental degradation."
- 5) Environmental Action Foundation of Michigan (EAM)
409 Seymour
Lansing, Michigan 48933
517/484-7421
This is a foundation fighting against pollution, improper land use, and other aspects of environmental exploitation. It exerts efforts to support and pass "strong environmental legislation and defeat congressmen with poor environmental voting records."
- 6) Public Interest Research Group in Michigan (PINGIM)
615 E. Michigan Avenue
Lansing, Michigan 48933
517/487-6001
PINGIM is a group of lawyers who respond to environmental issues.
- Joseph S. Teshinsky, Executive Director.
- 7) League of Women Voters of Michigan
202 Mill St.
Lansing, Michigan 48933
517/484-5383
The League is involved in the distribution of public information, political support, and lobbying. It is a non-partisan organization.
- Following is a complement of other Michigan environmental organizations that may be of interest to the reader. The majority are not centered locally.
- CITIZENS TO SAVE SUPERIOR SHORELINE
224 West Nicolet
Marquette, Michigan 49855
906/226-3800
- D.A.C.E. (DETROIT AREA COALITION FOR THE ENVIRONMENT)
4864 Third Street, Room 100
Detroit, Michigan 48201
313/577-3480
- DETROIT AUDUBON SOCIETY
15315 Grandville
Detroit, Michigan 48223
- EAST MICHIGAN ENVIRONMENTAL ACTION COUNCIL
One Northfield Plaza
5600 Crooks Road
Troy, Michigan 48064
ECOLGY CENTER OF ANN ARBOR
417 Detroit Street
Ann Arbor, Michigan 48104
313/761/3186
- ENVIRONMENTAL LAW SOCIETY
Hutchins Hall
University of Michigan
Ann Arbor, Michigan 48104
313/763/2176
- EMACT
347 F. Natural Resources Building
University of Michigan
Ann Arbor, Michigan 48104
- FEDERATED GARDEN CLUBS OF MICHIGAN
1729 11th Street
Wyandotte, Michigan 48193
313/285-9742
- HOLLAND AREA ENVIRONMENTAL ACTION COUNCIL
Hope College
Holland, Michigan 49423
616/992-5111
- LEAGUE OF CONSERVATION VOTERS
Route 4, Box 272
Petoskey, Michigan 49770
616/347-9981
- MICHIGAN ASSOCIATION OF CONSERVATION ECOLOGISTS (MA.A.C.E.)
6514 Creet
Drayton Plains, Michigan 48020
- MICHIGAN AUDUBON SOCIETY
1009 St. Joseph Drive
St. Joseph, Michigan 49085
616/483-4576

MICHIGAN NATURE ASSOCIATION
215 North Center
Royal Oak, Michigan 48067
313/988-5278

MICHIGAN STATE UNIVERSITY RESOURCE DEVELOPMENT DEPARTMENT
303 Natural Resources Building
East Lansing, Michigan 48823
517/355-3414

NORTHERN ENVIRONMENTAL COUNCIL
P.O. Box 894
Ashland, Wisconsin
715/682-5365

NORTHERN MICHIGAN ENVIRONMENTAL COALITION
P.O. Box 999
Marquette, Michigan 49855
906/269-1713

SAGINAW VALLEY NUCLEAR STUDY GROUP
5711 Summeret Drive
Midland, Michigan 48640
517/835-1303

SAVE OUR LAKES COMMITTEE
304 Liberty Life Building
Muskegon, Michigan 49440
616/722-7677

SIERRA CLUB, MACKINAC CHAPTER
300 E. Delhi Road
Ann Arbor, Michigan 48104
313/483-0500

THI-CITIES ENVIRONMENTAL ACTION COUNCIL
504 Sheldon
Grand Haven, Michigan 49417
616/862-2697

THOUT UNLIMITED, MICHIGAN COUNCIL
409 Adams
Saginaw, Michigan 48602
517/793-9700

WAYNE COUNTY SPORTSMAN'S CLUB
P.O. Box 5336, Teleford Station
Dearborn, Michigan 48128
313/941-2025

WEST MICHIGAN ENVIRONMENTAL ACTION COUNCIL
822 Cherry, S. E.
Grand Rapids, Michigan 49506
616/451-3051

Some of the most active national organizations are:

- 1) The United States Environmental Protection Agency
Office of Public and Intergovernmental Affairs
Region V 230 S. Dearborn Street
Chicago, Illinois 60604
312/353-2072

The U.S. EPA offers a newspaper called "Environment Midwest."

and also a publication that lists environmental organizations categorically by state, "Environmental Hotline '77," publication number EPA-905/9-77-006.

- 2) Natural Resources Defense Council, Inc. (NRDC)
15 W. 44th Street
New York, New York 10036

The NRDC is the most active legal environmental group in the country. They also publish a newsletter.

- 3) Environmental Defense Fund
162 Old Town Rd.
East Setauket, New York 11733
516/751-5191

Environmental Defense Fund is a coalition of scientists, lawyers, and economists working through the courts and administrative agencies. "EDF's job ... is to press the government to enforce the law (or to fill the gap where new laws are needed)."

- 4) National Parks and Conservation Association (NPCA)
1701 18th Street, N.W.
Washington, D. C. 20009
202/265-2717

NPCA works to promote proper preservation, legislation, and management of parks, wildlife areas, and endangered species. Newsletter available.

Woldumar is also open to the public year-round. Since it is privately supported, there is a trail fee for non-members. The center is comprised of 177 acres of land undergoing succession to a natural ecological state. There are trails through woods and fields, and along the Grand River. There is a pine forest, spruce forest, hardwood forest, and a vernal pond.

Activities for children include day camps, field trips, and classroom programs.

Classes

To obtain further knowledge of the environment, classes are offered at Michigan State University in the Colleges of: Agriculture and Natural Resources, Human Ecology, and Social Science.

The Lansing Community College Science Department offers courses in biology, geology, oceanology, conservation, and natural science. The Social Science Department offers courses in geography, introduction to social science (101), and ecology (Mother Earth ... 1978 and Beyond).

- 5) The Couteau Society
777 Third Ave.
New York, New York 10017

The Couteau Society is mainly interested in preservation of oceanic life. Publications available.

- 6) Great Lakes Focus on Water Quality
International Joint Commission

GLF deals with water quality standards and strives for pollution free environments in the Great Lakes. For their publication write to:

Editor, Great Lakes Focus
IJC Regional Office
100 Ouellette Avenue
Windsor, Ontario, Canada N9A 6T3

Lansing Area Nature Centers

The following are three of the most outstanding area nature centers that are open to the public

 - 1) Fenner Arboretum Park
2020 E. Mount Hope
Lansing, Michigan 48910
517/487-1425

The Arboretum is open year round. It consists of nature trails through fields and woods, picnic areas, and pavillion exhibits.

 - 2) Rose Lake Wildlife, DNR Nature Center
8562 E. Skoll Road
East Lansing, Michigan 48823
517/339-8638

Rose Lake is open to the public year-round. No vehicles are allowed on the trails. Activities include cross-country skiing, hiking, hunting, and bird watching.

 - 3) Woldumar (private) Nature Center
5539 Sanding Road
Lansing, Michigan 48917
517/522-0030

cannot be placed on any particular person or circumstance. But that is not of issue, that is relevant is this: With knowledge of the facts, it is a crime for an individual not to take positive actions and attempt to change.

Americans make up about six percent of the world's population. They use approximately 40 percent of the world's energy, and half of that energy is wasted. If the only involvement one takes from the suggestions and alternatives that have been presented in this paper, it should be to make a conscious effort to change his or her ideas concerning the environment. This earth is everyone's home. It is not meant to be exploited and "ripped-off" of its beauty and splendour. This planet must be cared for and loved, and in turn it will support its population, (a population within limits, of course). So if you are not inclined to take action through organizational or political channels, then make the change within yourself. The next time you throw down some litter, think twice and pick it up along with someone else. That is a start, and everything must begin somewhere.



CONCLUSION

The purpose of this paper has by no means been to paint a dismal picture of the future. Rather, it has been to stress the fact that everyone on this planet faces a polluting future. Once again, "there's no free lunch." Perhaps the cheering newspaper one throws on the ground appears to have a miniscule effect on the environment. But imagine a pile of such litter that would accumulate if everyone in the United States discarded just one wrapper in a common place. Perhaps 250 million pieces of paper still sounds insignificant. The analogy becomes clearer. In that case, by stating the fact that each American discards ten tons or more of solid waste in one year. Multiply that by 250 million people . . . and think about it.

Americans in particular must realize, and quickly that technology, or government, or even nature itself, will not solve the environmental crisis. Nature can repair itself to an extent. But there is a point, known as its carrying capacity, where the earth will not sustain any more people, or pollution, or massive exploitation of its resources.

But the earth need not reach that point. Because there is a solution, and it lies within the people themselves. Changes in attitudes and values do not occur overnight. Americans have been brought up in an affluent society, oriented around throwing away rather than reusing, of waste rather than conservation. Perhaps the blame for this condition

THE POLITICS OF ECOLOGY

Following are some bills currently in committee in the Michigan Congress. Though it is not an exhaustive list, the bills mentioned are the most relevant environmental issues in committee at this time.

House of Representatives

HB 4015, 4023, and 4849; These three bills are almost identical.

They deal with phosphate levels in water, and if passed will provide prohibitions on certain cleaning agents. Sponsors are Representatives McCollough, Rees, and Bennett.

HB 4121, Sponsored by Representative Anderson: This bill was just passed by both the House and Senate. It is "...an act to prevent the discharge of untreated or inadequately treated sewage or other liquid wastes into any waters of the state; to provide financial assistance to local agencies for the construction of treatment works to prevent such discharge; and to abate and prevent pollution of the waters of the adjoining state ...". This is presently the largest public works program in the state, funded by a federal grant of around 300 million dollars per year.

HB 4124, Sponsored by Representative McCollough: This bill, if passed, will require mandatory installment of litter bags in vehicles. HB 4247, Sponsored by Representative Keith: This bill is unique in

that it does not introduce legislation to promote a better environment.

On the contrary, it proposes to exempt county and local governments from the "surveillance fee," which deals with air pollution control. HB 4229, Sponsored by Representative Gommers: This bill deals with natural resources and wetlands, and provides for their development, use, and protection.

HB 4417, Sponsored by Representative Rees: This bill concerns oil and gas drilling. If passed it will prohibit drilling in Pigeon River State Forest, unless the drilling is first approved by the Natural Resources Commission. (There are seven commissioners of the RRC, with a four vote majority needed to approve a project. HB 4417 would require five votes of approval.)

HB 4548, Sponsored by Representative Anderson: This bill would repeal the bounty that now exists on coyotes and wolves. The bill has been passed by the House.

HB 4760, Sponsored by Representative Mathison: The bill deals with the hauling of wastes, liquid and industrial. If passed, it will provide for regulations and licensing.

HB 4804, Sponsored by Representative Harrison: This bill is in regards to waste disposal and regulations on disposal sites. It would provide for policing of waste for fire protection, as well as, prevention purposes.

HB 5209, Sponsored by Representative Martel: This bill proposes an anti-litter program and tax levy on anything disposable. Tax revenue

would be utilized by the state to initiate litter clean-up and proper disposal.

HB 5778, Sponsored by Representative Ostling: This bill promotes protection of inland lakes and streams by prohibiting the use of fertilizers within 500 feet of the shoreline. (About 60 to 70 percent of phosphorous pollutants come from rainwater run-off into the lake or stream, and about 20 to 25 percent comes from detergents.)

HB 5920, Sponsored by Representative Angel: This deals with trade, specifically beverage containers. It would prohibit the retail sale of metal containers with two or more metal alloys, unless they are suitable for recycling.

HB 4189, Sponsored by Representatives Monson and Anderson: Formerly with the Committee on Urban Affairs, this bill has been sent to the Appropriations Committee which is chaired by Representative Jacobetti, who does not have a reputation for supporting environmental issues. If passed, the bill will implement a comprehensive land use proposal. HR 561, Sponsored by Representative Dodak: Also of interest is the House Concurrent Resolution number 561. A resolution does not become a law, but merely sets a precedence or an expression of legislative intent. This resolution was passed but no roll call vote was taken. Essentially, it disallowed the DNR approval to transport and dispose of hazardous industrial wastes at a certain proposed facility in Hampton Township, Bay City. The DNR has the option to reassess the site and present it to the legislature again. However, the precedence set by this resolution may "tie-the-hands" of the DNR in future cases, and

prevent them from exercising any power in the assessment of waste disposal sites.

Senate

SB 63, Sponsored by Senator Hertel: This is "a bill to create a state toxic substance control commission and to prescribe its powers and duties; to require the reporting of certain abnormalities in human or animal health; and to prescribe penalties." That was passed by the Senate.

The House of Representatives has subsequently issued a House Substitute for Senate Bill number 63. It reads the same except for this addition: "...reporting of certain abnormalities in human or animal health; to create a toxic substance emergency fund; to prescribe certain powers of the governor; and to prescribe penalties."

In view of the rather recent PBB contamination, a bill such as this is vital for prevention of, or the ability to take immediate actions to contain such a situation, should it arise at a future date. SB 544, Sponsored by Senator Otterbacher: This bill deals with water pollution standards. It permits the use of certain herbicides for control of aquatic vegetation, but imposes strict regulations regarding their use.

SB 692, Sponsored by Senator Allen: This bill is highly similar to House Bill 4189. It was handled by the Senate Conservation Committee. The Committee is chaired by Senator Mack, who does not have a good environmental voting record. Senator Allen moved that the bill be discharged from that committee. The bill provides for a state land use planning process, by which local governments and regional planning

committees will work in cooperation with the state agencies in regulating land use.

land use.

Following is a list of Congressmen from the immediate and surrounding districts, and their voting records on the aforementioned bills that have passed either the Senate, House, or both.

District Senator HR 63 HR 204 HR 598 HR 908 HR 1192 HR 1221

18	Gilbert E. Berley (R)	YEA	YEA	YEA	YEA	YEA
19	Mal W. Collins (D)	YEA	YEA	YEA	YEA	YEA
20	John W. Holmes (R)	YEA	YEA	YEA	YEA	YEA
24	Earl E. Nelson (D)	YEA	YEA	YEA	YEA	YEA
25	Carl G. Corbin (D)	YEA	YEA	YEA	YEA	YEA
30	Richard A. Allen (R)	YEA	YEA	YEA	YEA	YEA

District Representative HR 1321 HR 1308 HR 204

23	Michael H. Conlin (R)	YEA	YEA	YEA
41	John W. Holmes, Jr. (R)	YEA	YEA	YEA
43	Paul Rosenbaum (D)	YEA	YEA	YEA
46	Don Angel (R)	YEA	YEA	YEA
49	Thomas G. Shyrps (D)	YEA	YEA	YEA
51	Thomas G. Shyrps (D)	YEA	YEA	YEA
55	Donald H. Gilmer (R)	YEA	YEA	YEA
56	David G. Hollister (D)	YEA	YEA	YEA
57	Thomas H. Holcomb (D)	YEA	YEA	YEA
59	John Lynn Jondahl (D)	YEA	YEA	YEA
79	Thomas E. Scott (D)	YEA	YEA	YEA
80	Berk Clodfelter (D)	YEA	YEA	YEA
81	Francis H. Powell (R)	YEA	YEA	YEA
87	Stanley H. Powell (R)	YEA	YEA	YEA

Of this sample, it can be concluded that Senators Ziegler,

Holman, Corbin, and Allen have the best environmental voting records.

Senators Berley and Nelson were not present during enough roll call

votes to draw any substantial conclusions.

Of the Representatives, the ones with the best voting records are as follows: Neamt, Porter, Angel, Griffin, Sharpe, Giller, Mah, Hollister, Holcomb, Jondahl, Conroy, Clodfelter, Spaulda, and Powell.

The votes of Representatives Conlin, Rosenbaum, Scott, and Oyle were not definitive enough to draw any conclusions.

The next time elections come around, cast your votes for the environment! Follow the voting records of your congressman and vote for the election of only those who exhibit a definite concern for the future of the environment. In the meantime, however, one can become involved in legislative actions, or obtain information concerning the enactment of environmental laws through either of the following committees:

House of Representatives
Conservation, Environment, and Recreation
The Capitol
Lansing, Michigan 48909

Senate
Committee on Conservation
The Capitol
Lansing, Michigan 48909

or
The Governor
The Capitol
Lansing, Michigan 48909

TABLE E1

ANCOVA RESULTS FOR ENVIRONMENTAL INFORMATION BY STUDENT STATUS

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariates	4928.523	1	4928.523	1.741	.188
SEATA1	4928.523	1	4928.523	1.741	.188
Main Effects	16336.910	2	8168.455	2.885	.058
SSTAT	16336.910	2	8168.455	2.885	.058
Explained	21265.434	3	7088.478	2.503	.060
Residual	668263.062	236	2831.623		
Total	689528.496	239	2885.056		

TABLE E2

ANCOVA RESULTS FOR ENVIRONMENTAL ATTITUDES (DUCAT-1)
BY STUDENT STATUS

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariates	818.602	1	818.062	.867	.353
DUCAT1	818.602	1	818.062	.867	.353
Main Effects	14245.467	2	7122.733	7.546	.001
SSTAT	14245.467	2	7122.733	7.546	.001
Explained	15064.068	3	5021.356	5.320	.001
Residual	222766.827	236	943.927		
Total	237830.896	239	995.108		

TABLE E3
ANCOVA RESULTS FOR ENVIRONMENTAL ATTITUDES (SEAT-D)
BY STUDENT STATUS

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariates	2921.288	1	2921.288	7.442	.007
SEATD1	2921.288	1	2921.288	7.442	.007
Main Effects	2151.110	2	1075.555	2.740	.067
SSTAT	2151.110	2	1075.555	2.740	.067
Explained	5072.398	3	1690.799	4.307	.006
Residual	92637.564	236	392.532		
Total	97709.962	239	408.828		

TABLE E4
ANCOVA RESULTS FOR ENVIRONMENTAL BEHAVIORAL INTENTIONS
BY STUDENT STATUS

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariates	.097	1	.097	.000	.989
RELBEHINT2	.097	1	.097	.000	.989
Main Effects	12226.613	2	6113.306	11.107	.001
SSTAT	12226.613	2	6113.306	11.107	.001
Explained	12226.710	236	4075.570	7.405	.001
Residual	129897.140	239	550.412		
Total	142123.850	239	594.660		
					GRAND MEAN = 48.27
Experimental Group Mean - 5.63					
Control Group (Night) - 9.99 (Neg)					
Control Group (Day) - 8.33 (Neg)					

TABLE E5

ANCOVA RESULTS FOR ENVIRONEMTNAL INFORMATION, ENVIRONMENTAL
ATTITUDES (SEAT-D AND DUCAT-1), AND ENVIRONMENTAL
BEHAVIORAL INTENTIONS COMBINED BY STUDENT STATUS

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariates STOTAL	44582.161	1	44582.161	2.914	.089
Main Effects SSTAT	164790.975	2	82394.488	5.386	.005
Explained	209373.136	3	69791.045	4.562	.004
Residual	3610612.860	236	15299.207		
Total	3819985.996	239	15983.205		
GRAND MEAN - 270.83					
Experimental Group Mean - 20.71					
Control Group (Night) - 33.23 (Neg)					
Control Group (Day) - 33.43 (Neg)					

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