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The environmental crisis; the effects of ecology courses on high school students

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AN ABSTRACT OF THE THESIS OF Carol C. Fletcher for the
Master of Arts in Sociology presented December 8, 1971.

Title: The Environmental Crisis: The Effects of Ecology Courses
on High School Students

APPROVED BY MEMBERS OF THE THESIS COMMITTEE:

✓ Barry Lebowitz, Chairman

John James

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It is a basic premise of this thesis that an environmental crisis exists in the world today and has been worsening at least since World War II. The crisis is evident in the population explosion, the deteriorating air and water quality, and the depletion of our natural resources. With the feeling that all persons must become aware, concerned, and involved with the environmental crisis if the trend is to be reversed, this study is concerned with one segment of the population -- high school students.

Sociologists, and especially human ecologists, have not been concerned professionally with the environmental crisis, but instead with spatial distributions of phenomena in cities. They have developed no theory that has been pertinent to helping mankind resolve his environmental problems, although potentially

the field of human ecology could do so. Because of the lack of such needed theory, suggestions made to alleviate the crisis have been disorganized: population control, political action, economic action, and education. Education, with the intent to generate data to guide curriculum development, is the focus of this study.

This exploratory study investigated the awareness, concern, and involvement of high school students with the environmental crisis. Two groups of students were interviewed: those who had taken an ecology course (informants), and those who had not (random). A total of 98 students and 5 teachers were interviewed at two Portland high schools, Reynolds and Aloha, in the spring of 1971.

The interviews consisted of three parts: a ranking of the importance of ecological problems by the students using ecological pictures, followed by a discussion of the reasons for the order; an interview using direct questions; and a questionnaire asking background information. All interviews were tape recorded. The data was coded, and statistically analyzed by a computer.

The data indicate that the ecology courses did influence the informants. [The Reynolds informants tended to view attitude change as the most important task to alleviate ecological problems, whereas the Aloha informants saw the major task as reducing population growth.] Each of these views reflected the major emphasis of the respective courses. The courses, each with different activities, also influenced the ecological involvement of the informants in different ways.

In background characteristics the informants tended to come from smaller families, more often had no religious preference,

camped more, and spent more time in wilderness areas than the random students. The informants were similar to the random students in the following ways: educational backgrounds and occupations of their parents, length of time lived in their present home, enjoyment of outdoor leisure activities, and extent of travels.

There is a difference in the awareness, concern, and involvement of the informants as compared to the random students. Both groups see an ecological crisis in the world and in the Pacific Northwest, and both are concerned about man's chances of survival on earth, but they differ in the reasons they give and the problems they see. Informants were also more actively involved in ecological activities in school and outside of school.

THE ENVIRONMENTAL CRISIS: THE EFFECTS OF
ECOLOGY COURSES ON HIGH SCHOOL STUDENTS

by

CAROL C. FLETCHER

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

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TABLE OF CONTENTS

	PAGE
LIST OF TABLES	vi
 CHAPTER	
INTRODUCTION	1
I IS THERE AN ENVIRONMENTAL CRISIS?	4
Population Size and Its Consequences	5
The Predictable Consequences of Population Imbalance	
Summary of Population Size and Its Consequences	
Population and Food Supplies	
Summary of Population and Food Supplies	
Environmental Pollution	18
Air Quality	
Water Quality	
Rate of Use of Our Natural Resources	23
Summary of the Rate of Use of Our Natural Resources	
II THE ENVIRONMENTAL CRISIS	28
Human Ecology	28
Environmental Crisis Writings	29
Needed: Environmental Crisis Theory	
What Can Be Done to Resolve the Environmental Crisis?	35

Population Control	
Political Action	
Economic Action	
The Role of Education	
III DESIGN OF THE STUDY	51
Introduction	51
Instruments Used	52
Pilot Testing	54
Study Settings in the Portland Area	56
Sources of Data	57
Tabulation of Data	59
IV FINDINGS: DATA AND INTERPRETATION	60
The Impact of the Environmental Crisis Courses on the Informants at Reynolds and Aloha	61
Summary	
Background Characteristics - Informants and Random Students	74
Summary	
The Awareness, Concern, and Involvement of Informants and Random Students with the Environmental Crisis ..	83
Awareness and Concern of Informants and Random Students	
Ecological Involvement of Informants and Random Students	
V SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	117
Summary and Conclusions	117
Recommendations	120
BIBLIOGRAPHY	125

APPENDICES

A. Student Background Information Sheet	130
B. Interview Guide	132
C. Teacher Interview Guide	134
D. Variable Dictionary	135

LIST OF TABLES

TABLE		PAGE
I	Three Most Important Ecological Problems in the World According to Informants	67
II	How Informants Became Ecologically Involved ..	69
III	Ecological Involvement of Informants at School	70
IV	Ecological Involvement of Informants Outside of School	71
V	Number of Children in Family - Informants and Random	75
VI	Length of Residence in Present Home	76
VII	Education of Mother	77
VIII	Education of Father	77
IX	Students' Religious Preferences	78
X	Outdoor Leisure Activities	80
XI	Frequency of Trips to Wilderness Areas	81
XII	Extent of Travels	82
XIII	Source of Ecology Information	86
XIV	Major Interest in Environmental Issues	87
XV	Influential Ecology Readings	89
XVI	Informants' Reasons for Taking Course	90

XVII	Reasons for Random Students Not Taking the Ecology Course	92
XVIII	Is There an Ecological Crisis in the World? ..	93
XIX	Is There an Ecological Crisis in the Pacific Northwest?	94
XX	Specific Problems Mentioned On Why an Ecological Crisis Exists in the World	96
XXI	Three Most Important Ecological Problems in the World	99
XXII	Why Is Population A Problem?	100
XXIII	Does the United States Have a Population Problem?	102
XXIV	Environmental Rating of Community	103
XXV	Optimism Versus Pessimism of Man's Chances of Survival	105
XXVI	Environmental Problems Can Be Solved By Technology	106
XXVII	Ecological Problems in Picture 15?	108
XXVIII	Ecological Involvement in School	110
XXIX	Ecological Involvement Outside of School	111
XXX	Willingness to be Involved in Life Style Changes	113

INTRODUCTION

It is a basic assertion of this thesis that an environmental crisis does exist in the world today. This crisis has been growing at ever rapid rates since World War II, and if a reversal of this trend in our environment is to occur, all persons must not only be aware of the problems that exist, but also be concerned enough about the quality of life and man's survival on earth to want to become involved in some manner to bring about change. One segment of the population toward whom this specifically applies, and toward whom this study is directed, is high school students.

While there have been many suggestions as to how to resolve the environmental crisis, education of our children is commonly agreed to be one major way, or one major ingredient of a comprehensive plan. Developing curriculum on the environment is one specific way of educating students about the environmental problems -- not only giving them a sound basis of knowledge, but also teaching them ways to be involved in a constructive manner to bring about such changes.

This study is a beginning attempt to discover where some high school students are in their thinking and in their actions toward the environmental crisis. If curriculum is to be developed on the environmental crisis (and beginning efforts have already been made by isolated teachers and schools), one ought first to have an understanding of students' views on this subject. At least three possibilities are

apparent. If students are not aware of many of the environmental issues, this calls for curriculum development of one type. If students are very knowledgeable about the problems but are not concerned about them because they do not see these problems as serious, this calls for another type. If students are interested in the quality of their environment and would like to become involved in maintaining this quality, then curriculum development should consider this aspect too.

Ninety-eight students and five teachers from two Portland area high schools were interviewed, and the results of these interviews are presented in this study. Only one previous study has been undertaken which sought to determine high school students' concern with an environmental problem, and this was concerned only with air pollution.¹

Chapter I, "Is There An Environmental Crisis?," analyzes three main aspects of the environment that are generally considered in discussions of environmental quality: population growth and its consequences, air and water cleanliness, and the rate of use of our natural resources.

In Chapter II selected environmental crisis writings are analyzed. Most of these writings have not been written by sociologists, and specifically not by human ecologists. In fact, human ecologists for the most part have not concerned themselves with the environment, but have spent their energies on spatial distributions of phenomena within cities. They, and sociologists in general, have not led the way in

¹James A. Swan, "Response to Air Pollution, A Study of Attitudes and Coping Strategies of High School Youths," Environment and Behavior (September, 1970), 127-53.

creating new ecological theory to give direction to empirical work on the environmental crisis. In the absence of such theory, suggestions have been made for population control, political action, economic action, and for improved education, but the suggested actions have been uncoordinated and not based solidly on theory. This study is an attempt to develop a knowledge base to coordinate ecological efforts in curriculum.

Chapter III presents the specific methodology used in this empirical study: the instruments used, the pilot testing results, the study settings in the Portland area, the sources of data, and a description of the tests and analyses used on the data.

Chapter IV presents the data and interpretations from three major questions that are asked: Did the two different environmental courses in the two different schools have a different impact on the students who took the courses? Is there a difference in the background characteristics of the informants as compared to the random students? Is there a difference between the informants and the random students on their ecological awareness, concern, and involvement with the environmental crisis?

The last chapter gives a summary and conclusions of the study, and then makes recommendations for further studies to be conducted to determine for curriculum development the awareness, concern, and involvement of high school students with the environmental crisis.

CHAPTER I

IS THERE AN ENVIRONMENTAL CRISIS?

Is there an environmental crisis in the world? This chapter will examine some of the relevant facts and arguments in an attempt to determine whether indeed there is an environmental crisis. Of course, there are some who neither recognize a present crisis nor see one coming. Others are predicting the end of the human race in the near future. This chapter will attempt to balance these views to determine the degree of the present crisis, and whether the future trend is toward a lessened or more severe crisis.

There are three main aspects of the environment that are generally considered in discussions of environmental quality: population size and its consequences (is there overpopulation?), air and water cleanliness (is there air and water pollution?), and the rate of use of our natural resources (are they being depleted?).

A normal ecosystem is, by definition, stable and self-correcting; no imbalance is permitted to grow so large as to threaten the continued existence of any component of the system. In human terms a crisis exists in the environment of the world if either at present or in the near future the ecosystem of the earth is becoming unbalanced, and the predictable consequences of such imbalance are unacceptable. Specifically, if people are being born faster than

they are dying, there is a population imbalance which must be corrected to stabilize the ecosystem. If more pollutants are being put into the air or water than are being removed, there is a pollution imbalance which must be corrected. If more energy and resources are being used than created, there is an imbalance needing correction. If for each of these the only correction which can be foreseen is unacceptable -- widespread famine, death, war, extreme regimentation and loss of freedom, or greatly diminished standards of living, then there is a crisis.

POPULATION SIZE AND ITS CONSEQUENCES

In the history of mankind the increasing abundance of humanity is a rather recent phenomena, concentrated principally in the years from 1650 to the present, and largely the result of the agricultural and industrial revolutions. However, not only has there been an absolute increase in the number of people since 1650, but the rate of increase has steadily grown. Over these three centuries "the rate of growth increased from about 0.3 percent per year between 1650 and 1750 to 0.9 percent per year between 1900 and 1950."¹ Since World War II the rate of growth has increased to around 2 percent. At this rate the annual increase of 70-75 million persons, and the population of the world in the year 2000 would be close to 7 billion. At the 2 percent rate the present world population of 3.6 billion would double in only about 70 years. Considering that

¹Philip M. Hauser, Population Perspectives (New Brunswick, New Jersey: Rutgers University Press, 1960), pp. 5-7.

it took centuries for the world population to reach 1 billion, only 80 years for this 1 billion to double, and now only another 80 years for the population to double again from 2 to 4 billion, the "population explosion" is an apt description.

<u>Doubling Times:</u> <u>Date</u>	<u>Estimated World Population</u>	<u>Time for Population</u> <u>to Double</u>
8000 B.C.	5 million	1,500 years
1650 A.D.	500 million	200 years
1850 A.D.	1,000 million (1 billion)	80 years
1930 A.D.	2,000 million (2 billion)	45 years
1975 A.D.	4,000 million (4 billion)	
Computed doubling time around 1970		35-37 years ²

There is clearly a population imbalance in the world ecosystem.

The Predictable Consequences of Population Imbalance

Since Thomas Malthus in 1798 produced his "dismal theorem" that the world's population would grow geometrically while food supplies would increase only arithmetically, the controversy has raged as to whether there is, in fact, a population crisis in the world. Malthus predicted that the only way for the imbalance to be corrected would be hard to accept -- widespread famine and death -- and thus identified population growth as a crisis. Those who would dispute the proclamation of a crisis must show that the consequences of the growth will be other than Malthus predicted -- that the imbalance can be corrected in acceptable ways.

Colin Clark,³ the British economist, is one of the more

²Paul R. Ehrlich and Anne H. Ehrlich, Population, Resources, Environment (San Francisco: W.H. Freeman and Co., 1970), p. 6.

³Tadd Fisher, "The Many-Faceted Food Problem," Population Bulletin, XXIV, No. 4 (December, 1968), p. 85.

reassuring persons on the question of the population explosion. He estimates that at the American level of food consumption the world could hold 47 billion people. At the subsistence level, 157 billion people could be fed. If a critical point exists, he feels, it is far in the future.

Others suggest either more acceptable solutions to population growth, or contend for other reasons that a crisis point is far in the future: there is much open land, forests, and farms in countries all over the world. Although some countries are very crowded, as India, others are not, as Australia, and migration could take place from one country to another. Uninhabitable lands could be cultivated for human occupancy as the Israelis have shown in the conquering of the Negev Desert. Countries with high consumption of resources are now learning to recycle, as the United States. Increased technology and the Green Revolution will be able to produce enough food for the world's peoples. The optimum population of the world varies with the individual; some persons living in large cities may not feel crowded at all. Movement of persons from cities to the rural areas would alleviate concentrated dense populations for those who do feel crowded. And some even suggest that the figures on growth may be inaccurate, such as those for Red China.

Clark and others also suggest that population growth is good in itself. Clark believes that the increased population competing for the earth's natural resources will have beneficial effects. It will "sharpen everyone's wits, as it always has, even if the level of innate

the environment: detergents in place of soap, nylon instead of wool and cotton, aluminum instead of steel, and plastic. Possony⁸ also supports the contention that the world environmental crisis is caused, in part, by technology.

People who see a population crisis are equally adamant and persuasive. For the most part they see the problems created by population increased and deny the likelihood that any of the ways of dealing with these problems suggested by others will ever come about. Georg Borgstrom puts it:⁹

The indisputable fact remains that we already possess on this earth more people than we are able to provide for adequately. At the same time that we are facing this formidable task, we have to perform the feat of satisfying the needs of twice as many human individuals in less than forty years. Man has almost reached the point where, for all practical purposes, he is depriving himself of any history.

Persons despairing of solving problems resulting from population growth contend that economic development does not increase with increased population except in certain special cases. Kingsley Davis¹⁰ states that economic growth is difficult to achieve, and that only one country outside of Western tradition (Japan) has been able to achieve it. Most of the developing countries have found

⁸Stefan T. Possony, "Technology and the Human Condition," American Behavioral Scientist, ed. by R. Strausz-Hupe, 11(July, 1968), p. 43.

⁹Georg Borgstrom, The Hungry Planet (New York: The MacMillan Co., 1965), p. 3.

¹⁰Kingsley Davis, "Population," in Population in Perspective, ed. by Louise B. Young (New York: Oxford University Press, 1968), p. 130.

that the benefits of economic progress have for the most part been erased by the growth in population. To quote Harrison Brown:¹¹

The evidence suggests rather strongly that in most underdeveloped countries the lot of the average individual has worsened appreciably during the last half-century.... People have become more poorly fed. There are fewer available goods per person. And practically every attempt to improve the situation has been nullified by the relentless pressure of continued population growth.

Too dense a population destroys to a great extent the productive capacity of its ecosystem. The overuse and exploitation of forests, minerals, and soils has already greatly reduced the capacity of many parts of the world to support people, and there is almost no likelihood of reversing this damage.

These persons also argue that the costs in individual freedom are very great if population continues to grow. To many, the computerization of life, the treating of man as numbers, and the indifference of society to the individual are becoming intolerable already.¹² The individual would be much affected by the growing increase in population, because it means that he must become more regimented. Harrison Brown suggests the mechanism. As the increase in numbers of people press on the available resources, this in turn will create the need for more elaborate organizations to produce enough food, to extract the needed natural resources, and to distribute the finished products. He hypothesizes that "the

¹¹Harrison Scott Brown, James Bonner, and John Weir, The Next Hundred Years (New York: Viking Press, 1957), pp. 47-8.

¹²Robert Rienow and Leona Train Rienow, Moment in the Sun (New York: The Dial Press, 1967), pp. 169-70.

greater the population density of an industrial society becomes, the more elaborate will be its organizational structure and the more regimented will be its people."¹³ Social organization will become more complex and inflexible, the individual will have less opportunity to express himself freely, and the individual will have greater difficulty in finding privacy, quiet, and some open space.

The crux of the problem is the determination of the "optimum population" of the world. There is no agreement among anyone as to how many people the earth can hold, and attempts at defining optimum population density have been merely verbal abstractions, as for example:¹⁴

The optimum density of population is that density at which a society in a given state of culture is able to utilize the resources of its habitat most efficiently. The optimum density of population necessarily varies with the state of culture and with the amount and kind of available resources.

The question, of course, is not so much how many people the earth can support, but what is the optimum number from the standpoint of the possibility of a good life.¹⁵

Summary of Population Size And Its Consequences

Everyone who has studied the population problem agrees that

¹³Harrison Scott Brown, The Challenge of Man's Future: An Inquiry Concerning the Condition of Man During the Years That Lie Ahead (New York: Viking Press, 1954), p. 256.

¹⁴Lee Raymond Dice, Man's Nature and Nature's Man; The Ecology of Human Communities (Ann Arbor: University of Michigan Press, 1955), p. 129.

¹⁵Joseph Wood Krutch, "A Naturalist Looks at Overpopulation," in Population in Perspective, ed. by Louise E. Young (New York: Oxford University Press, 1968), p. 395.

the rate of population growth has been increasing. To this degree they all agree that eventually something must be done to correct this imbalance. Their differences lie in the period of time before this increased rate will create a population crisis. Some see a crisis now, whereas others see any crisis, if at all, not coming for many years. The latter group thinks we both have time to find correctives for the imbalance, and that for the near future the gains from population growth outweigh the liabilities.

If we consider survival of mankind to be the most important thing -- survival not just for the short term but for the long run -- then something must be done about the imbalance in population growth. The long run survival of mankind with some capability for a good life will be determined by such factors as man's abilities to feed himself, man's success in preventing wars, the amount of freedom and integrity each individual human being is allowed, the prevention of exhausting the world's natural resources, and the preservation of a quality environment satisfactory for all inhabitation. The crux of the crisis is population imbalance;¹⁶

When one of the worst disasters of the twentieth century occurred in East Pakistan in the fall of 1970, an estimated half million people were drowned by a great tidal wave. Yet it took only 35-40 days for Pakistan's population to exceed the number it had reached the day before the disaster...

Those who are not yet bothered by population growth suggest some imaginative possible ways to handle increased population. However, the fact is that we have not yet managed to implement

¹⁶ Rufus E. Miles, Jr., ed., "Man's Population Predicament," Population Bulletin, Vol. 27, No. 2 (April, 1971), p. 4.

anything like their suggestions -- mass population migrations to empty areas of the world, growing food in deserts, vastly increasing food output. In the face of evidence to the contrary persons who have confidence in solving the population problem are willing to risk not treating population growth as a problem now on the hope that their suggestions will be able to be implemented. Is it a high risk? Would it not be better to deal now with correcting the population imbalance? Would that not make all the other suggestions so much more beneficial? It is to these questions that we now turn.

Population And Food Supplies

What is the likelihood that food supplies can increase faster than population growth? There has always been a food-population problem. Since the beginning of time man has experienced food shortages, hunger, and starvation. This was just as true when civilizations were confined to a few fertile valleys as it is today. But today a failure in food supplies threatens the future of our entire civilization in an inter-dependent world.¹⁷

What is the likelihood of failure? Today world food supplies are rising at an average rate of one percent per year, while conservatively estimated, world populations are rising at more than 1.8 percent per year.¹⁸ The extent of malnutrition at the present time is already staggering. Two-thirds of the world's people live

¹⁷ Orville L. Freeman, World Without Hunger (New York: Frederick A. Praeger, 1968), p. 3.

¹⁸ Lloyd V. Berkner, "Man Versus Technology," Population Bulletin, XXII, No. 4 (November, 1966), p. 83.

in countries where average diets are nutritionally inadequate, most having fewer than 2200 calories per day. The following table is based on the most favorable estimates, which assumes a 1 percent increase in annual food production.¹⁹

Year	Total World Calories (billions)	Population (billions)	Calories Per Person (per day)
1965	7,000	3.3	2,121
1970	7,357	3.6	2,094
1975	7,732	4.0	1,933
1980	8,126	4.5	1,806
1985	8,541	5.1	1,675
1990	8,977	5.7	1,575
1995	9,435	6.6	1,430
2000	9,916	7.4	1,340

1340 calories per day represents a starvation level for people and it also assumes that the calories are evenly distributed, which they would not be. [With the projection that in 35 years the population will double in the world, and barring some miracle jump in food production, the numbers of hungry just will not be able to be fed. The Ehrlichs²⁰ and the Paddocks²¹ both predict famines in the 1970's where millions of people will die, in spite of any crash food programs that might be developed. They see no way in which this mass starvation can be prevented. As it is bluntly put by one present day writer, if all of the food in the world were equally

¹⁹ Ibid.

²⁰ Paul R. Ehrlich, The Population Bomb (New York: Ballantine Books, 1968).

²¹ William Paddock and Paul Paddock, Famine - 1975! America's Decision: Who Will Survive? (Boston: Little, Brown and Company, 1967).

against the present 75 bushels; milk production soaring to 30,000 pounds per cow from today's 8000; and agricultural production in general increasing over four times during this period. Many new ideas have also been generated for new kinds of food made out of substances never used before. Fish protein concentrate, a high protein powder made from otherwise inedible fish, is such a new food. Many also place great faith in harvesting the sea and developing agriculture in now uninhabitable places.

But it is hard to see these optimistic ideas as persuasive. They are predictions without any historical basis, and even some of the recent smaller increases are interpreted in a questionable way. Faith in the Green Revolution was inspired by increased production in such countries as Iran, Ceylon, Pakistan, Turkey, and India, but it resulted not only from new high-yielding varieties of seed, but by excellent weather conditions during that period of time, which combined to give these countries record crops. Of course, poor weather can greatly decrease such production. Fish protein concentrate, hailed as one of the most hopeful possibilities for the future, has not proven yet to be very useful because of the tremendous expense of production.²⁵ Most experiments attempted in new agricultural lands, unsuitable before for agriculture, have ended in failure. Harvesting the sea hardly holds much promise for the near future, if at all.²⁶

²⁵"To Fill the World's Belly," Science News Letter, Vol. 96, No. 19 (November 8, 1969), pp. 422-3.

²⁶William E. Ricker, "Food From the Sea," in Resources and Man, A Study and Recommendations, ed. by Committee on Resources and Man (San Francisco: W.H. Freeman and Co., 1969), pp. 87-107.

A more realistic forecast for required food production is grim:²⁷

Between now and 1985, 85 out of every 100 people born will live in underdeveloped nations. These nations will have to increase their food supplies at least 80% to avoid famine. The rising income of the underdeveloped nations actually makes matters worse: As people become wealthier they demand more food, so the total increase in demand for food by 1985 will be closer to 140%.

"Malthus's approach -- identifying the basic elements essential to a solution and adopting practical steps to implement them -- is badly needed in a world where 1.7 billion men, women and children are perilously close to starvation."²⁸

Summary Of Population and Food Supplies

All persons concerned about the population-food situation would agree that if the world's people are to be fed, agricultural production will have to continue to increase at a rate at least equal to the rate of population growth, or the population rate will have to lower to meet the food production rate. The possibility of either one of these occurring in the near future is slim, at least based on current trends. When the world ecosystem is considered, the prospects for the future of feeding the world are not good -- some countries may survive but at the expense of others. As there is an imbalance in the food-population rates, it is fair to say that a food crisis does indeed exist in the world. The most hopeful approach would seem to be to act directly and massively to cut

²⁷"To Fill the World's Belly," Science News Letter, p. 423.

²⁸Robert C. Cook, ed., "Malthus in Retrospect, The Stork Visits Dorking-1766," Population Bulletin, XXII, No. 1 (February, 1966), p. 5.

population growth, and to do it now.

ENVIRONMENTAL POLLUTION

Few people would argue that there is no air or water pollution, for most everyone has felt the effect of smog in the air or has seen a polluted river. The issue again is whether the amount of air and water pollution has reached a crisis. The issue here is one of degree and one's view of the degree of crisis depends on predictions about whether the problems of air and water pollution can be resolved before it is too late, before the pollution creates unacceptable consequences.

Air Quality

Man has been emptying pollutants into the air ever since he appeared on earth. However, in the past the natural cleansing mechanisms of the earth could keep up with the pollutants. In recent years, with such emphasis on economic growth and progress, the quality of our environment has been deteriorating. The increase in pollutants is outstripping the natural corrective cleansing mechanisms.

In the United States alone, from 1946-1968, the use of automobiles increased by 200 percent, but the index of nitrogen oxides, a major ingredient of smog, jumped 630 percent.²⁹ The consequences for the future are going to be worse than at present, if the prediction that the number of automobiles in this country will quadruple by the

²⁹ Stanford N. Sessler, "The Nation Debates An Issue: The Economy Vs. the Environment," The Wall Street Journal, November 3, 1971, p. 18.

year 2000, comes true.³⁰

The earth has only a finite supply of air and water, yet we rarely give forethought in anticipating what Lovering calls the "what-else-do-you-get"³¹ consequences of the changes that we bring to our air and water. The result is that there is just not enough air and water on the earth to absorb today's man-made wastes without effect.

The quality of air is extremely important. Not only must we have clean air to breathe, but we must have a constant supply of it. LaMont Cole sees both aspects in jeopardy:³²

We are absolutely dependant on oxygen which is produced outside our borders -- mostly in the Pacific Ocean -- and brought in by atmospheric circulation. If we should inadvertently kill enough marine diatoms or the organisms they depend on for fixed nitrogen, we would start running out of oxygen to breathe.

We have been dumping chemicals and DDT into the ocean, and the problem is that we do not know exactly what effect this dumping is having on the marine diatoms or the organisms they depend upon.

But to what degree is there a crisis? Unfortunately, this is hard to determine, and most writing has merely stated the problem. For example, few can disagree with Commoner's description:³³

³⁰ Ibid., p. 123.

³¹ Thomas S. Lovering, "Mineral Resources from the Land," in Resources and Man, ed. by the Committee on Resources and Man (San Francisco: W.H. Freeman and Co., 1969), p. 130.

³² LaMont C. Cole, "Man and the Air," Population Bulletin, Vol. XXIV, No. 5 (December, 1968), p. 110.

³³ Barry Commoner, Science and Survival (New York: The Viking Press, 1963), p. 122.

by air pollution, "there is an ever-mounting accumulation of evidence linking the two."³⁶ This period from 1950 on is a period of rapid urbanization and the disease has been most often found among city dwellers.³⁷

Dr. Middleton, Director of the National Air Pollution Control Administration, was asked the question, how urgent is America's pollution crisis? He responded the following:³⁸

It is one of the most serious environmental problems we've ever faced. In our cities where it is most severe it makes healthy people ill. It obliterates the skyline and destroys natural and manmade beauty. It kills plants, causes disease in animals, corrodes steel, rots drainpipes, discolors fabrics. Air pollution may also be changing our climate in adverse ways. You name it, it happens.

Dr. Middleton's response relates to the United States, but air pollution knows no political boundaries.

Water Quality

Is the quality of the world's water in as serious a crisis as that of the air? Clearly more pollutants are being discharged into the world's bodies of water than the natural cleansing process can handle. At some point this imbalance must be corrected. As with population growth and air quality, the question of whether

³⁶ Lewis Herber, Crisis in Our Cities (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1965), pp. 66-8.

³⁷ One such study was in Jersey City. See Thomas M. Gocke, M.D., "What Is the Role of Air Pollution as A Cause of Disease?," American Journal of Public Health, Supplement to January, Vol. 54, No. 1 (January, 1964), pp. 71-8.

³⁸ John T. Middleton, "The Air We Breathe," Population Bulletin, XXIV, No 5 (December, 1968), p. 115.

there is a crisis in water quality is one of degree. Very little water any longer is pure. To some degree then virtually all water is polluted. But is the degree of pollution a crisis? Are we at the point where if the process is not reversed, the consequences will be unacceptable?

Swimming holes unavailable for swimming, fish inedible because of excess mercury, or other pollutants, oil slicks lining the coast lines of nations, the near extinction of some sea life as the gray whale, and water unsuitable for drinking, are all indicators of a crisis in the water supply of the world.

Unfortunately, there is no good measure of at what point water should be considered polluted. Many bodies of water are considered unsafe for swimming, but the degree of pollution used to determine danger often varies widely. Most untreated water is considered unsafe for drinking, but again in some areas of the world people can tolerate a much higher degree of impurity than in others. Many bodies of water have either no fish, or only trash fish, or fish which are inedible because of excess mercury or DDT. Oil slicks line the coasts of many countries.

If safety for drinking is the criterion, virtually all natural bodies of water are polluted. If swimming, or drinking are the criteria, almost every large waterway in the United States (Potomac, Delaware, Mississippi, Ohio, Hudson) as well as around the world (Rhine, Ganges, Tiber, Seine) and many lakes are polluted. If we require only the existence of edible game fish, a distressingly

large number of rivers would still be considered polluted (they have none).

One difference between air or water pollution, and population growth, is that no one argues that there are any beneficial side effects to pollution. The only reason not to act to decrease pollution is immediate economic cost, and even here the question is debatable. The immediate costs of pollution may far outweigh the costs of cleaning up the air or water. We may need only to figure out how to divert the costs of overcoming the effects of pollution to preventing it.

If water is a primary resource, and if the supply and condition of our water supply is a vital physical index of a nation's well-being, then, in the past few years we have suffered a very sharp decline in the quality of our living standards. Once again, with increasing numbers of people in the world, and with nations desiring to become industrialized to take care of their expanding populations, the problems of water supply and water pollution will become even more serious than they are at the present time.³⁹

RATE OF USE OF OUR NATURAL RESOURCES

One of the great delusions of mankind throughout the centuries has been the belief that the natural resources of the earth are inexhaustible. The population explosion along with increased industrial expansion has created the need for more of the world's natural resources; mineral, fuels, lumber, and energy -- all of which

³⁹Brown, The Challenge of Man's Future, p. 214.

are finite in amount.⁴⁰ As with population and pollution, no one disputes that our rate of use of resources has increased. The question again is, to what degree are we facing a crisis? Are we in imminent danger of running out of resources?

Some analysts do not see our natural resources as in a crisis state. There have been as yet no world-wide scarcities of resources as Malthus had predicted, and world trade has made it increasingly possible for countries with shortages of certain kinds to import from other countries. The widespread advance in technology has made possible the mining of deposits that were once thought inaccessible. Also, better ways of processing and using raw materials have stretched the usefulness of a given quantity.⁴¹ Those persons who have confidence in world trade and technology also feel that there is still sufficient quantity of most natural resources in the world. At worst it will simply take more effort and more money to get them out for use.

If scarcity of natural resources can be thought of in terms of cost rather than of physical elimination, since the less good resources which are left will take more money to extract, the issue of quantity versus quality is a very important one.⁴²

Problems of quality...are just as important as the problems of quantity and probably more difficult. Simply

⁴⁰H.B. vanLoom, "Population, Space, and Human Culture," Law and Contemporary Problems, Vol. 25 (Summer, 1960), p. 400.

⁴¹Hans H. Landsberg, Natural Resources for U.S. Growth, A Look Ahead to the Year 2000 (Baltimore: Johns Hopkins Press, published for Resources for the Future, 1964), p. 4.

⁴²Ibid., p. 13.

having enough oil, metals, land, and water would not spell a satisfactory life for most people. For example...pollution of water does not usually prevent its use, but it does make use less pleasant and more costly. The relationship of people to resources, which usually has been expressed in terms of quantity, needs to be restated for modern times to emphasize what is happening to the quality of resources.

On the other hand, the question still remains: At any level of quality how long can the natural resources of a finite world support increasing populations at rising levels of living? The United States will probably be able to continue to extract low grade ores, or perhaps to develop substitutes for them, for a substantial period of time, but for the underdeveloped countries of the world who do not even have the finances to feed their people, the problem of finding sufficient resources is more critical. Landsberg, even for the United States, recognizes that resource supplies will continue to meet needs only if three assumptions are met: continuing gains in technology, improvements in political and social distribution procedures, and a reasonably free flow of world trade.⁴³

The widening economic gap between the developed and the underdeveloped countries will almost certainly grow if resources are only available to technologically advanced, well organized, wealthy countries. While it may not be the aim of the United States, or for that matter any other country, to see this gap widened anymore than it is presently, the rapid use of resources may force this gap to widen. The United States, in particular, as well as the rest of the world, cannot continue to grow in population and in industry

⁴³Ibid., p. 6.

without having adverse effects on the natural resources of the world. If all countries had the standard of living of the United States, it would have severe consequences for the natural resources of the world:⁴⁴

...before any area can reach the per capita energy and mineral consumption rate of the United States, it must first build up its industry to that level. Were the whole world to have done this...the presently estimated world supply of the ores of most industrial metals, producible by present technology, would have been exhausted well before such a level of industrialization could have been reached.

Summary Of The Rate Of Use Of Our Natural Resources

All who have studied the rate of use of our natural resources agree that many of our natural resources are either running out or are becoming more inaccessible, thus more expensive to extract. But some do not see the problem of extracting these more hard-to-get resources as critical. Perhaps it is assumed that the wealthier nations will do the extracting and then supply the rest of the world. The cost would be expensive to the purchaser no matter who did the extracting. It seems unreasonable to expect the poor countries of the world to be able to pay for these resources; their money resources are needed now for the essentials of life -- food and shelter -- as well as for industrial development. These countries do not have the means for extracting this more inaccessible and more low-grade ore, let alone the means to pay someone else to do it. And the wealthier nations cannot continue to support the

⁴⁴ Charlton Ogburn, Jr., "Why the Global Income Gap Grows Wider," Population Bulletin, XXVI, No. 2 (June, 1970), p. 5.

poorer ones without adverse consequences. And if the poorer countries develop rapidly, the shortage will become acute all the more soon.

Yes, there is a crisis in the rate of use of our natural resources because there are imbalances in who can use them, and in the rate of use. Unless new sources of energy are found, resources will increasingly be available only to the wealthy and advanced.

IS THERE AN ENVIRONMENTAL CRISIS? CONCLUSION

There is indeed an environmental crisis on many fronts of the world: overpopulation in many areas and the numbers of people increasing; deterioration of the quality of our air and water; and rapid use and depletion of our natural resources that are finite in quality and quantity. Unfortunately, if a person limited his readings to sociology and particularly to human ecology, he would hardly realize that an environmental crisis did exist in the world, because most of the writings which have dealt with the crisis have not come from sociologists but from other professional fields.

CHAPTER II

THE ENVIRONMENTAL CRISIS

There are two major kinds of man-environment writings -- those that were undertaken by the human ecologists, beginning in the 1920's; and those that were written by 'alarmists,' beginning after World War II. Both kinds of writing focused on the man-environment relationship, both used many of the same statistics, but the environmental crisis writers began asking of this relationship very different kinds of questions than had been asked by the human ecologists. The first section of this chapter reviews this work. The second part of this chapter will look at some of the suggestions from these writings that have been made to help resolve the environmental crisis: population control, political action, economic action, and education. Education, particularly curriculum for high schools, will be emphasized, as it is the major focus of this study.

HUMAN ECOLOGY¹

The field of human ecology began in the 1920's at the University of Chicago through three major men -- Robert E. Park,

¹A much more detailed analysis of human ecology, its theoretical framework, its major theoreticians, and possible suggestions for new theory to help resolve the environmental crisis can be found in Carol C. Fletcher, "An Analysis of Human Ecology Theories," (unpublished theoretical paper, Department of Sociology, Portland State University, 1971).

Ernest W. Burgess, and Roderick D. McKenzie. Human ecology became the major component of sociology, dominating the field with its tremendous quantity of empirical studies, usually undertaken in the city of Chicago. The prime focus of human ecology during this period was the spatial-locational distribution of phenomena within the city.

Through the years human ecology maintained this focus, even though major ecological theorists, as Amos H. Hawley, James A. Quinn, and Otis D. Duncan, have enlarged upon the original theoretical formulations. The literature in human ecology is largely composed only of duplicated studies. The field has never gone beyond spatial distribution studies, never developed new direction or theory, and consequently the field has declined in stature, significance, and relevance.

One potential area for new theoretical development in human ecology is the environmental crisis. Unfortunately, very few human ecologists in particular, and sociologists in general, have dealt with the environmental crisis. Instead, most of the writings on the environmental crisis have come from specialists in other fields of endeavor.

ENVIRONMENTAL CRISIS WRITINGS

Although people have been writing about the problems of population since the turn of the century, it was not until 1948 that Fairfield Osborn wrote Our Plundered Planet,² the first major

²Fairfield Osborn, Our Plundered Planet (Boston: Little, Brown, and Co., 1948).

book on the environmental crisis in its totality. Since this publication, the number of articles and books on the deteriorating relationship of man to his environment has increased rapidly. The books and articles have contained much quantitative data, but although some have used the major ecological concepts in their writings, these ecological concepts have not been the basis for their conclusions, or for their point of view.

These writings on the environmental crisis have been produced by scholars in all fields of endeavor: biologists, economists, scientists, naturalists, and sociologists. Some of the books and articles have had great influence, though not necessarily at the time of their publication. Others have created tremendous controversy upon publication as Silent Spring, The Population Bomb, and Famine -- 1975! A few of the more pertinent sources will be briefly discussed.

"An early warning which, unhappily, was ignored,"³ is Paul Ehrlich's evaluation of Osborn's Our Plundered Planet. Man is not detached from, nor all powerful over, his environment, claimed Osborn, and if he is blind to the needs of co-operating with nature, he will destroy the sources of his life. "All the component parts in the machinery of nature are dependent one upon the other. Remove any essential part and the machine breaks down. This is a primary fact and there is no other comparable to it in importance."⁴ Man cannot be supported on earth by artificial processes and he must be aware

³Paul R. Ehrlich and Anne H. Ehrlich, Population, Resources, Environment (San Francisco: W.H. Freeman and Co., 1970), p. 362.

⁴Osborn, Our Plundered Planet, p. 48.

of the potentially self-destructive impact that he has when he destroys the earth's resources.

The destructive impact of man on his environment in the United States has been particularly strong, continues Osborn:⁵

The story of our nation in the last century as regards the use of forests, grasslands, wildlife, and water sources is the most violent and the most destructive of any written in the long history of civilization. The velocity of events is unparalleled and we today are still so near to it that it is almost impossible to realize what has happened, or, far more important, what is still happening. Actually, it is the story of human energy unthinking and uncontrolled.

Feeling that the majority of Americans did not know or were unconcerned about the environmental crisis, Osborn sought to develop new interest on the part of the public to bring about changes by pressuring legislators. He feared then, as many do now, that it might be only by experiencing or receiving a catastrophic warning from nature that man would be stirred into action. The most important and most difficult task in 1948 was to arouse public opinion, and this would take coordinated effort on the part of government, industry, and education. He found it extraordinary then that so few schools and colleges had conservation courses.

The Next One Hundred Years,⁶ written in 1957, came to the following conclusions based upon data that the authors analyzed:

1. The industrialization process will continue at a rapid

⁵Osborn, Our Plundered Planet, pp. 175-6.

⁶Harrison Scott Brown, James Bonner, and John Weir, The Next One Hundred Years: Man's Natural and Technological Resources, A Discussion prepared for Leaders of American Industry (New York: Viking Press, 1957), pp. 42, 50-1, 68-9, 94, 102, and 112.

pace and many decades will be needed before the per capita levels of consumption throughout the world approach those of the West.

2. Rapid rates of population growth can be maintained only if food production can keep pace with population growth. This is doubtful.

3. Increases in food can be attained through improved technology, and should be able to take care of the population, if world population becomes stabilized at between 7 - 8 billion persons, and at standards lower than those of the best-fed persons today.

4. As processing of more and more lower grade ores increases, capital investments per unit of metal output must necessarily increase, as must also energy consumption per unit of output.

5. The uneven distribution of some fossil fuels, as coal, has, and will continue to create more energy problems in the future, although there is theoretically sufficient coal in the world to last man for quite awhile.

6. There are potential sources of energy to last man for a long time, although these resources have to be transformed from potential resources into actual ones.

7. The production of scientists and engineers can be increased as can be their brain usage to develop more technology.

8. In the next century the problems of mankind are less those of technology than of man getting along with man. A world of abundance and creativity can exist if man works together, organizing themselves to work together to solve the problems that confront them.

The conclusions of Brown et al. in 1957 have been confirmed, supported, and substantiated since then by many other writers and scholars: man must recognize the problem of his deteriorating environment and do something about it, or his survival may be in question.

In 1962 came perhaps the most influential book ever written on the topic of man's relationship to his environment, Silent Spring.⁷

⁷Rachel Carson, Silent Spring (Greenwich, Connecticut: Fawcett Publications, Inc., 1962).

Rachel Carson is quoted more frequently than any other person in present day environmental-ecological writings. Her book is an attack on the contamination of the environment with lethal pesticides. In story after story, incident after incident from around the world, she spells out the disastrous effect that the indiscriminate use of pesticides has had on the soil, the rivers and seas, and the air. For the most part she saw this use of chemicals as creating an irreversible process -- damage would be done, or had been done, that either could not be corrected, or that set forth other processes of destruction; in poisoning the caddis flies in a stream, the salmon runs die out; in poisoning a lake to kill gnats, the birds who feed on the gnats eat and die; in spraying the elms with poison, the robins die, not because they were sprayed with poison but because the poison traveled to the earth to the earthworm and then to the robin.

As crude a weapon as the cave man's club, the chemical barrage has been hurled against the fabric of life -- a fabric on the one hand delicate and destructible, on the other miraculously tough and resilient, and capable of striking back in unexpected ways. These extraordinary capacities of life have been ignored by the practitioners of chemical control who have brought back to their task no "high-minded orientation," no humility before the vast forces with which they tamper.⁸

Of the recent writers on the environmental crisis, there is perhaps none as outspoken as Paul Ehrlich, nor perhaps as widely read. The Population Bomb⁹ has been reprinted many times since

⁸Ibid., pp. 261-2.

⁹Paul Ehrlich, The Population Bomb (New York: Ballantine Books, 1968).

its publication in 1968. It is readily available in most bookstores and has been widely used in courses in high schools and colleges. Ehrlich's major conclusions are pessimistic; man's time on earth is limited because of man's great apathy about the problems facing him. Ehrlich predicts mass starvation in the 1970's, and he finds the environment becoming intolerable for existence. Some countries, like India, he considers hopeless. He suggests abandoning it and countries like it, and concentrating on trying to save those countries that still have some glimmer of survival possibilities. The Ehrlichs' latest book published in 1970, Population, Resources, Environment, is much more quantitative than The Population Bomb. In it they look with care at the requisites of life that are in shortest supply for a population: space, heat, available energy, nonrenewable resources, water, and food; and with skepticism that needed quantities of these can be provided. Called an alarmist by many critics, Paul Ehrlich nevertheless has been heard.

Needed: Environmental Crisis Theory

Human ecology writings are largely irrelevant to the environmental crisis. Human ecology has not provided theory to help man explain ecological relationships, to contribute to our awareness of ecological imbalances, or to contribute to our knowledge of how to act to resolve the present and worsening environmental crisis. The environmental crisis writings have increased in quantity too rapidly to be absorbed. And like the empirical studies in human ecology, the environmental crisis writings are repeating the same

data in one journal after another. New ecological theory on the environmental crisis is needed to help synthesize and organize the tremendous quantity of information that has been written since 1948.

WHAT CAN BE DONE TO RESOLVE THE ENVIRONMENTAL CRISIS?

In the absence of the needed theoretical formulations, we know little of the likely effectiveness of various suggested solutions, nor the size of the effort necessary. Still, the surface plausibility of some of the proposals argue for getting on with them, even though theoretical understanding is some time off.

There are many suggestions of what can be done to help alleviate the environmental crisis: population control, more political pressure on the government, a decrease in overconsumption and "growthmania," a general change of attitudes and values of people toward the environment, and education of the general public about the environmental crisis. Education is a major and important suggestion, as it underlies any hope of change in several of the other areas. If education is successful, it can create an awareness and concern on the part of the population about the crisis, and then motivate them to become involved in trying to resolve the problems.

There can be no more urgent task than that of spreading knowledge of mankind's truly precarious situation. Public education on the broadest possible basis is called for from the first grade right up through our academic institutions. Although it may be one hundred years too late, we might still have a chance to save man and, possibly, civilization. But without a large-scale educational drive, our frantic rush downwards with a constantly accelerated speed cannot be slowed up or, better still, switched into a smooth climb

for prosperity, progress, and human betterment.¹

Many others join Borgstrom and myself in the plea that the greatest challenge facing the schools today is the necessity of educating children about the environmental crisis.² It is crucial that mankind not only be knowledgeable about the environmental crisis, but concerned enough about their and future generations' survival to want to do something about it now.

Sir Francis Bacon once said: "To learn to dominate Nature we must first learn to obey her."³ It is crucial that mankind develop an "ecological conscience," that he learn and understand that he is only one part in a great biological scheme, a web of life, and that his continued survival will depend upon a close working relationship with other organisms and with the total environment.

Man is not an isolated species living alone, but is dependent upon numerous associated species of plants and of animals for food and for many of the other essentials of life. Man also is directly or indirectly dependent upon the physical conditions that occur in the habitats in which he lives. All the biotic and physical factors that affect man are complexly interrelated.⁴

¹Georg Borgstrom, The Hungry Planet (New York: The MacMillan Co., 1965), p. xx.

²Also see Garrett DeBell, "Education and Ecology," in The Environmental Handbook, ed. by Garrett DeBell (New York: Ballantine/Friends of the Earth Book, 1970), pp. 129-33; and "Population Education - Evolution or Revolution," Population Bulletin, Vol. XXIV, No. 3 (Washington, D.C: Population Reference Bureau), pp. 3-40.

³Robert Rienow and Leona Train Rienow, Moment in the Sun (New York: The Dial Press, 1967), p. 38.

⁴Lee Raymond Dice, Man's Nature and Nature's Man: The Ecology of Human Communities (Ann Arbor: University of Michigan Press, 1955), p. 298.

Man, however, has not followed Sir Francis Bacon's advice, but has through the years had the attitude of superiority over nature. Whatever reasons for this attitude,⁵ religious or otherwise, man needs now to develop an ecological attitude which admits that he is the most powerful species on earth, but because of this, he must accept the role of consciously maintaining and caring for the planet's living resources.⁶ As more environmental crises develop and compound themselves, man must keep in mind the total web of life as he tries to remedy the problems.

Many writers believe that mankind can continue to survive if he recognizes the problems in time, and if he devises solutions that mankind as a whole can embrace.

I believe that man has the power, the intelligence, and the imagination to extricate himself from the serious predicament that now confronts him. The necessary first step toward wise action in the future is to obtain an understanding of the relationships between man, his natural environment, and his technology.⁷

Here enters the crucial role of education. In the many suggestions that have been made, and they will be discussed here briefly, education is the necessary ingredient for all of them to be effectively implemented in society.

⁵Lynn White, Jr. suggests that it is the Judaism-Christian mentality that is responsible for man's feelings of dominance. See, "The Historical Roots of Our Ecological Crisis," Science, Vol. 155 (March 10, 1967), pp. 1203-7.

⁶F. Fraser Darling, "Ecology of Man," American Scholar, Vol. 25 (Winter, 1955-56), p. 45.

⁷Harrison Scott Brown, The Challenge of Man's Future: An Inquiry Concerning the Condition of Man During the Years That Lie Ahead (New York: The Viking Press, 1954), pp. xi-xii.

Population Control

Population control is a very sensitive subject around the world, because it infringes on the most intimate of an individual's beliefs and actions. But as overpopulation is one of the most, if not the most critical problem in the world today, the issue of population control needs to be discussed. Many suggestions have been made to cut down on the numbers of people in the world, or at least to stabilize the growth rate. One such suggestion by the Committee on Resources and Man⁸ was for a general policy:

That efforts to limit population increase in the nation and the world be intensified by whatever means are practicable, working toward a goal of zero rate of growth by the end of the century...Ultimately this implies that the community and society as a whole, and not only the parents, must have a say about the number of children a couple may have. This will require profound modification of current attitudes toward parenthood.

There are less drastic ways that society can be organized to encourage parents to limit the number of children that they want. One suggestion is that tax incentives give tax breaks to those parents who have only two children. Adoption of extra children could be similarly encouraged for parents who want more than two children. A second suggestion is that family planning services be increased in number and be distributed evenly around the world. In order for family planning services to be increased, however, more money is needed for such organizations as Planned Parenthood, which often have had great difficulty surviving financially. Also, for such

⁸ Committee on Resources and Man, Resources and Man: A Study and Recommendations (San Francisco: W.H. Freeman and Co., 1969), p. 11.

services to be just located in poor or minority race areas has created feelings of discrimination and anger on the part of those receiving the services, such as the belief of many Negroes that the whites are out to reduce their numbers. The problem of population control is not just that of the disadvantaged, nor of 'the rest of the world' (as Americans often feel). "The population bomb is everybody's baby."

The most extreme suggestion is for government regulation of the number of children that a couple may have, giving permission to couples, and terminating pregnancies in families with two children. Although strongly urged by some, and feared by most, this suggestion gravely conflicts with the values of freedom held by most people.

"Continuing growth in man's numbers and in his consumption of the earth's resources has been a cornerstone of Western man's belief in progress. Now it is called into question."⁹ This calls for re-education to overcome previous values and beliefs. And a broader scale is critical, as Borgstrom comments about efforts to resolve the population problem:¹⁰

Most of our efforts to master the present population increase have been on a Lilliputian scale. We need a broader program of general education and a mobilization of the world's brain-power to facilitate a clear understanding of these issues and their true dimensions.

Very much related to population control is the suggestion

⁹Charlton Ogburn, Jr., "Why the Global Income Gap Grows Wider," Population Bulletin, Vol. XXVI, No. 2 (June, 1970), p. 5.

¹⁰Georg Borgstrom, The Hungry Planet, p. xiv.

that the medical profession and religious institutions take a stronger stance on the whole issue of population control. The American Medical Association has refused to take any strong stand on such issues as birth control, abortion, and sterilization. Patients desiring information and services have often found doctors unwilling to help. At least doctors ought to refer a patient to another doctor who does support these measures if he himself is opposed.

The Church has often been criticized recently for not being relevant to the needs of society. The idea that man is part of a great ecosystem that should be preserved and cherished might come closer to being an acceptable substitute for the religious beliefs that many men have discarded. Education aimed at changing attitudes of medical and religious personnel is needed now.

Political Action

Those actively concerned with the environmental crisis have made the suggestion that more legislators concerned with the environment and more legislation are needed. Many believe with the Ehrlichs that the laws of our free enterprise system are failing to meet the needs of everyone as long as they permit unrestricted reproduction and pollution.¹¹ But more laws may not be enough.

¹² Dubos is critical of the government when it does work on environ-

¹¹ Paul R. Ehrlich and Anne H. Ehrlich, Population, Resources, Environment (San Francisco: W.H. Freeman and Co., 1970), p. 268.

¹³ Rene Jules Dubos, So Human An Animal (New York: Scribner, 1968), pp. 229-30.

mental improvement. He says that most of the measures they undertake are palliative and at best short-sighted adaptive responses to acute crises, expressions of fear or panic rather than of constructive thought. He points to the programs of the Great and Beautiful Society as examples. He feels they are a hodge-podge collection of measures hastily formulated to correct a few glaring defects in cities and in the country, but they do not get at the basis of the problem. He also suggests, unfortunately, that Congress will only move when an environmental catastrophe frightens the public sufficiently to force Congress into action.

Many suggest that the quality of laws ultimately reflects the concern of the citizenry. For example, the Rienows strongly support the view that public complacency over the environmental problems needs to be changed and they particularly blame the attitude that science and technology will solve all of our problems. They see this "myth of scientific infallibility" as a convenient way for the public to avoid civic responsibility in doing something about the problems.¹³ The public needs help to understand and to judge the moral rightness and cultural worth of the course that scientists tell us to take.¹⁴ Since environmental problems are essentially social problems, the problems belong to everyone,

¹³Rienow and Rienow, Moment in the Sun, p. 199.

¹⁴H.B. vanLoom, "Population, Space, and Human Culture," Law and Contemporary Problems, Vol. 25 (Summer, 1960), p. 405.

and as Dales sums up when speaking of pollution;¹⁵ "In the end it is you and I who are going to elect the politicians who are going to decide how much pollution we are going to have, what sort of pollution it is going to be, and where we are going to have it."

Proposals abound. Ehrlich has suggested a Department of Population and Environment¹⁶ with power to force needed changes. Strict controls would be enforced by this department in areas such as pesticides, quantity of children per family, and environmental quality. It would also aid Congress in developing legislation related to population and environment, and to inform the public of the needs of such legislation. In virtually all of these cases, education is a critical component. Education is needed to give the public the understanding of the environmental problems, as well as to incite them to action to bring pressure upon the legislators to legislate needed changes.

Economic Action

Many blame the attitudes of men for the environmental crisis. Since the founding of the United States, the attitude of Americans has been to consume, to grow, and to progress. They moved across the country, consuming as they went and not replacing the wealth of natural resources that they used. At present, say the crisis

¹⁵J.H. Dales, Pollution, Property, and Prices, An Essay in Policy Making and Economics (Toronto: University of Toronto Press, 1968), p. 104.

¹⁶Paul R. Ehrlich, The Population Bomb (New York: Ballantine Books, 1968), pp. 138-9.

thinkers, this has caught up with man.

Air pollution, like water pollution and all the other examples of our deteriorating conditions of living, is a by-product of too many people with too much push in the direction of economic progress and not enough in the direction of social progress.¹⁷

The result of "growthmania" in the United States has been an overconsumption of resources and materials. The United States with six percent of the world's population consumes over 50 percent of its resources, and that figure is expected to reach 80 percent by the year 1980.¹⁸

Such consumption produces a tremendous amount of solid wastes which are disposed of as pollution into the air, waters, or landscape, from industries producing goods for the American consumer.¹⁹

Each year in the United States we must dispose of some 55 billion cans, 26 billion bottles and jars, 65 billion metal and plastic bottle caps, and more than half a billion dollars of other packaging materials. Seven million automobiles are junked each year, and the amount of urban solid wastes (trash and garbage) collected annually is approximately 150 million tons.

Industries have received much criticism and blame for the condition of our deteriorating environment, though to a degree the industries will respond to what the American public demands, and there has been little solid demand for changes.

While proposals abound, many call for major changes in attitudes and values, as Ezra Mishan:²⁰

¹⁷ Rienow and Rienow, Moment in the Sun, p. 118.

¹⁸ Ehrlich and Ehrlich, Population, Resources, Environment, p. 61.

¹⁹ Ibid., p. 128.

²⁰ Ezra J. Mishan, The Costs of Economic Growth (New York: Frederick A. Praeger, 1967), p. 174.

...if men are concerned primarily with human welfare, and not primarily with productivity conceived as a good in itself, they should reject economic growth as a prior aim of policy in favor of a policy of seeking to apply more selective criteria of welfare. Such a policy would involve (1) legislation to spearhead the attack on much of our post-war blight; and (2) a substantial diversion of investible resources from industry to the task of re-planning our towns and cities -- in general, to direct our national resources and our ingenuity to recreating an environment that will gratify and inspire men.

The ideas and attitudes that lead to "growthmania" can no longer be tolerated in today's world. Not only must the United States change its attitudes towards economic progress, but also must encourage the underdeveloped countries who are trying to copy the United States' industrial progress, to consider and value their total environment as they modernize. Air and water pollution know no political boundaries, so economic growth has to be considered from the viewpoint of international consequences.

Education is needed to convince Americans and any other people with high economic growth that a change in life style is needed. It is in many ways the high consumption by peoples that has created our environmental crisis and this trend needs to be reversed. "There is a price for progress."²¹

The Role Of Education

Unfortunately, educational programs have not been successful.²²

²¹ A comment by Robert C. Cook, quoted in Moment in the Sun, by Rienow and Rienow, p. 205.

²² J. George Harrar, "Beyond Survival," in The Next Ninety Years, Proceedings of a Conference Held at the California Institute of Technology, March, 1967 (Pasadena, California: California Institute of Technology, 1967), p. 87.

Today all the training and education we have provided for ourselves have failed to give us an awareness of what we, either by our passivity or by our actions, are doing to our environment and, ultimately, to ourselves.

Educational programs have not been providing the public with the kind of education that will help them evaluate the choices that are, or will be, available to them, to prepare them to understand and make decisions relating to the environmental crisis. Auerbach and Flieger, for example, dispute the view that since there is an increased concern among the public about air pollution, the educational needs are being met;²³

This is simply not true. Nor is the corollary true - that the need for public information and education programs is already being adequately met. The need for such programs is greater now than ever before and, will inevitably be even greater in years to come.

There are many ways of educating people. Curriculum development for schools is one way of accomplishing this goal. Improved curricula are important ways to do something about the environmental crisis. Curricula focusing on the environmental crisis may also help the schools. One of the biggest complaints of American high school students today is that high school education is not relevant to the needs of students. Students have become disenchanted studying subjects which they feel will have no bearing on their life, no meaning for their work, or no usefulness for them as they face the problems of society. There may be no more relevant subject to be studied than our environment and our

²³Irvin L. Auerbach and Kenneth Flieger, "The Importance of Public Education in Air Pollution Control," Journal of the Air Pollution Control Association, Vol. 17, No. 2 (February, 1967), p. 102.

survival as a human race.

Not only does the environmental crisis make such curricula very relevant, but curricula developed on this crisis could engage students in the kinds of problems that they will have to come to grips with as they become adults -- the number of children they will have, the kind of life style they want for themselves and the effect that this life style will have on the quality of the environment, their role with respect to organizations dedicated to preserving the environment (wildlife and wilderness organizations), and their own role as citizens: will they write letters to Congressmen, consume less, and recycle as individuals; or will they remain apathetic citizens?

Some view ecology as possibly providing an organizing framework for focusing the entire school curriculum:²⁴

Ecology, more as a mode of analyzing and viewing our physical and biological world than as a precise experimental science, could, in the 1970's, become a fulcrum of school curricula around which many other disciplines would pivot. Biology, geography (greatly enlivened by infusions of economics), demography, geology, agronomy, anthropology (with much greater emphasis on natural history and the changing relationships of man to his environment, how he has treated it and how it has treated him) and other disciplines can all contribute to a deeper understanding of our world ecosystem.

Our educational establishment, from elementary school through the post-graduate college years, can perform no more useful service than to illuminate the principles of human survival and to dedicate itself to preserving and enhancing the quality and diversity of life.

²⁴Rufus E. Miles, Jr., ed., "Whose Baby Is the Population Problem?" Population Bulletin, Vol. XVI, No. 1 (February, 1970), p. 31.

Curricula developed to meet the criterion of relevance and to help resolve the environmental crisis would fit easily into the modern trend toward problem oriented, multi-disciplinary approaches. Too long the schools have been strictly discipline oriented. Today's world problems cannot be solved just by sociology, or psychology, or economics. The problems need the thoughts and work of all the disciplines, practitioners and scholars alike. Creating a multi-disciplinary approach in the public high schools will be no easy task. Neither will the creation of new curricula, whether in the form of a separate course, or as materials on the key concepts for all the standard subjects, be easy. Curricula schedules are already crowded with subjects that some people feel are necessary. Environmental education will undoubtedly involve attitudes and values, and in the past, schools have tended to shy away from any conflicts of this nature. Across the country some "man-in-environment," or "ecological crisis" kinds of courses have been developed by interested and concerned teachers. But this curriculum development has been on an individual basis, usually with the teacher focusing only on what he knew about, had available, or felt was important. The efforts, to say the least, have been isolated and disjointed.

But the costs of failure, and the rewards of success, are high:²⁵

Many of the benefits will be discouragingly intangible - a blue sky instead of a gray one, trees and green fields instead of barren hillsides, bird songs instead of a silent

²⁵Robert Morison, "Education for Environmental Concerns," Daedalus (Fall, 1967), pp. 1221-2.

spring, clean streets, well-proportioned facades, and quiet walks instead of ugliness, traffic jams, and noise. The educational system for tomorrow must not only make it clear how these presumable goals can be achieved but why they are worth achieving.

There is, of course, no guarantee that increased "population" or "environmental" awareness induced by courses or curricula will lead to attitude changes, or different life styles, or to concerted involvement, but there is some evidence that attitude change is related to awareness. It certainly is worth trying through curriculum in the schools to create an ecological awareness, concern, and involvement in all students. They, afterall, will someday become adults charged with the responsibility of continuing a quality environment for the next generation.

Where does one begin then? Any effective curriculum development needs data on where students are in their thinking, for the future of the environment will be largely what they chose it to be, and these choices will, in turn, depend in large part on what they think life itself ought to be.²⁶ It was to explore this question -- the present view of students toward the environmental crisis -- that this study was undertaken.

Ripley and Buechner's article²⁷ served as a point of departure for this exploratory research project. They stated that

²⁶Ibid., p. 1220. For further support see "Population Education - Evolution or Revolution," Population Bulletin, Vol. XXVI, No. 3 (no date given), pp. 4 and 20.

²⁷S.D. Ripley and Helmut K. Buechner, "Ecosystem Science As A Point of Synthesis," Daedalus (Fall, 1967), pp. 1192-9.

while the most critical problem facing humanity today is an ecological one of relating human societies harmoniously to their environments, the task of focusing knowledge on contemporary world problems in an ecological context seemed overwhelming. They then presented a two-dimensional conceptual model, based on levels of integration and points of view, as an aid in orienting knowledge toward the environmental crisis.

However, the critical idea that Ripley and Buechner contributed to this study was the notion of a conceptual environment:²⁸

Man's image of the world in which he lives and his understanding of man's place in the universe are critical in achieving ecological homeostatis. Science can contribute basic facts and ideas about ecosystems. But man's concerns and values also determine the behavior of societies. His conceptual environment has changed through time, a transformation expressed in literature, poetry, music, architecture, and modifications of the landscape. The natural scientist will most probably have less influence in the evolution of a conceptual environment relevant to today's ecological crisis than the humanist. Man's conceptual environment, not science, will determine the future of humanity.

They see the humanist having the responsibility of developing our understanding of values with relevance to the central ecological crises of today. We should study the whole ecosystem of human-society-plus-environment and the interrelationships between these systems on a global basis, even though we can never achieve a total understanding of it. They feel that their two-dimensional conceptual model does provide an approach through which inter-

²⁸ Ibid., p. 1196.

disciplinary efforts can be organized to evolve unifying principles and concepts leading to a better understanding of man's place in the universe. Their model represents a point of synthesis of research and education to focus them on the contemporary problems of adapting human societies harmoniously to their environments.

As mentioned earlier the task of achieving an ecological orientation on the part of the population can come through curriculum development in education. The empirical study that follows is a beginning attempt to discover what the ecological awareness and concerns of some high school students -- their conceptual environment -- are. By doing this, one hopefully can point directions for the needed curriculum development.

CHAPTER III

DESIGN OF THE STUDY

Introduction

An individual's relationship to the environmental crisis has several possible levels. Many people are merely aware of one or more aspects of the environmental crisis; they have some knowledge of the problems. Others not only know about various aspects of the crisis, they have a value system which enables them to judge certain environmental situations as crises; in short, they not only are aware of the problems, they are concerned about them. Finally, there are those who are not only aware and concerned, they are actively involved in trying to deal with the environmental crisis. The purpose of this exploratory study, then, was to find out how aware, concerned, and involved some high school students were with the environmental crisis.

Students were interviewed from two suburban high schools in Portland, Oregon. Interviewed at each high school were key informants, either juniors or seniors who were taking an environmental crisis course; a random sample of juniors who were not; and all teachers of the environmental crisis courses. A total of 98 students and 5 teachers were interviewed during the spring of 1971.

Instruments Used

The interview was the method used to obtain information from both students and teachers. It consisted of two parts for the students: a group of pictures representing ecological problems to be ranked in order of ecological importance and discussed, and general questions.

Eight pictures were selected from magazines to represent various ecological problems, as air pollution, overpopulation, noise pollution, and man's relationship to nature, though each was subject to a variety of interpretations. All were numbered and presented to the students. The pictures were used at the beginning of the interview. Students were told to rank these pictures in order of ecological importance, the interpretation of ecological importance being left to the student. There were very few questions by the students associated with this procedure, and it created an interest in the student right at the beginning of the interview. After the students had placed the pictures in the order that they wanted, the order was recorded, and each picture was discussed.

The idea of using ecological pictures came from The Focused Interview.¹ In it the authors stress the importance of something that constantly can be referred back to in the interview discussion, as a movie, a book, or slides. Using the ecological pictures allowed the students to see a problem and discuss it without having to rely on memory. For many who had never been interviewed

¹Robert K. Merton, Marjorie Fiske, and Patricia L. Kendall, The Focused Interview (Glencoe, Illinois: The Free Press, 1956).

before, this was important as they were a bit nervous when they began to talk.

Questions for the direct interview were written in three categories -- for example:

Awareness: What do you consider to be the three most important ecological problems in the world?

Concern: Do you think man's survival is endangered in the world? in the Pacific Northwest?

Involvement: Have you ever tried to do anything about the ecological problems at school? outside of school?

After the completion of the picture ranking and the interview, each student was asked to fill out a questionnaire covering socio-economic information and ecological interests of the student. The student was told that this information would be held in strict confidence.

The entire interview was tape recorded, the tape recorder being placed in the middle of the table. Each student was asked if he minded being taped, and with the exception of one student, all agreed to be taped. Each student was also told the purpose of this study, and the affiliation with Portland State University, at the beginning of the interview. The interviews lasted from 20 to 45 minutes.

The teachers and student teachers of the environmental crisis courses were also interviewed and taped. They were asked about the origination and development of the environmental crisis course, their major emphasis in teaching the course, what the

content and activities were for the course, whether they had seen a change in the awareness, concern, and involvement of the students they taught in the course, and what were their major ecological concerns and involvements.

Pilot Testing

Originally there were just a background questionnaire and a interview. These were pilot tested on five students at one high school recommended by teachers as key informants because of their interest and involvement in ecological activities. No pictures were used in this initial set of interviews. The questions on the interview were modified as a result of the pilot test for the actual interviews. Some modifications were also made on the questionnaire to eliminate some confusing and irrelevant questions.

The original intent of this study was to use only key informants.² These students, it was felt, could transmit the greatest amount of information about their own, as well as other students' awareness, concern, and involvements with the environmental crisis. A key informant should also be motivated to share information with the interviewer, and the selection of the high school students was made on this premise.

However, the interviewing of the equivalent of key informants during the pilot testing uncovered a critical problem. When the

²Kurt W. Back, "The Well-Informed Informant," in Human Organization Research, ed. by Richard N. Adams and Jack J. Preiss (Homewood, Illinois: The Dorsey Press, 1960), p. 181.

informants were asked to talk about the activities of other students, they could not even give names of other students who were or were not ecologically involved, let alone what these students believed or did. Some would say that they knew of a few others who were involved, but they did not know their names or much about them. This request to talk about other involved students was repeated during the regular interviews to see if the pilot test phenomenon was accidental, and it was not. Students in these schools just did not seem to know the names or activities of many of the students in their classes, raising problems for any key informant methodology in studies involving high school students.

With this result it was decided to interview a random group of students in addition to informants from the ecology courses. The difference in responses between the informants and the random group of students was large, so it was decided to proceed with both groups of students, informant and random, in the regular interviews.

The "picture test" was also developed and pilot tested because initial straight interviews were difficult for a number of students. Twenty pictures were used, and initially each student was asked to categorize or arrange the pictures into groups according to which ecological problems seemed to fit together. Although the students experienced little difficulty in grouping the pictures, the process was time-consuming, and it was discovered that more information could be obtained in less time by just

having the students rank the pictures in order of ecological importance. It was decided to follow this pattern in the final study.

Study Settings In The Portland Area

Through telephone interviews with all the curriculum vice-principals in the Portland Public School System, and most suburban systems, it was found that there were only three high schools with ecology courses, Aloha in Beaverton, Reynolds, and one high school in Portland, whose class was small and comprised mostly of seniors. Aloha's course ran for a full year, while Reynolds went for a semester. Other schools in the Portland area had ecology clubs, or taught ecological problems in with their science and social studies curricula.

Since this study took place at the end of the school year, it was more difficult to get in touch with students who were involved in ecology clubs, most of which had disbanded for the year. Interviewing students in courses also allowed students to be taken out of these classes instead of taking them from other subjects, a procedure not very appreciated by other subject matter teachers when the school year is closing. And the class with seniors eliminated a number of days of possible interviewing, as seniors are graduated earlier than the end of the school year for other students.

Since the major concern of this study was curriculum, and given the practical problems, the decision was made to interview

as informants only those who were involved in the environmental crisis courses at Aloha and Reynolds.

Although there were no socio-economic data available on either school, an intuitive judgment was that both appeared similar. Both schools attract a wide economic range of students from suburban and rural settings. Both environmental courses had been in operation for the same length of time, one year, and both courses had more than one teacher teaching them. The responses of the random sample from both schools, then, ought to be similar; the responses of the informants might vary, according to the major emphasis of the curriculum in each of the two courses.

The generalizability of the findings should be restricted to those schools with similar characteristics as described here. No intent is made to generalize the findings to urban settings where the responses might be completely different. Any attempt to carry out this study in some urban schools and to compare the data will have to await further studies.

Sources Of Data

The key informants were recommended by the teachers of the environmental crisis courses. In both schools where the study was undertaken, a group of teachers worked together, so that the students recommended usually were recommended by more than one teacher. No number was specifically requested. The teachers listed all of those students they felt met the criteria of a key informant. There was an attempt, however, to arrive at a balance

between boys and girls. At Reynolds all informants recommended were interviewed, a total of 14. At Aloha, of the 15 recommended informants, 12 were interviewed.

Through the use of a table of random numbers a random sample of those juniors from each school who had not taken the course was chosen. Since most of the students in the courses were juniors, it was decided to restrict the random sample interviews to juniors to save time and to make comparisons more easy between random students and informants. At Reynolds there were 260 juniors, one-half of whom had taken the "Man-in-Environment" course. A 20 percent random sample was drawn from the list of approximately 125 juniors who had not taken the course, and all twenty-four were interviewed. At Aloha there were a total of 335 juniors, 60-65 of whom were taking the "Environmental Crisis" course. A 10 percent random sample was drawn in the same manner as Reynolds, and a total of 35 students were interviewed. Only one girl, although contacted, never came for the interview. A combined total of 85 were interviewed, 26 informants and 59 random.

As much as possible, students were interviewed during their social studies courses to prevent cutting into other courses, or were interviewed during their free periods. At Reynolds a study area adjacent to the social studies resource center was used for interviewing students, while at Aloha the Teachers' Professional Library was used.

Tabulation Of Data

All of the tapes were transcribed almost verbatim in order to get the most accurate expressions of the students. In transcribing the tapes indications were also made as to whether the student responded spontaneously to a question, or whether he had to be prodded.

A content analysis was made of the responses to the questions in the interview, as well as of the responses to each of the ecological pictures. These data were then coded, and along with information from the questionnaires, key punched, and statistically analyzed. The chi-square statistic was used in the analysis of the data, using the categories of students, informant and random, as the control variables. Further analyses of subgroups within random or informant were not conducted because of the small sample size, particularly of the informants.

The results of the analysis and the interpretations are found in the following chapter.

CHAPTER IV

FINDINGS: DATA AND INTERPRETATION

An exploratory research effort inevitably yields data which can be used to address a huge variety of questions. Given that curriculum development was identified as one way of influencing the necessary change in attitudes toward ecological problems, the overall intent of this study was to generate data to support curriculum development efforts in the area of human ecology.

There are three major questions related to curriculum which these data can be used to address:

1. Did the two different courses in the two different schools have a different impact on the students who took the courses?
2. Assuming that most ecology courses will be elective, or voluntary, is there a significant difference between the background characteristics of students who chose to take ecology courses (the informants in this study) compared to those who do not (the random sample)?
3. Is there a significant difference between the informants and the random students in their ecology knowledge or awareness, in their values or their degree of concern, and in their activities or involvement in ecology?

The first question, when related to information about the courses, should suggest conclusions about the impact of the courses, and possibly what seems to have contributed most to the impact. The last two questions will suggest the nature of the population to

which ecology courses will naturally appeal, for the value that that has to enable curriculum developers to build on these characteristics. The data will also challenge developers to design curricula to reach students who do not choose ecology courses.

There are several obvious conditions of this study which make some conclusions difficult to draw. Since data were collected only after the courses were nearly over, it is difficult in some cases to tell for certain whether the differences between random students and informants can be accounted for by the effects of the courses or by the process of selecting the course in the first place. Also, in spite of the comparatively large number of interviews for a single-person study, the sample is still small for a number of sub-analyses which might prove interesting. Nevertheless, in addition to the development of an effective methodology for investigating student ecology ideas, the study should suggest numerous topics for more careful scrutiny.

In considering the three questions, information from all three components of the survey has been used -- the background information sheet which each student filled out, the questions asked in the structured interview, and the information obtained from the student's discussion of the ecological pictures.

THE IMPACT OF THE ENVIRONMENTAL CRISIS COURSES ON THE INFORMANTS AT REYNOLDS AND ALOHA

This section will attempt to determine whether the courses did indeed have an impact on the students in them. First, as

these environmental crisis courses were the only two of this nature offered in the Portland area, it would be worthwhile to mention how they came into being and how long they had been in existence. The teachers' major emphasis in teaching the courses will also be discussed. Then selected interview questions will be analyzed to determine if the emphasis in the two different courses affected the responses (concerns, interests) of the informants to these questions: What are the specific reasons why an ecological crisis exists in the world? Why is man's survival endangered? What are the three most important ecological problems in the world? Does the United States have a population problem? Lastly, whether the courses had an impact on the ecological involvement of the informants in school and outside of school will be analyzed.

The "Man-in-Environment" course at Reynolds and the "Environmental Crisis" course at Aloha both began operation in the fall of 1970. Both came into being under similar circumstances -- curriculum reform in each of the respective schools. After each of the proposals for a new course had gone through school channels, it was offered as a choice to the students, along with several other choices. In both schools the environmental crisis course was extremely popular with the students, and so both began. The teachers in both schools were involved in writing the proposal for the new course, as each possessed a real interest in environmental problems. At Reynolds the course was offered only through the

social studies teachers, and lasted one semester. At Aloha the course was a beginning attempt to be interdisciplinary, with a science and a social studies teacher responsible for the course. It lasted the whole school year.

There was a difference in the objectives that the teachers had for their courses at the two schools. At Reynolds the major focus of the "Man-in-Environment" course was to change attitudes. That "by becoming aware of the problems and exposed to some of the solutions, a student would in turn change his attitudes toward the environment, and maybe even see some solutions," was the major emphasis of one of the Reynolds teachers. The second teacher felt that the answer to the existing environmental problems is a sound relationship between people, a more extensive attitude change.

Once we do that, then all the other goals that the citizens of this country have established for themselves, and the ones that the underdeveloped nations want to acquire, really cease to be meaningful -- the money, the acquisition of things. If we all really just desire a better relationship and understanding between each other, it seems to me that the environment by that nature will clean up.

As the major emphasis was on honest relationships among people and related attitude changes, neither teacher stressed content that much. They did briefly discuss eight areas of environmental concern, from which students chose areas of interest for individual research projects: air and water pollution, solid wastes, over-population, noise pollution, food, urbanization, transportation, and human relations.

The major emphasis of the teachers at Aloha was different from

the emphasis at Reynolds. As one of the Aloha teachers commented:

Man is part of the biosphere -- he isn't above it, apart from all living things. Therefore, he is subject to the same laws as governs nature.

Man is threatening the biosphere and that is the reason why he must be coped with. The peril is extremely great. It is not in the distance. The ecological web, which was so complex, is threatened already. If man is a part of all living things, he can't terminate a species. There's no basis for him to take over the biosphere, to be the only species. There is no grounds for that kind of behavior.

You'd have to add that there is a possibility to do something. You can do something, and hopefully you must.

In discussing the peril, the problems of overpopulation were particularly stressed. Over 60 percent of the class time at Aloha was devoted to outside speakers and agencies -- people concerned about particular topics. Since one of the two teachers was a science teacher, students did laboratory experiments that dealt with ecological problems, such as measuring the biodegradableness of different soaps in water. The last quarter of the year the students were involved in either an action project or a research project of their own choosing. During the year much emphasis in all the activities in the course was put on what the students individually could do.

How much impact did the courses have on the informants? The data will yield some answers to this question, using selected, relevant questions asked of the informants.¹

When the Reynolds informants mentioned specific problems to support their contention that an ecological crisis does exist in

¹ See Appendices for the Student Background Information Sheet, Interview Guide, Teacher Interview Guide, and Variable Dictionary.

the world, 36 percent of them responded that the problems of awareness, education, or attitudes were responsible for the crisis.

I think, since taking the course, that things are a little more serious. A lot of people don't that I've talked to on my own. The problem is education.

The stubbornness of people who keep dumping into the rivers and who know, and who have been warned. They keep doing it. They'd save a lot more if they'd put money into cleaning it up than if they keep on polluting. It gets worse and worse -- the same goes for the air.

Again, when the Reynolds informants gave reasons why man's survival is endangered, they mentioned 57 percent of the time that it depends on man's attitudes, awareness, and concern as to whether man will find solutions to the problems of the environment.

Because of attitudes. People around here are wrapped up in their own things. He'll go along oblivious to what's happening, destroying himself, till it happens.

I'm pessimistic to the point where people will fool around and wait until there is a crisis before they do something. Right now everybody's too worried about making money, getting what they want. To do anything about this problem, they will have to sacrifice, and they're not going to do it until they have to.

From the responses to these two questions, it is a reasonable conclusion that the course did influence the Reynolds informants. It is interesting to note that when the Reynolds informants were asked the major emphasis of their "Man-in-Environment" course, only 14 percent of them responded that people's attitudes need changing about the crisis. 64 percent of them, however, responded that they felt that the major emphasis of their course was

knowledge -- being made aware of what the problems are in the environment, and then doing something about them. The major emphasis of the course, then, changing attitudes and awareness of people, the Reynolds informants related not only to others, but to themselves as well. The "Man-in-Environment" course at Reynolds did influence those who took it.

There was more of a definite interest or concern with one topic or problem at Aloha than there was at Reynolds. In Table I the responses from the informants in both schools are compared. The question asked them to list the three most important ecological problems in the world.

As can be seen from this table the major interest among the informants at Aloha is the problem of population. Other questions supported this finding. When asked their major interest in environmental issues, 75 percent of the Aloha informants mentioned population. Not only were they interested in population, but they also saw it as the major cause of the environmental crisis in the world and in the Pacific Northwest. 58 percent of the Aloha informants felt that population was an environmental problem because it was the crux of all the other problems. "Overpopulation is the main problem. Without it we wouldn't have the trouble of pollution. There's so many people, so unless we have less there's nothing we can do."

When asked if the United States had a population problem the informants at Aloha responded, yes, overwhelmingly (83 percent).

And when asked if they would be willing to limit their families to two, 100 percent said that they would.

TABLE I

THREE MOST IMPORTANT ECOLOGICAL PROBLEMS IN THE WORLD
ACCORDING TO INFORMANTS

	Reynolds	Aloha
Population, Air Pollution, Water Pollution	29% 4	42% 5
Population, Scarcity, Pollution	21% 3	0% 0
Population, Pollution, Other	7% 1	17% 2
Pollution and Other Responses for Problems	29% 4	8% 1
Population as the Crux of All the Other Problems	0% 0	33% 4
Other Responses	14% 2	0% 0

TOTAL 14 12 26

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 11.1566 WITH 5 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.050 LEVEL)

There may be some explanations why the problems of over-population were of so much concern to the Aloha informants.

TABLE II
HOW INFORMANTS BECAME ECOLOGICALLY INVOLVED

	Reynolds	Aloha	
Through another person or friend	14% 2	0% 0	
Through the course and/or teachers	29% 4	67% 8	
Through parents	14% 2	8% 1	
Through the media	7% 1	0% 0	
Other ways	14% 2	25% 3	
Not applicable	22% 3	0% 0	
TOTAL	14	12	26

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 4.834 WITH 4 DEGREES OF FREEDOM

(NOT SIGNIFICANT AT 0.100 LEVEL)

The difference in the kind of school ecological involvement between the two groups of informants is illustrated in Table III.

TABLE III
ECOLOGICAL INVOLVEMENT OF INFORMANTS IN SCHOOL

	Reynolds	Aloha	
Earth Day (attended or did something on that day)	0%	50%	
	0	6	
School organizations (student council, ecology club)	7%	8%	
	1	1	
Long-term involvement	14%	17%	
	2	2	
Short-term involvement	14%	8%	
	2	1	
Course involvement	50%	0%	
	7	0	
No involvement	14%	17%	
	2	2	
TOTAL	14	12	26

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 13.2579 WITH 5 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.050 LEVEL)

An example of long-term personal involvement is the informant who initiated a glass drive for the school, collected glass all year, and then took it to the Owens-Illinois Company. Those involved in short-term activities would do such things as periodically clean up the litter in the school yard or the cafeteria on their

own. Particularly for Reynolds informants, the course offered them the only opportunity of doing something with certain environmental issues. One example of this is the experience that some of the Reynolds students had of going to Bell Telephone Company to talk to the employees about the environmental problems.

The Reynolds informants, though, were significantly less involved outside of school than were the Aloha informants, as seen in Table IV.

TABLE IV
ECOLOGICAL INVOLVEMENT OF INFORMANTS OUTSIDE OF SCHOOL

	Reynolds	Aloha	
Very involved and tries to convince others to be	7% 1	33% 4	
Very involved	14% 2	0% 0	
Partially involved and tries to convince others to be	29% 4	50% 6	
Partially involved	29% 4	17% 2	
Little or no involvement	21% 3	0% 0	
TOTAL	14	12	26

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 7.7587 WITH 4 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.100 LEVEL)

The informants who were very involved and who tried to convince others to be did such things as: attended conferences on their own, attended hearings and legislature meetings, became members of organizations such as Zero Population Growth, recycled all materials (cans, glass, paper), and talked a great deal to their parents, friends, or employers about environmental problems and ways to help resolve them. Partial involvement meant that students recycled, conserved materials, and participated in other activities of this nature. These students were not as extensively involved in organizations and projects as were the very involved students.

It is difficult to determine the reasons for the lesser involvement of the Reynolds informants outside of school. One explanation might be that the many guest speakers from various organizations that spoke at Aloha provided information about 'action' projects. The students at Aloha then would have more opportunity to join such organizations or at least gather information on how to get involved. Also, some of the speakers provided the incentive for project topics for various students. For example, after a Tri-Met representative spoke, two informants became involved in conducting a survey in the Aloha area about their community feelings of riding mass transit. This may explain, too, why 100 percent of the Aloha informants would support mass transit, while only 27 percent of the Reynolds informants would. These are only suggestions for reasons, but it certainly seems that the courses

did influence the ecological involvement of informants.

Summary: The Impact Of The Environmental Crisis Courses
On The Informants At Reynolds And Aloha

Did the environmental crisis courses influence the students' responses and their involvement in ecological activities? The data indicate that they did. The Reynolds informants, with less stress put on specific content in their course, felt that the problems of changing awareness, attitudes, and education were very important if the environmental crisis was to be resolved. The Aloha informants, however, were more interested and concerned about the problems of overpopulation, because of the emphasis that had been put on it in their course.

The informants responded that the courses also influenced their involvement in ecological activities in school and outside of school. Many opportunities were presented to the Reynolds informants in their course, and it is through their course that most of their involvement in environmental issues in school came. At Aloha the findings were different. The informants were mostly involved in Earth Day activities in school, but in activities outside of school they were more involved than the Reynolds informants. The course activities at Aloha largely account for this, as they gave Aloha informants more opportunities to become involved outside of school.

In general, it appears that courses do influence the students who take them, and are the major influencing factor.

BACKGROUND CHARACTERISTICS - INFORMANTS AND RANDOM STUDENTS

What are the background characteristics of the informants? Do they share common characteristics that would tend to lead them to take an ecology course, or are they similar in background characteristics to the randomly selected group of students?

The following background characteristics were determined for each population: the number of children in the family of each student, the length of time each student had lived in his present home, the education of each of his parents, the religious preference of the student, and the kinds of activities that each student participated in out of doors. Combining both schools there were 26 informants and 59 randomly selected students. Not every question was asked of every student.

The data on the number of children in the students' families were grouped into two categories: students who came from families of 1-3 children, and students who came from families with 4 or more (maximum was 12). This information is found in Table V.

Table V clearly indicates that students who select the environmental crisis courses tend to come from smaller families. Very few come from families with 4-12 children. It would appear, then, to be more difficult to get students involved in such courses who come from large families. Since the population problem is usually considered a major component of the environmental crisis (and discussed in both courses), it is possible that students who come from larger families tend to shy away from a course they think

might prove uncomfortable. Should this prove true, the implications for curriculum would be major, in particular how to attract students from larger families into the course in the first place, without deleting a critical component of the course.

TABLE V

NUMBER OF CHILDREN IN FAMILY - INFORMANT AND RANDOM

		Informant	Random	
Number of Children	1-3	77% 20	51% 30	
	4-12	23% 6	49% 29	
TOTAL		26	59	85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 5.066 WITH 1 DEGREE OF FREEDOM

(SIGNIFICANT AT 0.100 LEVEL)

Does the length of residence in the community have any effect on the decision of a student to take an environmental crisis course? Table VI presents data on how long students have lived in their present home.

Even though the chi-square statistic is not significant, it is interesting to note that the percentage of informants who have lived in their home only 0-1 year is the smallest percentage on the table. Any school with high transiency rates would have, it seems, more difficulty in getting students involved in environ-

mental crisis courses.

TABLE VI

LENGTH OF RESIDENCE IN PRESENT HOME

YEARS	LENGTH OF RESIDENCE IN PRESENT HOME		TOTAL
	Informant	Random	
0-1	8% 2	17% 10	85
2-5	42% 11	25% 15	
6-10	35% 9	34% 20	
11 or more	15% 4	24% 14	
	26	59	

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 3.3734 WITH 3 DEGREES OF FREEDOM

(NOT SIGNIFICANT AT 0.100 LEVEL)

Does the education of the parents of the students make any difference? There was no significant difference between the educational attainment of the parents of the informants and the random students as seen in Table VII and Table VIII.

Informants do not tend, then, to come from more educated parents than the random students. Therefore, students joining the environmental crisis courses do not seem to come from more stimulating homes than those students who chose not to take the course.

TABLE VII
EDUCATION OF MOTHER

	Informant	Random	
High School	65% 17	70% 41	
College	35% 9	29% 18	
Don't Know	0% 0	2% 1	
TOTAL	26	59	85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 0.140 WITH 1 DEGREE OF FREEDOM

(NOT SIGNIFICANT AT 0.100 LEVEL)

TABLE VIII
EDUCATION OF FATHER

	Informant	Random	
High School	50% 13	53% 31	
College	50% 13	39% 23	
Don't Know	0% 0	8% 5	
TOTAL	26	59	85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 0.046 WITH 1 DEGREE OF FREEDOM

(NOT SIGNIFICANT AT 0.100 LEVEL)

At both schools, Reynolds and Aloha, there also was no difference between the occupations of the fathers, as the greatest percentage were involved in technical work and business (46 percent of the informants' fathers as compared to 36 percent of the random students' fathers). It could be that there simply were not large enough internal differences in the school populations to pick up any differences on education and occupation, but in more diverse schools such differences might become apparent.

In analyzing the results of the students' religious preferences a significant finding was uncovered:

TABLE IX
STUDENTS' RELIGIOUS PREFERENCES

	Informant	Random	
Protestant	39% 10	65% 38	
Catholic	11% 3	15% 9	
Other	15% 4	15% 9	
No religious preference	35% 9	5% 3	
TOTAL	26	59	85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 13.4758 WITH 3 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.010 LEVEL)

The interesting result is in the 'No religious preference' category for the informants. This could mean that the informants are more free-thinking than the random students, more independent, and that this is related to more interest in topics such as the environmental crisis. That finding cannot be interpreted from this data, but the significant point is that students who indicate no religious preference tend to take the environmental crisis course.

In analyzing the background characteristics of the informants as compared to the random students, how do the personal activities of the informants compare to the random students? Outside experiences might be one real difference between ecology-minded students, and others who are not. Is there a difference between the kinds of outdoor activities in which informants engage compared to the random students? The results are in Table X.

As Table X suggests, informants and random students participate in similar kinds of outdoor activities.

If they engage in similar activities, do they visit wilderness areas with equal frequency? Wilderness was defined as an area that was isolated and primitive. In Oregon examples from some forest and coastal areas were given. The results point to the fact that there is a difference in such activity, and they are given in Table XI.

The informants do go more often to wilderness areas. The informants may be more appreciative of, and therefore more concerned with, protecting their environment as a result of their frequent trips to wilderness areas, or it may be that the same

TABLE X
OUTDOOR LEISURE ACTIVITIES

	Informant	Random
Outside, away from home activities (hike, fish, hunt, climb, backpack)	31% 8	14% 8
Athletics	23% 6	29% 17
Outside, around home activities (walk, play with animals, yardwork)	31% 8	34% 20
Away from home activities and athletics	8% 2	5% 3
Other	8% 2	19% 11

TOTAL

26

59

85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 4.736 WITH 4 DEGREES OF FREEDOM

(NOT SIGNIFICANT AT 0.100 LEVEL)

TABLE XI
FREQUENCY OF TRIPS TO WILDERNESS AREAS

	Informant	Random	
High Frequency	69% 18	42% 25	
Low Frequency	31% 8	58% 34	
TOTAL	26	59	85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 5.2080 WITH 1 DEGREE OF FREEDOM

(SIGNIFICANT AT 0.050 LEVEL)

type of people who go to wilderness areas also are environmentally conscious. In either case, they might be more prone to take an environmental crisis course.

The informants also camped more than the random students, and when they did camp they tent camped more, as compared to the random students who trailer camped. These findings point to the informants as being somewhat different from the random students, utilizing more primitive areas in more primitive ways (tenting), and therefore, possibly more interested in environmental issues.

There was, however, no significant difference between informants and random students in their extent of travels, as seen in Table XII.

TABLE XII
EXTENT OF TRAVELS

	Informant	Random
Little travel (Oregon, Washington)	12% 3	17% 10
Moderate travel (Pacific Northwest, California)	42% 11	54% 32
Much travel (USA)	19% 5	22% 13
Not applicable	27% 7	7% 4

TOTAL

26

59

85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 0.087 WITH 2 DEGREES OF FREEDOM

(NOT SIGNIFICANT)

Although the informants more often go to wilderness areas, they have not traveled any more extensively than the random students.

Summary: Background Characteristics - Informants and Random Students

It is important for a course on environmental issues to draw on the experiences of its students, and to provide for differences among students when designing curriculum. There are many significant differences between those students who tend to take environmental crisis courses and those students who do not. The

informants come from smaller families and they have less strong religious ties. They have more often taken advantage of opportunities to go to wilderness areas and they camp more.

The random students, on the other hand, have many characteristics that are similar to the informants. Their parents have similar educational backgrounds, they have lived in their present homes for similar lengths of time, they enjoy most of the same kinds of outdoor leisure activities, and they have traveled equally as much.

With these similarities and differences in background characteristics, we turn now to determine whether there are differences in their responses to environmental problems -- how aware and concerned they are about the problems, how involved they are in attempting to do something about them, and whether these two kinds of differences are related.

THE AWARENESS, CONCERN, AND INVOLVEMENT OF INFORMANTS AND RANDOM STUDENTS WITH THE ENVIRONMENTAL CRISIS

This section will attempt to determine whether there is a difference in the awareness, concern, and involvement of the informants about the environmental crisis as compared to the random students. The first part will analyze some of the differences in the awareness and concern of the informants about the environmental crisis as compared to the random students.

First, some pertinent information about the students will

be discussed: their ecological sources of information, their major ecological interests, their ecological readings, and their reasons for taking, or not taking the environmental crisis course.

Second, responses will be given to selected, relevant questions of the environmental crisis in an attempt to determine the differences in the awareness and concern of both groups. The questions asked are:

Is there an ecological crisis in the world?
Is there an ecological crisis in the Pacific Northwest?
What are the specific problems that are given to support the contention that an ecological crisis does exist?
What do you see as the three most important ecological problems in the world?
Why is population a problem?
Does the United States have a population problem?
How do you rate the environmental quality of your community?
Are you optimistic or pessimistic about man's chances of survival?
Can the environmental problems be solved by technology?

The use of a picture to bring out awareness and concern responses is used as a final example to illustrate differences in the awareness and concern of the informants about the environmental crisis as compared to the random sample.

The second part of this section will attempt to determine whether there is a significant difference between both groups in their involvement in ecological activities in school and outside of school.

Throughout this section representative comments from both groups of students, the informants and the random students, will be used to illustrate the nature of each group's responses. The information is drawn from the interview questions and from the

discussions with the ecological pictures.

Awareness and Concern of Informants and Random Students

Before it can be determined if there is a difference between the awareness and concern of informants compared to a random sample of students, it would be worthwhile first to learn where each group receives its ecological information, each group's major ecological interests, and the reasons of each group for taking, or not taking the environmental crisis course. These factors could influence how the students respond to the questions on the environmental crisis.

Where do students obtain their information on the environmental crisis, and is there a difference in the sources of information for the informants as compared to the random students? The sources of ecology information are found in Table XIII.

The courses, along with magazines, appeared to be very major sources of basic information for the informants, whereas television and magazines were the most important sources of information for the random students.

What were the students' main ecological interests? The responses to this question are important for curriculum development, for if gathered before the course began, a course could build on these interests. If determined after, the influence of the course could be tracked. The results are in Table XIV.

TABLE XIII
SOURCE OF ECOLOGY INFORMATION

	Informant	Random
Television	8% 2	37% 22
Radio	0% 0	2% 1
Magazines	31% 8	29% 17
Newspapers	8% 2	7% 4
Books	4% 1	2% 1
Discussion groups	0% 0	2% 1
Speakers	11% 3	5% 3
Friends	4% 1	3% 2
Other (course, class, school)	27% 7	8% 5
Checked many responses	8% 2	5% 3
TOTAL	26	59

85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 12.5145 WITH 9 DEGREES OF FREEDOM

(NOT SIGNIFICANT AT 0.100 LEVEL)

TABLE XIV
MAJOR INTEREST IN ENVIRONMENTAL ISSUES

	Informant	Random
Conservation	12% 3	7% 4
Population	58% 15	29% 17
Societal values	12% 3	0% 0
Natural resources	4% 1	14% 8
Air pollution	4% 1	17% 10
Water pollution	12% 3	19% 11
Others (noise pollution, pollution in general, food problems, recycling)	0% 0	15% 9

TOTAL 26 59 85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 19.836 WITH 6 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.010 LEVEL)

An interesting finding from this table is the difference in the kinds of interests of the informants as compared to the random students. The greatest ecological interest of the informants

is population, whereas population is much less so for the random students. The random students, generally, seem to be more interested in pollution problems than the informants. The category of societal values which a number of informants viewed as their major interest, but which received no response from the random students, is indicative of a different level of insight into the problems. It appears that the topic of population would be worthwhile to begin any course, because of the high interest of the many students.

Another significant difference between the informants and the random students relating to awareness and concern with environmental problems is the amount and kind of reading that each group of students does. Where students receive their information on ecology is very important for curriculum development, for it is often from readings that students gain knowledge to form opinions. If the sources of information are biased and inaccurate, the problems in reteaching the student are very difficult. Students were asked to name any readings in ecology that had influenced them, and the results are in Table XV.

Books that were assigned in class, such as Ehrlich's The Population Bomb, had much effect on the students. Often, in discussing the pictures or in the interview conversation, the students who had read books such as this one, would discuss what Ehrlich had said about the particular topic under discussion at the time. The random students who had read this book were equally as impressed as the informants. Certainly, the problems in finding

appropriate books and readings for curriculum for all kinds of students is no easy task, but books appear to have been influential with the students in this study.

TABLE XV
INFLUENTIAL ECOLOGY READINGS

	Informant	Random	
Little or no reading	8% 2	31% 18	
Mentions specific books, articles	69% 18	31% 18	
Mentions readings in general	15% 4	22% 13	
Other responses	4% 1	2% 1	
Cannot remember	4% 1	15% 9	
TOTAL	26	59	85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 13.133 WITH 4 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.010 LEVEL)

The environmental crisis courses were offered in both schools. Why then, did some students choose to take the course, while others did not? When asked why they signed up for the environmental crisis course, the informants gave the replies in

Table XVI.

TABLE XVI

INFORMANTS' REASONS FOR TAKING COURSE

	Reynolds	Aloha
Interested in the subject of ecology	7% 1	75% 9
To learn more about the problems	21% 3	8% 1
To learn more, and to do things to help	21% 3	8% 1
Credit requirements, choice of courses available	21% 3	8% 1
Other reasons	21% 3	0% 0
No response	7% 1	0% 0

TOTAL 14 12 26

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 11.457 WITH 4 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.010 LEVEL)

The reasons for taking the course vary considerably between the two schools, but if one considered the first three cells to indicate concern for the environment on the part of the students, the greatest percentage of informants took the course for such a

reason. Both of these courses were elective. The students could choose the course in place of another social studies course, and still meet the proper requirements. It appears from this table (XVI) that the students who did take the courses were interested in the topic, and would, therefore, be more motivated to learn. Persons developing curriculum for such courses should determine whether the materials they are developing are for elective courses, or for a required course that all students in the school have to take. Teaching students who are already interested is quite different from reaching those who are not.

When the informants were asked why they became involved in ecological activities, their concern for the environment again became evident: 36 percent of the informants at Reynolds and 50 percent of the informants at Aloha became involved because of their concern for the environment. They wanted to help or they felt that someone needed to do something.

Someone's got to do something about it -- the more people doing it, the more people seeing what you're doing, the more people involved.

I wanted to do something as the problems were getting worse. I wanted to do something to help it a little.

These responses from informants are certainly different in nature from the random student who did not take the environmental crisis course because he was "not interested in the course." The responses of the random students for not taking the environmental crisis course are found in Table XVII.

TABLE XVII

REASONS FOR RANDOM STUDENTS NOT TAKING THE ECOLOGY COURSE

Wanted to take another course -----	20%
Course didn't sound interesting; didn't want it -----	15%
Had to meet other requirements; scheduling problems -----	10%
Didn't understand what it was about -----	7%
Heard things about the course (too much work) -----	10%
Could learn about ecology from other sources than course -----	2%
Other reasons -----	14%
Not applicable -----	22%

It is evident from the above that a large percentage of the random students just did not want to take the environmental crisis course. This has implications for curriculum development in that to reach all students, whether interested in environmental issues or not, ecology will have to be integrated into the required courses of the school.

Selected questions will now be analyzed in an attempt to determine differences between the informants and the random students in their awareness and concern with the environmental crisis.

Do the informants and random students see an ecological crisis in the world, and in the Pacific Northwest? Both groups, the informants and the random students, see an ecological crisis in not only the world, but also in the Pacific Northwest, as indicated in Table XVIII and Table XIX. While the differences are not statistically significant, in terms of percentages, some leanings are

apparent. More informants see an ecological crisis in the world and in the Pacific Northwest than do random students; randoms tend to see the crisis point as more distant.

TABLE XVIII

IS THERE AN ECOLOGICAL CRISIS IN THE WORLD?

	Informant	Random
Yes	84% 22	63% 37
No	4% 1	5% 3
Don't know	4% 1	7% 4
Not yet, will be if keeps going	8% 2	25% 15

TOTAL

26

59

85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 4.4073 WITH 3 DEGREES OF FREEDOM

(NOT SIGNIFICANT AT 0.100 LEVEL)

TABLE XVIX

IS THERE AN ECOLOGICAL CRISIS IN THE PACIFIC NORTHWEST?

	Informant	Random	
Yes	46% 12	24% 14	
No	15% 4	14% 8	
Don't know	8% 2	9% 5	
Not yet, not as serious as other places	31% 8	54% 32	
	TOTAL		85
	26	59	

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 5.1351 WITH 3 DEGREES OF FREEDOM

(NOT SIGNIFICANT AT 0.100 LEVEL)

There are some implications for curriculum here. Regardless as to whether it was the course that made a difference, or whether the students who took the course were concerned in the first place, the significance is that after the course, the informants do see more of a crisis than the random students. The combination of a curriculum and an elective course can teach that an environmental crisis does exist, not only in the world, but also in the Pacific Northwest.

Not only do both groups of students see an environmental

crisis existing, as indicated in Tables XVIII and XIX but they also think that man's survival on earth is endangered. 58 percent of the informants and 54 percent of the random students responded that yes, man's survival is endangered. When asked to mention specific problems, or reasons why such a crisis existed in the world and in the Pacific Northwest, differences began to appear between the informants and the random students. 77 percent of the informants and 49 percent of the random students mentioned a specific problem to support their contention that an ecological crisis existed in the world. What the students saw as major problems are found in Table XX.

It is interesting to note that changing people's attitudes and awareness and increasing education ranked the highest for the informants. For example:

People don't understand that they're really ruining their environment.

We need more crises. If we had a really good crisis, it would make people stop and think. That's what it's going to take to make people aware about what's going on, to think a little bit.

The random students mentioned the problems of population and pollution most frequently when asked what they saw as causing an ecological crisis in the world. For example:

Overpopulation and air pollution -- those two will become the most serious.

By 1980 we'll have to wear gas masks if we don't do something about the air. I think we better do something before we have to wear gas masks.

If something isn't done, you'll have no air with air pollution. With air pollution, you'll have weak people, dying people. And on down the line -- you'll ruin all the natural beauty that they ever had. With overpopulation nobody will have enough food and they'll be breathing in dirty air and it'll cause a lot of disease. It'll really ruin everything if it keeps going.

TABLE XX

SPECIFIC PROBLEMS MENTIONED ON WHY AN ECOLOGICAL CRISIS EXISTS IN THE WORLD

	Informant	Random
Population, population and pollution	19% 5	22% 13
Pollution in general	12% 3	15% 9
Awareness, education, attitudes	27% 7	14% 8
Scarcity (resources, space, food)	15% 4	3% 2
Other problems (air pollution, water pollution)	15% 4	17% 10
Not applicable	12% 3	29% 17

TOTAL 26 59 85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 4.708 WITH 4 DEGREES OF FREEDOM

(NOT SIGNIFICANT AT 0.100 LEVEL)

In responding more specifically to the issue of whether an ecological crisis existed in the Pacific Northwest, 38 percent of the informants and 42 percent of the random students mentioned some kind of pollution (air pollution, water pollution, or land pollution) to support their viewpoint. As might be expected from the more local focus, the responses to this question included more personal observations and more specific referents. For example, informants responded:

Now we have to reserve campsites. It isn't as crowded as Boston, but as great outdoors land, it loses with more people. It loses more and more wilderness. We had so much water, but if you pollute it, it's gone, you can see it, it's not good for anything.

Right now we're not as bad as California. We'll start to get there because everyone is moving out here because of the problems elsewhere.

The random students had similar responses:

It's not as bad as other places, but little by little it's getting worse, like our air pollution wasn't bad a few years ago and now it's getting worse. We're seeing more litter, and our streams are getting more polluted little by little.

Not any serious problems there, except for water pollution -- the Willamette shouldn't be like that.

I don't think ours is as bad as everyone else's. We're pretty lucky. We're not overpopulated really. Our rivers are getting dirtier, like the Columbia. Our air is getting dirtier -- you notice it when you're in Portland. We're not as bad off. I don't think we have a crisis yet, but when we have a crisis, I think other places will be really bad off, like Los Angeles.

In general, as the questions focused on the more local area, the responses of the random and informant students tended to become more alike, although basically more informants than random students thought the crisis was here rather than coming

TABLE XXI

THREE MOST IMPORTANT ECOLOGICAL PROBLEMS IN THE WORLD

	Informant	Random
Population, air pollution, water pollution	35% 9	31% 18
Population, scarcity, pollution	12% 3	5% 3
Pollution only	0% 0	37% 22
Pollution and other responses	19% 5	9% 5
Population, crux of the other problems	15% 4	3% 2
Other responses	19% 5	15% 9
TOTAL	26	59

85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 16.311 WITH 5 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.010 LEVEL)

This table indicates that the informants were much more interested in the problems of population, while the random students were more interested in the problems of pollution. Since the random students receive most of their information from television, it might be assumed that the problems of pollution are

more stressed in the media than are the problems of population.

But this is an assumption.

Along the same lines there was a significant difference between the random students and the informants in their response to the question, why is population a problem, as seen in Table XXII.

TABLE XXII

WHY IS POPULATION A PROBLEM?

	Informant	Random	
Social problems	8% 2	12% 7	
Crux of all other problems	54% 14	20% 12	
Problem of scarcity	31% 8	37% 22	
Not a problem (something else is)	8% 2	5% 3	
Other problems	0% 0	15% 9	
Not applicable	0% 0	10% 6	
TOTAL	26	59	85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 10.688 WITH 4 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.050 LEVEL)

As can be seen from Table XXII, the greatest percentage of informants see population as the crux of the other environmental problems, and so stated with vivid finality. "Overpopulation is the stem of all the environmental problems -- in particular, pollution, depletion of natural resources," stated one informant. "We live on Spaceship Earth and there's only so much material, and when you have an overabundance of people using those limited materials, some things are bound to give -- shortage of food, famine, disease." Another informant commented succinctly: "All ecological problems result from us. The more of us, the more the strain on our environment."

The random students, on the other hand, saw problems of scarcity, or crowding, or limited space as separate problems, not connected to population as a causal factor, nor interrelated: "There's not enough room for people to live."

After the students had mentioned reasons why population was a problem, they were then asked if they thought the United States had a population problem. The results are similar in kind to the difference in responses between an ecological crisis in the world versus one in the Pacific Northwest. The data can be found in Table XXIII.

The informants decidedly see the United States having more of a population problem than do the random students. Again, it is difficult to determine whether this is an effect of the courses or not, although the weight of evidence would suggest it is. For the random students the problem is away from them, in certain areas "like New York City." For the informants it is not. For the random

students the problems of the environment in New York City are isolated from persons living in Oregon.

TABLE XXIII

DOES THE UNITED STATES HAVE A POPULATION PROBLEM?

	Informant	Random
In certain areas	8% 2	29% 17
Yes, definitely all over	50% 13	19% 11
It will have one if trend continues	0% 0	17% 10
Not as bad as other countries	8% 2	17% 10
Other reasons	4% 1	5% 3
Not applicable	31% 8	14% 8

TOTAL . 26 59 85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 16.286 WITH 4 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.010 LEVEL)

One implication for curriculum development is to teach students concepts such as "web of life," "interdependence," and "balance of nature." Such an awareness of man's interdependence

is the crucial difference between the informants and the random students. There is less of a world crisis, and less of a local ecological crisis than seen by the informants.

To further this analysis, how do the students, informants in contrast to the random, rate the quality of the environment of the community in which they live? It is not known whether the difference in the responses of the two groups was due to the fact that the informants had just finished the environmental crisis course. However:

TABLE XXIV
ENVIRONMENTAL RATING OF COMMUNITY

	Informant	Random
Excellent	4% 1	9% 5
Good	39% 10	59% 35
Fair	39% 10	31% 18
Poor	15% 4	2% 1
Not sure	4% 4	0% 0

TOTAL 26 59 85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 8.226 WITH 3 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.050 LEVEL)

For whatever reasons it appears that after the courses were over, the informants held a poorer impression of their communities than did the random students. The environmental crisis courses, in discussing the environmental problems that exist, could very easily have made the informants more aware of such problems in their own neighborhoods. The random students would not have had the benefit of the course.

There are some problems that could be created for curriculum as a result of these findings. Do environmental crisis courses turn out disenchanted students? If so, the possibilities of upsetting parents and the community are substantial. On the other hand, the environmental crisis courses may appeal more to mal-contents. At any rate a course would have to be careful not simply to destroy a student's impression of where he lives. If it presents environmental problems, it should also give constructive things that the student might do to help improve his neighborhood.

Perhaps the difference between the informants and the random students is the difference between awareness and concern. The random students, for the most part, are as aware of the problems as the informants, but as can be seen in Table XXV, they do not view the problems as critical as the informants do.

The informants see the crisis as contemporary and hold fewer hopes that man will be able to reverse the trends and solve his environmental problems. The random students believe that the problems are not yet as critical, and that solutions can be found

to the problems in time to prevent any danger to man's survival.

TABLE XXV

OPTIMISM VERSUS PESSIMISM OF MAN'S CHANCES OF SURVIVAL

	Informant	Random	
Optimistic	35% 9	46% 27	
Pessimistic	50% 13	22% 13	
If trend continues, pessimistic; if not, optimistic	8% 2	10% 6	
Don't know	4% 1	9% 5	
Not applicable	4% 1	14% 8	
TOTAL	26	59	85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 5.404 WITH 3 DEGREES OF FREEDOM

(NOT SIGNIFICANT AT 0.100 LEVEL)

Certainly, a course on the environmental crisis would not want merely to destroy positive outlooks of students concerning man's survival. But a naive view would have to be made more complex. To do this, a course would have to present to the student opposing viewpoints on the various problems, and deal with unexamined beliefs, as the feelings held by many that science and

Students who have not taken the environmental crisis course tend more to believe that solutions will be found to the environmental problems, but the informants see the situation differently to some extent. Whether it is the course that made the difference cannot be determined here. Neither is it clear whether this view is merely a negative outlook, or whether it is a balanced and complex judgment.

Picture 15, showing sand buggies on the dunes, illustrates well a final example of the difference in concern for the environment between the informants and the random students. When asked if they saw any ecological problems in the picture, the students gave the responses in Table XXVII.

This picture puzzled many random students, since, if no problems were apparent to them in the picture, at least from outward appearance, they had difficulty in interpreting it. It was ranked last by the random students 29 percent of the time. Most of the comments for this picture were similar to the following, from a random student: "That's fun, it really is. It's something to do, entertainment. We have one and we often visit the dunes."

One problem for curriculum development resulting from the previous discussion is how to discuss changing life styles with students. Technology and affluence have made such items as dune buggies and snowmobiles available to many people, but if the environment is to be protected, man may have to do without, or at least limit such luxuries. Attempting to bring about a change

in attitudes of today's youth toward life styles will be no easy task for those interested in developing curriculum on environmental issues.

TABLE XXVII
ECOLOGICAL PROBLEMS IN PICTURE 15?

	Informant	Random
No problems	0% 0	31% 18
Disturbing the land, tearing it up	19% 5	12% 7
Not hurting the land because it's desert	23% 6	9% 5
Noise pollution, the need for quiet areas	23% 6	12% 7
Air pollution	8% 2	12% 7
Other reasons	23% 6	20% 12
Not applicable	4% 1	5% 3

TOTAL 26 59 85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 13.373 WITH 5 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.050 LEVEL)

Ecological Involvement Of Informants And Random Students

Both groups of students are aware than an ecological crisis exists not only in the world, but to some extent in the Pacific Northwest. The students are aware enough to be concerned that man's survival is endangered. The question then becomes, if they see an ecological crisis existing, how involved have they been in trying to do something about the problems? This section will analyze the ecological involvement of the informants and the random students in school and outside of school, as well as each student's willingness to be involved in changing his life style.

Both the informants and the random students were asked about their involvement in ecological activities in school, and they responded in the manner indicated in Table XXVIII. Earth Day, 1970, was a large affair for many schools. Consequently, many of the random students were involved in it -- attending lectures, walking to school, or picking up litter.

It is interesting to note that no random students were involved in personal long-term or short-term activities. Many of the informants were involved in activities that stemmed from their environmental crisis course. The big difference between the random students and the informants is in the last cell. 48 percent of the random students were not involved at all.

The difference in the involvement of informants outside of school as compared to random students was even more significant than in school. This information is found in Table XXIX.

TABLE XXVIII
ECOLOGICAL INVOLVEMENT IN SCHOOL

	Informant	Random
Earth Day activities	23% 6	41% 24
School organizations (student council, ecology club)	8% 2	7% 4
Long-term involvement	15% 4	0% 0
Short-term involvement	12% 3	0% 0
Course involvement	27% 7	5% 3
No involvement	15% 4	48% 28

TOTAL 26 59 85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 29.7371 WITH 5 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.001 LEVEL)

TABLE XXIX

ECOLOGICAL INVOLVEMENT OUTSIDE OF SCHOOL

	Informant	Random	
Individual activities - very involved and tries to convince others to be	19% 5	0% 0	
Individual activities - very involved	8% 2	0% 0	
Individual activities - partially involved and tries to convince others to be	39% 10	10% 6	
Individual activities - partially involved	23% 6	25% 15	
Little or no involvement	12% 3	64% 38	
TOTAL	26	59	85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 34.0567 WITH 4 DEGREES OF FREEDOM

(SIGNIFICANT AT 0.001 LEVEL)

To not only present the knowledge for students, but also to present means by which students can become actively involved in doing meaningful activities for the good of the environment is a difficult task. Since the school is the source of much involvement, one problem a course should consider is how to get the school tied up with the community organizations that are involved in environmental issues. At the very least, a course

should present information to the students that such organizations do indeed exist. Even more important, a course could teach students how to do things on a personal level -- recycling, conserving materials and resources, writing letters to the legislature.

Students were also asked how they would change their life style if it meant having a better environment. There was a significant difference in how the informants and random students responded to this question, particularly whether they responded spontaneously or whether they had to be prodded, to be given a suggestion before they could respond. The results are found in Table XXX.

Even though the random students had to be prodded more, as indicated in Table XXX, there were no significant differences in the content of their responses in contrast to the informants. 89 percent of the informants and 75 percent of the random students agreed that they would limit their families to two. 62 percent of the informants and 66 percent of the random students supported mass transit. In recycling they were also similar, 50 percent of the informants and 54 percent of the random students willing to recycle. Limiting their families in size, supporting mass transit, and recycling are some of the ways that the students would be willing to be involved in changing their life style.

Curriculum is one way of presenting information to the students about why and how they might change their life style to

create a better quality environment.

TABLE XXX

WILLINGNESS TO BE INVOLVED IN LIFE STYLE CHANGES

	Informant	Random	
Mostly spontaneous responses	77% 20	37% 22	
Mostly prodded responses; no suggestions made on own	23% 6	63% 37	
TOTAL	26	59	85

CELL PERCENTS BASED ON COLUMN SUMS

CHI-SQUARE STATISTIC = 11.3418 WITH 1 DEGREE OF FREEDOM

(SIGNIFICANT AT 0.001 LEVEL)

Summary: The Awareness, Concern, And Involvement of Informants And Random Students With The Environmental Crisis

There is a difference in the awareness, concern, and involvement of the informants as compared to the random students. Although both groups see an ecological crisis in the world, in the Pacific Northwest, and are concerned about man's survival on earth, they differ in the reasons they give and the problems they see. Informants are more concerned with the problems of population, seeing population as the crux of most of the other environmental problems. Although the random students also consider population to be a major problem, they tended in more of the questions to be more concerned with the problems of pollution (air, water, land).

Information from the ecological pictures gives support to

the data found in the interviews. Although these are two different kinds of interview procedures, the results from the data are similar, confirming the interview data. For example, the informants ranked the picture of population first, whereas the random students ranked the picture of air pollution first most of the time. Where the informants saw population as the crux of the other environmental problems, random students thought in terms of not enough room, or not enough land, or not enough food.

The informants more strongly doubted that technology could solve our environmental problems than did the random students. Informants tended to be more pessimistic about the chances that man could solve his problems in time to save himself.

Informants appeared to show concern for the environment even before taking the course. They took the environmental crisis course because they were interested in ecology, or because they were concerned about the environment and wanted to do something to help. On the other hand, the reasons of the random students for not taking the environmental crisis course were of a different nature -- wanted to take another course, the course didn't sound interesting, had scheduling problems, heard things about the course (too much work).

The informants were much more actively involved in ecological activities, both inside school and also out in the community and in their own homes. There were significantly fewer informants who were not involved at all than there were random students. It

appears that much of the involvement of informants resulted from their taking the environmental crisis courses, which is certainly one strong reason for having such courses. If nothing else, the course exposes the students to information, knowledge and action, that the students can use if they wish.

If it is believed that an environmental crisis does exist, then the data on the awareness, concern, and involvement of the informants as compared to the random students (as a beginning attempt), does support the contention that such environmental crisis courses are very useful, and very needed. The task, therefore, for developers of curriculum is great.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary And Conclusions

This study was conducted with an admitted bias that an environmental crisis does exist in the world, indicated by the increasing numbers of persons inhabiting the world, the deteriorating quality of our air and water, and the increasingly rapid depletion of our natural resources.

The role of sociologists in helping to identify and define, let alone resolve the environmental crisis, has been minimal. Most of the writings on the deteriorating quality of our environment have come from scholars in other fields of endeavor. Yet collecting frightening statistics is no substitute for analytic models and solidly based policy recommendations. There is great need for sociologists, and human ecologists in particular, to develop ecological theory which could organize empirical data and initiate empirical studies to determine the existence of ecological imbalances in the world and suggest the nature and magnitude of corrective action.

Many suggestions have been made to help resolve the environmental crisis: population control, political action, economic action, education, and many others. It is education -- par-

ticularly high school curriculum -- that is the focus of this empirical study. This study focused on the awareness, concern, and involvement of high school students, some of whom were taking newly organized ecology courses, some of whom were not.

Two different kinds of methodology were used, both of which proved effective. The two groups of students who were interviewed at two different schools with environmental crisis courses were:

1) informants -- those students who had taken an environmental crisis course, and who were recommended by their teachers as being aware, concerned, and involved; and 2) a random sample of juniors who had not taken the course.

Comparisons of these two groups of students provide an effective way of determining similarities and differences in attitudes toward the environmental crisis, between those who were aware, concerned, and involved, and those who were not. If environmental crisis courses are going to be elective, and most of them will have to be, it is important to know the kind of student who chooses to take the course. Perhaps these are the students whose attitudes do not need changing in the first place. Also, since informants from two different environmental crisis courses were interviewed, the methodology allowed similarities and differences between the attitudes of informants to be viewed. This provided a sense of the relative influence of the two courses.

The data showed that there were some differences between the informants and the random students in their background charac-

teristics, and in their awareness, concern, and involvement with ecological activities. Informants came from smaller families, they were less religiously oriented, they spent more time in wilderness areas, and they camped more. They were similar to the random students in that their parents have similar educational backgrounds and occupations, and they have traveled as extensively as the random sample.

Although the informants and the random students saw an ecological crisis in the world, in the Pacific Northwest, and were concerned about man's survival on earth, they differed in the reasons they gave and the problems they saw. The informants were much more concerned about the problems of population, seeing it as the crux of the other environmental problems, while the random students viewed the problems of pollution as the more serious. The informants tended to be more pessimistic about the outlook for man, feeling that man's chances of survival are limited. The informants were also more actively involved in ecological activities in school, and outside of school. Much of this involvement stemmed from the courses.

The environmental crisis courses in the two different schools did influence the informants' responses to some extent. Much of the informants' information about the environmental crisis came from the courses, as did incentives for ecological involvement in activities and organizations. The Aloha informants were more concerned with population problems, the focus of that course,

whereas the Reynolds informants felt that awareness, attitudes, and education needed to be changed, more the emphasis of the Reynolds course.

There were some shortcomings in this study. The data were collected at the end of the school year, when the courses were practically over. It was therefore difficult to determine cause and effect in some instances. For example, was it the more aware, concerned, and involved students who tended to take the environmental crisis course, or did the course bring about more awareness, concern, or involvement?

While interview questions which could give more direction for curriculum development are difficult to design, the conclusions which could be drawn about curriculum from this study were limited. Although the use of the pictures, each one representing something important ecologically, proved to be a very successful technique, gaining the attention and interest of the students, some of the pictures used tended to be too difficult for the students to interpret, requiring too high a level of analysis. Those pictures that could be interpreted easily, as the pictures representing overpopulation, air and water pollution, and litter, yielded good data and supported the findings from the questions asked during the interview.

Another shortcoming is the small size of the sample of students. However, if one wanted to use both informants and a random selection of students in a study, the size of the informant group, by its

nature, would always be relatively small. If environmental crisis courses become more popular (which they undoubtedly will), and if one interviewed informants from a number of schools, then the size of this group would be much enlarged. A larger group would allow more analyses to be undertaken. In this study the chi-square statistic was used, but further sub-analyses were difficult because of the small number.

Recommendations

The data gathered in this study might prove useful in two areas: indicating directions for new ecological theory, and guiding ecology curriculum development. The study was designed primarily to achieve the latter. For educators and persons considering developing environmental education curriculum, some recommendations from this study are: Environmental crisis courses definitely serve as a source of information for students, and they create in the students a concern and involvement with ecological activities that is not shared by the students who do not take the course. Courses of the nature of those in this study, then, should be developed and incorporated into schools wherever there is a desire to deal with ecological matters.

Outside speakers representing various points of view appeared to be a very successful instructional technique. They influenced both the problems which the students saw as most serious and the amount of direct involvement in ecological activities. Students often became involved in the groups associated with the speakers.

This appeared to be the key impetus to direct involvement by the students.

Having students do research projects of their own choosing seemed to work well, particularly when those projects involved action on the part of the student. They appear to give the student a chance to put to use the knowledge that he has learned in the course. While the teachers felt such projects should be under the guidance and supervision of the teacher, the length of these projects should be determined by the teacher and the student together. Some students fare better with more short-range projects, rather than one long one. Emphasis on the interdependence of man enables the students to see the interrelated nature of the ecological crisis, rather than just as isolated problems.

If students locate specific environmental problems in their own community, and then take some kind of action to remedy the problem, it appears to help in making the problem more significant to him. An interdisciplinary approach also seemed to work best. Giving the students an opportunity to test out hypotheses that are presented also was effective. For example, the science lab was used in one instance for the student to determine for himself whether phosphates in soap were harmful to water or not. It appeared that all of the traditional subjects taught in high schools today could become more relevant if a current, important topic, such as the environmental crisis, were incorporated into them in some similar manner.

massive for any one person to begin to tackle. New ecological theory would allow people to better cope with these environmental problems.

The social organization of mankind in the future undoubtedly will be very much affected by the environmental problems that exist, and sociologists will be much amiss if they do not begin to tackle the problems of ecological theory and research now.

Further studies need to be conducted. Since the two schools in this study were in suburban areas, it would be interesting to conduct a study in an urban setting. Interviews before and after the course would also prove beneficial. And informants need not come only from environmental crisis courses, but from ecological clubs or organizations as well.

For the most part this study developed a methodology which effectively generated a great deal of information from students about their awareness, concern, and involvement in ecology. The problem that needs the most thought and analysis is how to determine exactly what kind of data gathered from students would prove most useful and meaningful for developing curriculum on the environmental crisis. Very few of the curriculum development projects in the country, regardless of size and funding, have started with clear knowledge of what the student would bring to the course, regardless of the acknowledged importance of the information. This study suffered from the common lack of clear knowledge about how to relate student data to curriculum development tasks.

This study has been a beginning, an exploratory project, but hopefully it will create an interest in educators and sociologists to do further research into how to change the degree of awareness, concern, and involvement of persons with the environmental crisis. There are many problems to be surmounted in this research, but more importantly, the problems of the environment need to be surmounted if man is to survive.

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APPENDIX A

STUDENT BACKGROUND INFORMATION SHEET

Name _____ Telephone Number _____

Address _____

Age at last birthday _____ Number of children in your family _____

Name of High School _____

Year in High School _____ Junior; _____ Senior

How long has your family lived in your present home? _____

How would you environmentally rate the community you live in?
_____ Excellent; _____ Good; _____ Fair; _____ Poor; _____ Not sure

Indicate the type of community in which you live:
_____ Urban; _____ Suburban; _____ Rural; _____ Other

What does your father do for a living? _____
industry (place of work)

(position)

Does your mother work? _____ If so, what does she do? _____

What is the last year of education completed by each of your parents?

Father: _____	grade school	Mother: _____	grade school
_____	high school	_____	high school
_____	college	_____	college
_____	graduate school	_____	graduate school

What is your religious preference?	What is the religious preference of your parents?
_____ Protestant	_____ Protestant
_____ Catholic	_____ Catholic
_____ Jewish	_____ Jewish
_____ Other _____	_____ Other _____

What is your political preference?

_____ Republican
 _____ Democrat
 _____ Other _____

Where do you receive most of your information on ecological problems?

_____ television	_____ magazine articles	_____ discussion groups
_____ films	_____ newspaper articles	_____ speakers
_____ radio	_____ books	_____ friends
	_____ government agencies	_____ other _____

Do you believe that most of the students in your school are concerned about ecology?

_____ yes; _____ no; _____ uncertain

The ecology crisis can be solved by the application of technology.

_____ strongly agree; _____ agree; _____ uncertain; _____ disagree;
 _____ strongly disagree

What is your major interest in environmental issues, or ecology?

_____ conservation	_____ natural resources	_____ recycling
_____ population	_____ air pollution	_____ urban problems
_____ societal values	_____ water pollution	_____ food problems
_____ and priorities	_____ noise pollution	_____ ecological systems
		_____ other _____

APPENDIX B

INTERVIEW GUIDE

1. What do you consider to be the three most important ecological problems in the world?
2. Do you see an ecological crisis in the world? (problems serious enough to be a crisis?)
in the Pacific Northwest?
3. Do you think man's survival is endangered? Why or why not? Are you optimistic or pessimistic about his chances?
4. A. Why did you sign up for the ecology course? (informants)
B. What is the major emphasis of your ecology course? (informants)
C. Did you know there was an ecology course being offered? (random) Why didn't you take the course?
D. What are the major activities and interests that are pursued in your ecology club? (if in club or organization)
E. What ecological books have you read on ecology that have influenced you?
5. Have you ever tried to do anything about the ecological problems? Specifically what?
 - A. In school
 - B. Outside of school
 - C. How did you become ecologically involved? (informants)
 - D. Why did you become ecologically involved? (informants)
 - E. Have other students become involved for the same reasons as you? (informants)
 - F. What are other students doing? (informants)
 - G. Would they agree with you on your choice of ecological problems, and with your concern? (informants)

6. What specifically are you doing, and are willing to do, to change your life style if it meant having a better environment?
 - A. Would you support mass transit?
 - B. Would you limit your family to two?
 - C. Would you recycle?
7.
 - A. What are your leisure activities that take place outdoors?
 - B. What opportunities have you had to go to wilderness areas? How often have you gone?
 - C. Do you camp?
 - D. Are most of your activities centered in and around Portland?
 - E. Where have you traveled in the United States?
8.
 - A. Are there any ecological problems in your neighborhood? Specifically, what are they?
 - B. Have you, or any members of your family, made any effort to correct these ecological problems? If so, what specifically?
9. Is there any ecological problem that would concern you enough that you would become actively involved? (random) What, in particular?
10. What does the word "ecology" mean to you?
11. What suggestions would you make for a course in ecology to make students aware, concerned, and involved? Is there anything that you would specifically like to learn if you took the ecology course? (random)

APPENDIX C

TEACHER INTERVIEW GUIDE

1. How did the Environmental Crisis/Man-in-Environment course come into being? Why? When?
2. What has been your role in bringing this course into being?
3. How many students took the course this year?
4. What kind of student tended to take the course? Why? Is this kind of student representative of the socioeconomic status of the school?
5. What has been your major emphasis in teaching the course?
6. What has comprised the course in content?
7. What has comprised the course in activities?
8. What kinds of activities seemed to work with what kind of student? Are there any activities that did not seem to work? Why?
9. Do you feel that there has been a change in the students' ecological awareness, concern, and involvement since taking the ecology course? For how many students? What are some specific examples?
10. What have been your major ecological concerns and involvements?

APPENDIX D

VARIABLE DICTIONARY

<u>Column</u>	<u>Categories</u>	<u>Code</u>	<u>Informant (%)</u>	<u>Random (%)</u>
<u>BACKGROUND INFORMATION SHEET</u>				
4-6	Student Identification Reynolds 101---146 Aloha 201---252			
7	Random or Informant Informant Random	1 2		
8	Age at last birthday 15 16 17 18	1 2 3 4	0 14 25 73	50 86 57 9
9	Sex Male Female	1 2	54 46	51 49
10	Number of children in family 1 2 3 4-8 9-12	1 2 3 4 5	8 19 50 19 4	7 20 24 48 2
11	Year in high school Sophomore Junior Senior	1 2 3	0 54 46	0 100 0
12	Length in present home (years) 0-1 2-5 6-10 11 or more	1 2 3 4	8 42 35 15	17 25 34 24

Column	Categories	Code	Informant (%)	Random (%)
13	How would you environmentally rate the community you live in?			
	Excellent	1	4	9
	Good	2	39	59
	Fair	3	39	31
	Poor	4	15	2
	Not sure	5	4	0
14	Indicate the type of community in which you live.			
	Urban	1	4	2
	Suburban	2	81	64
	Rural	3	12	24
	Other	4	4	5
	No response	5	0	5
15	Occupation of Father			
	Upper level professional..	1	0	3
	Middle level professional	2	8	3
	Lower level professional..	3	12	14
	Technical and business ...	4	46	36
	Skilled trades.....	5	4	19
	Semi-skilled	6	15	7
	Unemployed.....	7	0	5
	Deceased.....	8	12	5
	Don't know, no response...	9	4	9
16	Occupation of Mother			
	Upper level professional .	1	0	0
	Middle level professional.	2	0	2
	Lower level professional .	3	8	10
	Technical and business ...	4	0	3
	Skilled trades	5	27	15
	Semi-skilled	6	19	15
	Unemployed	7	46	53
	Deceased	8	0	0
	Don't know, no response ..	9	0	2
17	Last year of education completed by father			
	Grade school	1	15	12
	High school	2	35	41
	College	3	42	29
	Graduate school	4	8	10
	Don't know, no response...	5	0	9

<u>Column</u>	<u>Categories</u>	<u>Code</u>	<u>Informant (%)</u>	<u>Random (%)</u>
18	Last year of education completed by mother			
	Grade school	1	8	5
	High school	2	58	64
	College	3	35	24
	Graduate school	4	0	5
	Don't know, no response...	5	0	2
19	Student's religious preference			
	Protestant.....	1	39	64
	Catholic	2	12	15
	Jewish	3	0	0
	Other	4	15	15
	No religious preference...	5	35	5
20	Parents' religious preference			
	Protestant	1	50	71
	Catholic	2	8	12
	Jewish	3	0	0
	Other	4	19	10
	No religious preference...	5	23	7
21	Student's political preference			
	Republican	1	27	25
	Democrat	2	27	37
	Other	3	15	7
	No political preference...	4	31	31
22-23	Where do you receive <u>most</u> of your information on ecological problems?			
	Television	1	8	37
	Films	2	0	0
	Radio	3	0	2
	Magazines	4	31	29
	Newspapers	5	8	7
	Books	6	4	2
	Government agencies	7	0	0
	Discussion groups	8	0	2
	Speakers	9	12	5
	Friends	10	4	3
	Other	11	27	9
	Checked many responses....	12	8	5

Column	Categories	Code	Informant (%)	Random (%)
24	Do you believe that most students in your school are concerned about ecology?			
	Yes	1	42	42
	No	2	31	29
	Uncertain	3	27	29
25	The ecology crisis can be solved by the application of technology.			
	Strongly agree	1	15	10
	Agree	2	27	42
	Uncertain	3	27	34
	Disagree	4	19	12
	Strongly disagree	5	12	2
26-27	What is your major interest in environmental issues?			
	Conservation	1	12	7
	Population	2	58	29
	Societal values and priorities	3	12	0
	Natural resources	4	4	14
	Air pollution	5	4	17
	Water pollution	6	12	19
	Noise pollution	7	0	3
	Pollution in general	8	0	3
	Recycling	9	0	2
	Urban problems	10	0	0
	Food problems	11	0	2
	Ecological systems	12	0	2
	Checked many responses ...	14	0	3

QUESTIONNAIRE

28	What do you consider to be the three most important ecological problems in the world?			
	Population, air pollution, water pollution	1	35	31
	Population, scarcity, and pollution	3	12	5
	Population, pollution, other	5	12	7
	All pollution	6	0	37
	Pollution and others	7	19	9
	Population, crux of all ..	8	15	3
	Other	9	8	9

Column	Categories	Code	Informant (%)	Random (%)
29	Do you see an ecological crisis in the world?			
	Yes	1	85	63
	No	2	4	5
	Don't know	3	4	7
	Not yet, will be if keeps going	4	8	25
30	Reasons			
	Mentions specific problem	1	77	49
	There is a crisis in certain areas	2	12	14
	If something isn't done, there will be a crisis....	3	8	20
	Other reasons	4	0	7
	No reasons given	5	4	10
31	If specific problem is mentioned, what is that problem(s)?			
	Population	1	19	22
	Air pollution	2	8	5
	Water pollution	3	8	2
	Land pollution	4	0	0
	Pollution in general	5	12	15
	Awareness, education, attitudes	6	27	14
	Scarcity (resources, food production, space)	7	15	3
	Other problems	8	0	10
	Not applicable	9	12	29
32	Is there an ecological crisis in the Pacific Northwest?			
	Yes	1	46	24
	No	2	15	14
	Don't know	3	8	9
	Not yet, not as bad as other places	4	31	54
33	Reasons			
	Mentions specific problem	1	50	49
	There is a crisis in certain areas	2	35	32
	If something isn't done, there will be a crisis ...	3	15	7
	Other reasons	4	0	7
	No reasons given	5	0	5

<u>Column</u>	<u>Categories</u>	<u>Code</u>	<u>Informant (%)</u>	<u>Random (%)</u>
34	If specific problem is mentioned, what is that problem(s)?			
	Population, or population and pollution	1	19	19
	Air pollution	2	12	10
	Water pollution	3	15	14
	Land pollution	4	0	0
	Pollution in general	5	12	19
	Awareness, education, attitudes	6	0	3
	Scarcity (resources, food production, space)	7	15	3
	Other problems	8	4	9
	Not applicable	9	23	24
35	Do you think man's survival is endangered?			
	Yes	1	58	54
	Yes, if keeps going	2	15	12
	No	3	0	9
	Not yet, getting to be ...	4	12	12
	Not applicable	6	15	14
36	Are you optimistic or pessimistic about man's chances?			
	Optimistic	1	35	46
	Pessimistic	2	50	22
	If things done, optimistic, if trend continues, pessimistic	3	8	10
	Not applicable	4	4	14
	Don't know	5	4	9
37	Reasons			
	Mentions specific problem	1	31	39
	Depends on man's attitudes, awareness, and concern ...	2	39	10
	Will depend on man's adaptation	3	15	14
	The crisis is in the future	4	4	10
	Other reasons	5	0	14
	Not applicable	7	12	14

Column	Categories	Code	Informant (%)	Random (%)
38	Why are you optimistic or pessimistic?			
	Man has or will find solutions	1	31	48
	Adaptation (living vs. survival)	2	8	12
	Mentions particular problem	3	4	5
	Not applicable	4	35	24
	Other reasons	5	23	12
39	Why did you sign up for the ecology course? (informants)			
	Interested in subject of ecology	1	39	
	Wanted to learn more about the problems	2	15	
	To learn more, to help....	3	15	
	Credit requirements, choice of courses available	4	15	
	Other reasons	5	12	
40	What is the major emphasis of your ecology course? (informants)			
	Knowledge (made aware of problems)	1	42	
	Learning about problems and doing something about them	2	39	
	People's attitudes need changing about the crisis	3	8	
	Other reasons	4	12	
41	Did you know the ecology course was being offered? (random)			
	Yes	1		80
	No	2		17
	Other reasons	3		4
42	Reasons for not taking course?			
	Wanted to take another ...	1		20
	Didn't sound interesting..	2		15
	Other requirements.....	3		10
	Didn't understand it	4		7
	Could learn elsewhere.....	5		2
	Heard things about course.	6		10
	Other reasons	7		14
	Not applicable	8		15
	No reasons given	9		7

Column	Categories	Code	Informant (%)	Random (%)
43	Will you take the course next year? (random)			
	Yes	1		19
	No	2		49
	Don't know	3		14
	Not applicable	4		2
	No response	5		15
44	Readings in ecology that have influenced you?			
	Little or no reading	1	8	31
	Mentions specific books, articles	2	65	27
	Few articles, magazines ..	3	15	22
	Mentions specific magazines	4	4	3
	Class lectures, discussions	5	4	2
	Can't remember	6	4	15
45	Involvement in ecological activities, <u>in school</u> ?			
	Earth Day (attended or did something that day).....	1	23	41
	School organizations	2	8	?
	{ Long-term activities	3	15	0
	{ Short-term activities	4	12	0
	{ Course involvement	5	27	5
	No involvement	6	15	48
46	Involvement in ecological activities, <u>outside of school</u> ?			
	{ Very involved and tries to convince others to be	1	19	0
	{ Very involved	2	8	0
	{ Partially involved and tries to convince others to be ..	3	39	10
	{ Partial involvement.....	4	23	25
	{ Little or no involvement..	5	12	64
47	How did you become ecologically involved?			
	Not applicable.....	1	12	71
	Through other people, or friends.....	2	8	3
	{ Through course/teachers...	3	46	7
	Through parents.....	4	12	12
	Through the media.....	5	4	5
	Other ways.....	6	19	2

Column	Categories	Code	Informant (%)	Random (%)
48	Why did you become ecologically involved?			
	Not applicable	1	35	85
	Through another person:			
	friend, teacher, parent...	2	4	2
	Readings or the media.....	3	0	3
	Concern for environment...	4	42	7
	Through the course.....	5	12	0
	Other reasons	6	8	3
49	Have other students become involved for same reasons as you?			
	Yes	1	46	3
	Qualified yes	2	15	2
	Don't know	5	12	3
	Not applicable	6	15	90
	Other reasons	7	12	2
50	What are other students doing?			
	Don't know	1	12	5
	Mentions specific names...	2	39	2
	Knows of others, no names	3	23	0
	Not applicable	4	8	92
	Other responses	5	15	2
51	Would they agree with your choice of ecological problems and your concern?			
	Yes	1	23	2
	Qualified yes	2	27	7
	No	3	8	2
	Qualified no	4	12	0
	Don't know	5	23	0
	Not applicable	6	4	90
	Other reasons	7	4	0
52	What specifically are you doing, or willing to do, to change your life style?			
	Many spontaneous responses	1	77	37
	Mostly prodded responses..	2	23	63
53	Specifics on mass transit			
	Would support it, pay taxes	1	62	66
	Supports mass transit, not paying taxes for it	2	19	31
	Other responses	3	0	3
	Not applicable	4	19	0

Column	Categories	Code	Informant (%)	Random (%)
54	Specifics on limiting family			
	Would limit family to two	1	89	75
	Would not limit family....	2	8	20
	Not applicable	3	4	0
	Other responses	4	0	5
55	Specifics on recycling			
	Would recycle	1	50	54
	Would not recycle, would if had to (not on own)	2	4	22
	Not applicable	3	46	22
	Other responses	4	0	2
56	What are your leisure activities that take place outdoors?			
	Outside, away from home activities (hike, fish, backpack, hunt)	1	31	14
	Athletics	2	23	29
	Outside, around home activi- ties (walk, yardwork, play with animals).....	3	31	34
	Other responses	4	4	10
	Combination of 1 and 2 ...	5	8	5
	Not applicable	6	4	9
57	Where do you spend most of your time?			
	Indoors	1	12	15
	Outdoors	2	69	51
	$\frac{1}{2}$ and $\frac{1}{2}$	3	12	34
	Not applicable	4	8	0
58	What opportunities have you had to go to wilderness areas?			
	Many opportunities	1	69	42
	Few opportunities	2	31	58
59	What kind of camping do you do, if you camp?			
	Tent camps or backpacks ..	1	62	41
	Trailer camps	2	4	22
	Does not camp	3	15	31
	Not applicable	4	19	7

Column	Categories	Code	Informant (%)	Random (%)
60	Extent of travels?			
	Little travel	1	12	7
	Oregon and Washington	2	0	10
	Pacific Northwest and California	3	42	54
	USA, traveled extensively.	4	19	22
	Not applicable	5	27	7
61	Number of times you visit the city of Portland?			
	1X week	1	23	15
	2-3X week	2	19	22
	2X month	3	4	10
	1X month	4	8	17
	Hardly ever	5	0	14
	Not applicable	6	31	20
	Yes	7	15	2
62	Are there any ecological problems in your neighborhood? What?			
	Mentions a specific problem (slew behind our house)....	1	54	27
	General problem (air pollution)	2	27	24
	No problems	3	19	49
63	Have you or any family member made any effort to correct these ecological problems?			
	Yes, specifically did something	1	19	22
	No	2	65	31
	Not applicable	3	15	48
64	Is there any ecological problem that would concern you enough that you would become actively involved?			
	If it affected me personally, got really close to me	1	12	10
	There's nothing one person can do	2	8	5
	If it gets bad enough	3	8	7
	{Mentions specific problem or organization to join	4	27	2
	No, don't know	5	0	24
	Other responses	6	12	19
	No response	7	4	0
	Mentions general problem (air pollllution, population)	8	31	34

Column	Categories	Code	Informant (%)	Random (%)
65	What does the word "ecology" mean to you?			
	The environment, study of the environment, nature...	1	27	32
	Conservation, preservation of our environment	2	12	14
	The problems, condition of our environment	3	8	14
	Interrelation of species...	4	15	5
	Balance of nature, balanced ecosystems	5	15	9
	Other responses	6	4	3
	Don't know	7	0	10
	Mentions specific problems	8	19	14
66	Suggestions for a course in ecology to make students aware, concerned, and involved?			
	Field trips to see how bad it is	1	19	29
	Course serves the purpose	2	31	15
	Speakers, specialists.....	3	8	9
	Get involved	4	15	5
	No ideas	5	8	19
	Not applicable	6	15	19
	Other reasons	7	4	5
67	If you took the course, what would you like to learn?			
	What an individual can do, how to get involved	1	12	14
	Mentions a specific problem	2	19	24
	Learn how bad the problems really are	3	15	22
	Learn what needs to be done (costs, laws).....	4	0	12
	Other responses	5	15	3
	No ideas, not interested..	6	0	17
	Not applicable	7	39	9

RANKING OF PICTURES (Deck II)

28-43	Ranking of pictures in order			
44 (17)	What does the picture represent?			
	Overpopulation, population explosion	1	100	90
	Other	2	0	10

Column	Categories	Code	Informant (%)	Random (%)
45	Why is population a problem?			
	Social problems (unrest, jobs)	1	8	12
	Crux of other problems ...	2	54	20
	Problem of scarcity (food, resources, space).....	3	31	37
	Not a problem (something else is)	4	8	5
	Other problems	5	0	15
	Not applicable	6	0	10
46	Does the U.S. have a population problem?			
	In certain areas (cities)	1	8	29
	Yes, all over	2	50	19
	It will have one, if keeps going as is	3	0	17
	Partially, not as bad as other countries	4	8	17
	Other reasons	5	4	5
	Not applicable	6	31	14
47 (20)	What does the picture represent?			
	Air pollution, industrial pollution	1	96	98
	Other	2	4	2
48	Why is air pollution a problem?			
	Affects life - health and survival	1	35	75
	Economic reasons (apathy by industries).....	2	42	10
	Other reasons	3	23	15
49	Who is responsible for doing something about the problem?			
	The government (laws).....	1	12	5
	People who do the polluting and if they don't, the government.....	2	15	44
	Everybody (people, factories, government).....	3	50	41
	Government through the people	4	15	7
	Not applicable	6	8	0

Column	Categories	Code	Informant (%)	Random (%)
50 (19)	What does the picture represent?			
	Water pollution	1	85	78
	Other	2	4	14
	Don't know	3	12	9
51	Why is water pollution a problem?			
	Water needed for life (fish, source of food for humans).	1	46	57
	Attitudes and actions of people (economic, ignorance, don't care)	2	46	17
	Not applicable	3	4	5
	Other reasons	4	4	20
52	Does it bother you to see a dead fish?			
	Yes, like fishing, fish alive	1	12	15
	Useless killing - a waste and repercussions for the life cycle	2	31	39
	Yes, don't like to see dead animals	3	8	9
	If continues, could be man	4	4	9
	No	5	0	14
	Not applicable	6	31	10
	Other reasons	7	15	5
53 (2)	What does the picture represent?			
	Litter, land pollution ...	1	77	100
	Other	2	19	0
	Not applicable	3	4	0
54	Why is litter a problem?			
	Ruins beauty, gives bad impression	1	39	49
	Disposal problems.....	2	19	7
	Hazard (health, accident, fire).....	3	8	20
	Other reasons	4	31	10
	Not applicable	5	4	14
55	Why do people litter?			
	Attitudes and actions(don't care, laziness, ignorance)	1	85	86
	Not enough containers	2	4	7
	Other	3	4	5
	Not applicable	4	8	2

Column	Categories	Code	Informant (%)	Random (%)
56	Do you litter?			
	Yes, think about it more, less than before	1	19	32
	Yes, nothing big.....	2	4	14
	No	3	31	32
	No, when I think about it.	4	8	12
	Not applicable.....	6	39	10
57 (7)	What does the picture represent?			
	The earth, world, planet..	1	58	66
	The world and all its problems	2	12	10
	Don't know, don't under- stand	3	0	7
	Other	4	12	7
	Space program	5	12	9
	Air pollution, smog	6	8	2
58	Ecological pictures associated with this picture?			
	No, no problems	1	4	17
	Think of all the problems, or mentions some	2	39	42
	Most important thing, represents everything.....	3	15	15
	How beautiful it is from a distance (how we want it to be, what it used to be)...	4	19	10
	Other	5	23	10
	Not applicable	6	0	5
59 (8)	What does the picture represent?			
	Space program, rocket	1	35	54
	Technology, progress.....	2	19	9
	Pollution of some kind....	3	8	22
	Waste of money	4	35	12
	Other	5	4	3
60	Any ecological problems in picture? Are you in favor of the space program?			
	Wastes money which could be used on earth's problems..	1	62	37
	New place of inhabitation.	2	8	17
	Creates pollution	3	8	12
	Search for knowledge	4	8	12
	Other	5	15	7
	No problems	6	0	15

Column	Categories	Code	Informant (%)	Random (%)
61 (15)	What does the picture represent?			
	Enjoyment, fun, recreation	1	19	27
	Don't know, don't understand	2	12	15
	Dune buggies on the beach	3	12	17
	Other.....	4	19	15
	No problems	5	4	3
	Need for open spaces, undisturbed places	6	8	14
	Fun, but ruining land.....	7	27	9
62	Ecological problems associated with picture?			
	No problems	1	0	31
	Land problems, tearing up the land	2	19	12
	Not hurting the land because it's desert.....	3	23	9
	Noise pollution, need for quiet areas.....	4	23	12
	Air pollution, oil slicks	5	8	12
	Other	6	23	20
	Not applicable	7	4	5
63 (3)	What does the picture represent?			
	Don't know, don't understand	1	0	10
	Boy trying to understand plant, watching it grow...	2	12	25
	Importance of the relationship of man and nature.....	3	23	15
	Next generation and their life on earth (both boy and plant are starting life)..	4	23	17
	Boy looking sad (last plant on earth, plant won't grow)	5	31	20
	Other.....	6	12	12