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ABSTRACT

The material contained in this document is the result of an Education Professions Development Act Grant awarded to Miami-Dade Junior College for the fiscal year 1972. Much of the material was developed in a two-week teacher training workshop held in July, 1972, in Miami Beach, Florida. In this session, 46 faculty members from across the country, consultants, and workshop staff contributed initial input for this document. The material in this book is intended to expand the format of the "Man and Environment Revised Curriculum" by making this more useful for teachers to teach the various topics. Over 30 topics are covered in the publication, including value systems, pollution, population dynamics, and economics. Every topic is then subdivided into alternatives. Each alternative is composed of an overview containing background information on the topic, the basic concept to be learned, student learning objectives, and teaching/learning strategies. Contained within this book are a multitude of ideas about how elementary and secondary grade teachers may present the modular topics of Man and Environment in an interdisciplinary framework. The book is designed as a supplement to other Man and Environment and ecological materials. (Author/MA)

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MAN AND ENVIRONMENT TEACHING ALTERNATIVES

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ENVIRONMENTAL EDUCATION INFORMATION REPORTS

Environmental Education Information Reports are issued to analyze and summarize information related to the teaching and learning of environmental education. It is hoped that these reviews will provide information for personnel involved in development, ideas for teachers, and indications of trends in environmental education.

Your comments and suggestions for this series are invited.

John F. Disinger
Associate Director
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FOREWORD

The material contained in this book is the result of an Education Professions Development Act Grant awarded to Miami-Dade Junior College for the fiscal year 1972. The majority of the material was developed in a two-week teacher training workshop held in July, 1972, in Miami Beach, Florida. In this session forty-six faculty members from across the country, consultants and workshop staff contributed the initial input for this document.

The starting point for this document was the Man and Environment Revised Curriculum which was developed in previous environmental education workshops in Denver, Colorado (June, 1970), and Las Vegas, Nevada (November, 1970). The material in this book is intended to expand the format of the Man and Environment Revised Curriculum in terms of making this more usable for teachers to teach the various topics.

There is no one author to this book. All of the various people who have contributed to the production of this document are listed in the introductory pages of this document.

The process for developing the bulk of the material took place in an intergroup process in which faculty members defined and offered suggestions regarding how the various modules could best be taught. Consultants with specialized knowledge, and group facilitators, contributed to the developmental process. At the conclusion of the workshop the materials were typed in a preliminary form, and sent to all participants. After that occurred it became clear that some modules were not treated as thoroughly as others, and that some topics were not covered at all in the workshop. In order to fill the void in these areas, specialized outside consultants with expertise in specific areas were contracted with in order to supplement the materials developed in the two-week workshop session. After this was accomplished, another group with expertise in the area of environmental education were assembled to review and critique this document. After the critical analysis session, an editor was secured to put the book into its final form. The cumulative results of all of these efforts are contained in the Man and Environment Teaching Alternatives.

ACKNOWLEDGEMENTS

The Man and Environment Teaching Alternatives has been the result of a vast number of individuals' concern toward developing meaningful environmental education teaching materials. The excellent cooperation from the U.S. Office of Education in working on the implementation of the Education Professions Development Act Grant that funded this project, and in particular the efforts of Dr. John Peo in the Division of College Support, and Dr. George Lowe in the Environmental Education Office, must be cited.

I wish to gratefully acknowledge the President of Miami-Dade Community College, Dr. Peter Masiko, Jr., who allowed the institution to commit its resources and its staff toward this important project. I would also like to recognize all the members of Miami-Dade Community College who served as staff to the project, particularly Dr. Carol Zion and Mr. Howard Weaver. The work of Dr. J. Terence Kelly, as Assistant Project Director, especially must not go without recognition. Also, the efforts by Ms. Doris Lyons, an administrative intern from The University of Tennessee, who served as Research Associate, and who did all of the preliminary editing, deserve to be highlighted.

The amount of typing necessary to put this document in various stages of development, including a quick turn-around preliminary product, a first draft, and then a final production, required the excellent work of a number of quality secretaries at Miami-Dade. These individuals, who worked both in typing and proofreading, and who did an excellent job, are Edith Heath, Grace Metz, Janet Evans, Virginia Tyler, Jackie Lyons and Joan Sarandon.

Dr. Robert H. McCabe
Project Director

DISCLAIMER

The project presented or reported herein was performed pursuant to a grant from the U.S. Office of Education, Department of Health, Education and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Office of Education, and no official endorsement by the U.S. Office of Education should be inferred.

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HOW TO APPROACH THE USE OF MAN AND ENVIRONMENT TEACHING ALTERNATIVES

Contained within this book are a multitude of ideas about how teachers may present the modular topics of Man and Environment in an interdisciplinary framework. This book has not necessarily been developed to stand by itself. It is envisioned that these curriculum materials and suggestions on how to teach the course would be an excellent supplement to other Man and Environment and ecological materials.

Objectives are stated more in general terms than in behavioral terms, which may make some teachers uncomfortable. However, in this approach there is a great deal of flexibility which the teacher may apply in terms of deciding to what degree and how well students ought to master various concepts. This also encourages teachers to take the general objectives and work them into more specific behavioral or performance type of objectives. Another area in which the book may not be consistent is the fact that the objectives under some concepts may not directly relate. This same principle would apply for some of the teaching/learning strategies. This is the result of a multitude of authors working on a product of this type.

Objectives and teaching/learning strategies, while falling under a particular concept, may have application not only to that concept in the module, but also to many others. For this reason, teachers should not get disturbed that in specific instances things don't seem immediately to fit. Teachers should also keep in mind that students might not always achieve objectives, either because the teaching/learning strategies are not comprehensive enough to allow them to get there, or for a variety of other reasons. An important thing to keep in mind when approaching a particular unit is to review all the various alternatives presented in this book to teach the module. In this way, there may be added strength in picking and choosing those strategies which seem to you as a teacher to have the greatest strength in allowing students to achieve desired objectives. This suggests that perhaps teachers may want to compile another alternative, essentially a combination of various parts of all the alternatives presented in this book on a particular module. The teaching/learning strategies may be regarded as simply suggested ways to get students to meet the objectives. Naturally, the teacher is free to supplement any of the teaching/learning strategies with other approaches to ensure that students do reach the objectives to the level which the teacher decides.

It is also important to recognize that the teaching/learning strategies, when reading them, may be interpreted as specific things for students to do, or specific things for teachers to do, or sometimes they may be applicable to both the student and the teacher. Again, the teacher is free to use the teaching/learning strategies in any way which seems to be most beneficial to the learning experience the teacher wants to have the students undergo.

In essence, the emphasis on developing this book has been an accumulation of a tremendous amount of ideas about what is important in the Man and Environment curriculum; what some of the objectives are that teachers should have students work toward; and some ways in which they may achieve these objectives. Approaching the book from this perspective will allow a teacher to derive the maximum benefit from this type of curriculum document.

J. Terence Kelly
Editor

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MAN AND ENVIRONMENT
TEACHING ALTERNATIVES

ENVIRONMENTAL IMPERATIVES

Alternative #1

OVERVIEW

This module attempts to convey the following: 1) A clear understanding that man is an inseparable part of the environmental system in which he exists; 2) man's technology alters the interrelationship of this system; 3) an appreciation of the environment, both natural and man-made; 4) a fundamental knowledge of the problems confronting man, ways to solve these problems, and the need for citizen and governmental partnership in working out solutions; and 5) attitudes, ethical standards and behavior patterns which will foster citizen commitment and action now to overcome the environmental crisis and to improve the quality of life in the future.

CONCEPT

MAN IS AN INTEGRAL PART OF THE ENVIRONMENT, AND, THEREFORE, HE MUST UNDERSTAND THE INTERACTION AND INTERDEPENDENCE OF THE ELEMENTS WHICH MAKE UP AN ECOSYSTEM.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define an ecosystem.

Describe the elements of a food web with man as the top order consumer.

Discuss a number of adverse environmental changes which would have immediate and/or cumulative impact on man as a species.

TEACHING/LEARNING STRATEGIES

Prepare a number of case studies showing man's interdependence with the environment.

(Let some be the result of a physical catastrophe, such as an earthquake or a volcanic eruption with consequent disease, social migrations, etc.)

(Let the others be the long-range consequences of man's activities.)

CONCEPT

MAN MUST UNDERSTAND THE INTERRELATIONSHIPS BETWEEN ORGANISMS AND THEIR ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explain man's involvement in the biogeochemical cycle - nitrogen, carbon, and water.

Define the term "ecology."

Identify three types of relationships that exist within any ecosystem.

TEACHING/LEARNING STRATEGIES

Verbally (or with film) trace CO₂ through the cycle including man's overload of CO₂ through combustion of fossil fuels.

Trace a water drop from a snowflake in Minnesota to a mild solution of sulfuric acid in Philadelphia.

Work a food web "backwards" from whatever the student ate at his last meal.

Put a food web together based on what students know about a specified geographical area.

Compare food webs for different cultures with different eating patterns; e.g., Eskimo vs. Hindu.

Identify the waste products from fossil fuels (combustion) and trace these by-products.

Define a specific geographical area, and let the students identify ecological relationships in that area; e.g., school playground.

Bring in a praying mantis to eat a grasshopper.

Examine parts of an ecosystem (consumer, producer, competitor), and manipulate and order the components to construct a model.

Use game strategies and simulation/extinction, predator/prey relationships. Other games: "Man and Environment Game," "Pollution Game."

Cut up paragraphs from essay - give to students - let them reassemble in some order.

CONCEPT

IN ORDER TO SURVIVE, MAN MUST CONSERVE THE FINITE RENEWABLE AND NON-RENEWABLE RESOURCES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Differentiate between renewable and non-renewable resources.

Understand in depth at least three renewable and three non-renewable resources.

Identify four or more resources which may not be available fifty years from now.

Describe ways in which resources used yesterday might be better used tomorrow.

TEACHING/LEARNING STRATEGIES

Create a situational play for what life will be like when we run out of fossil fuels - what are the long term consequences of the loss - what effect on establishing priorities in usages, etc. - from the perspective of hindsight.

Role play conflicting interests in setting priorities for use of fossil fuels (industry, consumer, power companies, drug manufacturers, etc.).

Develop the Space Ship Earth concept - compare to long-range space travel - recycling, waste disposal, etc.

CONCEPT

MAN MUST LEARN TO REVISE HIS SHORT-TERM VALUE SYSTEM TO ACCOMMODATE HIS LONG-TERM NEEDS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explain how various civilizations achieved success through environmental degradation, and eventually caused their own downfall.

Demonstrate how a country uses resource management. Positive or negative implications; e.g., Japan, Israel, Holland.

Identify and relate ways in which a local mismanagement of one resource has created an ecological crisis affecting future generations.

TEACHING/LEARNING STRATEGIES

Search the literature and share in class discussion of areas that are now "semi-Sterile" that were once biologically productive (forest or grasslands to desert - discuss the role of man).

Let students in small groups design a strategy to illustrate short-term value systems which accommodate long-term needs. Each group would use a different value to be identified by the group.

ENVIRONMENTAL IMPERATIVESAlternative #2OVERVIEW

This module deals with the basic contention that it is imperative that man must recognize his vital part in the ecosystem, and function within that system as a knowledgeable, concerned and responsible individual, in order to maintain a balanced environment. Because all of man's activities have an effect on the quality of the environment, it is imperative that those behavior patterns and attitudes producing negative consequences to the ecosystem be understood and eliminated, and those producing positive results be likewise understood and reinforced. The solution to present problems, and the insurance of sound environmental conditions in the future, depend upon all facets of society harmoniously working together for the common good of all.

CONCEPT

MAN IS AN INSEPARABLE PART OF THE SYSTEM CONSISTING OF MAN, HIS CULTURE, AND THE NATURAL ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define "culture".

Define "ecosystem".

Identify the major components of an ecosystem.

Analyze information to determine the impact on the natural environment of the different cultures; e.g., the agrarian culture of the U. S. in the late 1800's vs. the post-World War II industrial culture; the culture of a selected tribe of American Indians vs. the culture of the European immigrants in the early 1800's, etc.

Explain why a coastal salt marsh is an environment vital to man.

TEACHING/LEARNING STRATEGIES

Select and visit an example of a virgin or slightly modified natural environment to examine the components of an ecosystem.

Divide the students into small groups. Each group will select one culture to use in debating the statement, "The _____ culture has/had a more detrimental impact on the environment than the _____ culture." Half of the group is to assume the affirmative position and half the negative. The debate should generally follow debate rules. Each affirmative speaker will make a three minute presentation; each negative speaker will make a three minute presentation, and then there will be a three minute rebuttal for each side.

CONCEPT

MAN'S CULTURE, INCLUDING HIS TECHNOLOGY, CREATES CONDITIONS THAT MAY RESULT IN AN IMBALANCE WITHIN THE ECOSYSTEM.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand coastal changes that have resulted from inland development.

Determine the effects of an up-river community on a down-river natural environment.

Explore the impact of imposing a particular culture on each of the components of an ecosystem.

Demonstrate how the automobile is polluting the air, and discuss technological solutions.

Identify the number and types of non-returnable containers.

Explain ways in which the demand for electrical power has changed man's culture and the natural environment.

Determine how large-scale scientific farming has enabled our country to grow more food than it needs, but how monobiotic farming can have negative consequences.

TEACHING/LEARNING STRATEGIES

Match environmental problems with the culture origin of the problem: automobile, demand for electrical power, non-returnable containers, monobiotic farming, and sewage disposal. Relate specific problems to more than one origin, i.e. depletion of fossil fuel reserves is attributable to more than one cultural origin--electrical power, industry, automobile, etc.

Propose technological or "life style" solutions for each of the paired "problem-origin of problem" categories identified above.

The students should design and implement a series of simple experiments to measure the impact of a technological culture on components of the ecosystem. Water test kits and soil test kits are available. Bottled "smog" is available--different materials can be dropped into the bottles to observe the effect.

Testing for fecal contamination of lakes and rivers is very simple with a special agar that contains a dye indicator. Observation of acids on rocks or phosphate detergents in containers of pond water, etc., are simple and can be related to technological by-products.

Successful completion of this exercise requires that students be able to identify the components of an ecosystem to identify some of the major by-products of a technological culture, and devise a simple experiment to test the effect of one or more by-products on some components of the ecosystem.

CONCEPT

RESTORING BALANCE WITHIN THE ECOSYSTEM REQUIRES THAT MAN'S ATTITUDES, ETHICAL STANDARDS AND BEHAVIORAL PATTERNS BE MODIFIED SO THAT THE STRESSES PLACED ON THE ECOSYSTEM WILL BE REDUCED.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand man's historical rationale concerning unrestricted utilization of natural resources.

Explore the attitudes of two or more societies exhibiting a compatibility with the environment.

Hypothesize alternatives to those attitudes which are presently incompatible with harmonious relationships within an ecosystem.

Identify ethical standards which will help improve the environment.

Determine behavioral patterns which will help improve the environment.

TEACHING/LEARNING STRATEGIES

After identifying several attitude sets and behavioral patterns that are incompatible with a quality environment, students should monitor TV programs and commercials, and other advertising to see if these attitudes are being created or reinforced by the media. The student should then write letters to the public relations departments of the sponsoring companies to protest the advertising. Each letter should be reviewed by faculty so that it is written in good taste. The letter is to be followed up within at least two weeks, either to solicit a response (if none was obtained), or to press a little harder for removal of the offensive advertisement.

Examine some specific resource management policies for your region, and evaluate them for comprehensiveness.

CONCEPT

INDIVIDUALS AND GOVERNMENTAL AGENCIES MUST WORK TOGETHER TO RECOGNIZE AND SOLVE ENVIRONMENTAL PROBLEMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand how sewage treatment systems, where properly financed and installed, could enable man to recycle water and help keep the environment cleaner.

TEACHING/LEARNING STRATEGIES

If sewage treatment facilities in the local community are inadequate (and most are), students should find out what steps are necessary to bring it up to tertiary treatment (to handle at least phosphates and nitrates). How much would it

STUDENT LEARNING OBJECTIVES (Cont'd)

Define the functions of a political system insofar as these pertain to man and environment.

Identify the types of environmental problems dealt with by governmental agencies.

Compare specific responses of the political systems of the U. S. and the Soviet Union to various environmental problems.

Consider individual actions that could be effective in influencing governmental response to environmental problems.

Determine ways that community colleges or universities can be a catalyst for solving community environmental problems.

TEACHING/LEARNING STRATEGIES (Cont'd)

cost? What are the obstacles? What agencies are involved in making decisions here?

Small groups within the class might each select a different environmental problem pending (or recently resolved) in their state or local community. Each group should develop a case study of the problem. The case study should include information such as:

- a. the history of the problem;
- b. a list of the agencies that are involved in making decisions related to the problem (this is always a surprising number);
- c. the role of individuals or conservation groups;
- d. the action taken or the proposed alternative actions.

Where possible, students should interview agency representatives and/or individuals active in seeking solutions to the problem.

THE NATURE OF MAN

Alternative #1

OVERVIEW

This module is designed to introduce the student to the profound human issues involved in the examination of the relationship between man and the environment. The study of the environment and the growth of ecological awareness cannot rely just on the data of the natural sciences, though these are fundamental in studying man and the environment, but also have to include a genuine understanding of man and of man's fundamental relation to nature and the environment. Man's understanding of himself and of his own task in the world is the root of his constructive attitudes toward his fellow man and the environment. At the same time a confusion of man regarding his own nature and his own task diminishes the chances of a consistent response to the human and natural environment, and leads to a destructive or indifferent attitude toward his world and surroundings.

The main issue to be discussed in this module, then, should be the genuine understanding of man's nature and of his place in nature. What is man? What is his relation to, and role in, the environment? The study of these problems involves all the different levels of human knowledge: the scientific, the historical, the philosophical, the psychological, and the religious perspectives. Many serious thinkers (scientists and philosophers) suggest that, in spite of all the accumulation of information about man, we still experience an anarchy of thought regarding the nature of man precisely because the wealth of information is not necessarily a wealth of insight (cf. Cassirer). "What is man?" -- should be recognized then as the most urgent and the most challenging question we may ask.

The most crucial effort of the study of the nature of man should be the following: to open one's mind toward the most basic insights on the nature of man according to the different perspectives of human knowledge. A contemporary analysis of man indicates that man is in nature, and, thus, he is a part of the natural environment; man is an animal, he has a biological structure with physical and chemical processes. However, as the contemporary analysis continues, man is not just in nature, he is not just an object, but also a subject; he is somehow an outsider in nature through his awareness of himself and of his environment. There is a personal, a social, a psychological, and even a religious dimension of man's nature. This fact of being an outsider in nature, however, does not exempt man from his relation to the environment, but much rather, it emphasizes the fact that man (through his awareness and free choice) has a responsibility toward the environment; his relationship should be the result not just of preconditioning, but also of his own decisions -- he establishes his own attitudes.

From this, one can understand that the role of man is crucial in studying the environment precisely because man, through his own attitudes, has the potentiality of becoming a despotic master or the responsible guardian of the environment.

CONCEPT

MAN'S AWARENESS OF HIMSELF AND OF HIS ROLE IN THE WORLD IS THE MOST BASIC SOURCE OF HIS DIFFERENT ATTITUDES TOWARD HIS HUMAN AND NATURAL ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the reasons for, and the sources of, man's different attitudes toward his human and natural environment.

Comprehend the fact that man's attitudes toward the environment are the outcome of his view of himself (of his own nature), and of his role in the world.

Determine attitudes toward fellow man and the environment reflecting understanding of himself, and of his role in the world.

TEACHING/LEARNING STRATEGIES

Have the students spend twenty minutes in a public park and observe the behavior of different persons passing through the park:

- a. how children play;
- b. how older people relax;
- c. how the young walk and talk;
- d. how some people become destructive;
- e. how many people like to contemplate and enjoy nature.

The students will give reports on their observations, and will indicate some possible explanations of the types of behavior they were able to observe.

Have the students interview two of the most interesting persons observed in the above-mentioned strategy, and, thus, discover, 1) how these people view themselves, and 2) how these people view their task in living. Furthermore, the students will request an answer for the question, "What is man?" As a result of this interview, the students will explain the relationship between the self-image and the view of man these people have, and their behavior and attitudes in passing through the park.

Have the students write an essay on why so many persons remain indifferent toward environmental issues.

Have students identify one of their personal attitudes toward the environment, and explain how this attitude can be understood in the light of their own view of themselves, and of life in general.

TEACHING/LEARNING STRATEGIES (Cont'd)

Compare the industrialized and the agricultural society's attitudes toward nature and the environment. Students will relate the different attitudes to the different views of man held by the industrialized and the agricultural society.

Have the class visit an art gallery, and find some works of art which illustrate the medieval man's and the modern man's attitudes toward the environment. Have the students compare these two types of man.

Have students draw or find a picture to illustrate the attitude of the farmer, the travel agent, the businessman and the airline pilot toward nature and the environment.

CONCEPT

THE UNDERSTANDING OF THE NATURE OF MAN CANNOT BE BROUGHT ABOUT BY A PARTICULAR DISCIPLINE ALONE, BUT ONLY THROUGH THE COOPERATION OF ALL THE BRANCHES OF HUMAN KNOWLEDGE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Evaluate the different approaches to interpreting the nature of man and his relationship to the environment.

Identify the different branches of human knowledge that are involved in studying the nature of man.

Describe the contributions of the different branches of knowledge to the interpretation of the nature of man.

TEACHING/LEARNING STRATEGIES

Have the students make an inventory of the different views of man taught to them in different courses in high school and college.

Have the students observe the television news commentary for an entire week, and identify the image of man implied. Have the students do the same thing for TV advertisements.

Collect from the local newspapers a series of political essays which reflect the capitalistic view of man.

STUDENT LEARNING OBJECTIVES (Cont'd)

TEACHING/LEARNING STRATEGIES (Cont'd)

Discover and appreciate the need for, and the role of, open-mindedness in constructing a coherent view of man and his basic relationship to the environment.

Read the Communist Manifesto, and point out what the communist view is on the nature of man.

Have the student indicate in discussion what views of man are contained in the writings of their favorite authors.

Give a short report on the nature of man according to the Bible, and the Constitution of the United States.

CONCEPT
MAN IS A PART OF NATURE AND AS SUCH IS RELATED TO NATURE AND THE ENVIRONMENT THROUGH HIS BIOLOGICAL CONSTITUTION.

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES

The student will be able to:

Explain the biological nature of man and of his natural relationships to the environment.

Describe and comprehend the animal nature of man.

Discuss the principle of man as living in, and being a part of, the animal and natural kingdom.

List three basic similarities between man and the other members of the animal kingdom.

Identify the two basic phenomena of life that are the same in man and the other animals.

Draw a picture in order to illustrate how man's biological nature preconditions his ways of living, and even his culture.

Have the class visit a museum of natural history, and identify five basic elements of the biological nature of man.

Present examples of how man's biological nature can be protected through a kind of living that is in harmony with nature, and is governed by an attitude of concern with the environment.

TEACHING/LEARNING STRATEGIES (Cont'd)

Discuss the ways air pollution harms the biological nature of man, and destroys the quality of human living.

Present examples of how sound pollution harms the biological nature of man, and destroys the quality of human living.

Have the students write an essay on how their biological nature needs to be protected when going through high school or college.

CONCEPT

MAN, THROUGH HIS PERSONAL, SOCIAL, PSYCHOLOGICAL AND RELIGIOUS CONCERNS, CAN TAKE INITIATIVE IN INFLUENCING THE CONDITIONS OF THE ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand that man is not just an object among other objects in the environment, but that he is at the same time a subject in the environment.

Appreciate the right meaning of the most human characteristics of man as a person.

Identify the ways man can take initiative in relating to his fellow man and the environment.

Discover the humanistic approach to environmental problems, and the role of human values in making environmental decisions.

TEACHING/LEARNING STRATEGIES

Have students write an essay on what the American Revolution indicates on the nature of man.

Have the class visit the local zoo, and have them indicate the two basic differences between the visitors and the inhabitants of the zoo.

Have the students write an essay on how culture and education influences man's environmental decisions.

Read and discuss in small groups some selected chapters from Erich Fromm's The Revolution of Hope, analyzing the nature of man and his relationship to a human environment.

TEACHING/LEARNING STRATEGIES (Cont'd)

Discuss human values involved in making environmental decisions.

Compare by research the Greek, the medieval, and the modern views of the nature of man.

Discuss how the Greek, the medieval, and the modern man differ in their attitudes toward the environment.

CONCEPT

MAN SHOULD NOT BEHAVE AS A DESPOTIC MASTER OF, BUT MUST ESTABLISH A HARMONY WITH, AND A RESPONSIBLE ATTITUDE TOWARD, NATURE AND THE ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Evaluate man's role in nature, and his attitudes toward the environment.

Recognize the need for recapturing today a sense of living in harmony with nature and the environment.

Determine and give examples of man's role as guardian of the environment.

Identify the ways man can be, and often was, a despotic master and exploiter of the environment.

TEACHING/LEARNING STRATEGIES

Read individually, and discuss in groups, Hermann Hesse's Siddhartha with particular attention to the description of the role of nature and the environment in human living.

List examples of how the industrial revolution affected man's attitudes toward the environment.

Visit a local farm, and determine whether the farmer's life is more in harmony with nature than the life of the suburbanite.

Discuss in groups what it means to live in harmony with nature.

Cite examples of ways in which man is exploiting nature, and being a despotic master of nature.

Relate three personal experiences of making or participating in a responsible environmental decision.

Write an essay on the nature of man, and the environmental responsibilities of contemporary society.

VALUE SYSTEMSAlternative #1OVERVIEW

This module is designed to show that man's behavior, having neither negative nor positive effects on the environment, is directly related to its value system. In order to describe and make this relevant to the present generation of students, it is necessary to examine past values of man and relate them to the present world environmental conditions. By doing this, it is anticipated that gaining an understanding of old values and their consequences will give way to understanding new values which will give promise to the attainment of an ecologically sound future.

CONCEPT

HISTORICALLY, MAN HAS VALUED EXPEDIENCY IN ATTAINING HIS GOALS WITHOUT REGARD TO HIS ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

- The student will be able to:
- Understand the principle of economic expediency, and the accompanying detrimental effects on the environment.
 - Understand political expediency, and its detrimental effects on the environment.
- Explore examples of political, economic, or personal expedient practices which have had detrimental effects on the environment. The analysis will include:
- a. a complete description.
 - b. the short-range effects on the environment.
 - c. the long-range effects on the environment.

TEACHING/LEARNING STRATEGIES

Review literature on the Four Corners Project near Fruitland, New Mexico and discuss the morality of generating power in a remote area and creating pollution in remote areas of New Mexico to produce power for California.

- a. Assign specific reading to students.
- b. Write to the New Mexico Environmental Improvement Agency for a list of studies and/or reports on the plants located in New Mexico.
- c. The objective of these plants is to produce cheap electric power. Comment on the fact that none of the electricity goes to New Mexico residents.

Review the Cross Florida Barge Canal Project from the perspective of:

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

- a. The Corps of Engineers
- b. Friends of the Earth
- c. Florida Defenders of the Environment

Discuss and review literature on dams built to generate electricity, reviewing:

- a. The impact on archeological sites.
- b. The impact on fish life migratory patterns and nitrogen levels in waters below these dams.
- c. Review the November 1972 issue of Outdoor Life (page 45) - "Requiem for the Rogue River" by Anthony Net Boy, and have students comment on the value of destroying one species of fish and replacing it with others.

Ask a guest speaker from the Pollution Control Department to discuss recent enforcement action:

- a. Discussing how violators have placed a higher value on economic goals than environmental quality.
- b. What economic actions were taken against violators.
- c. How were the economic sanctions determined?

Ask a local judge or have individuals interviewed by phone on specific closed cases concerning violations of environmental regulations. Questions should include:

- a. What type of evidence was considered?
- b. What kind of factors led to the ultimate decision?
- c. How were economic sanctions determined?

Research publications for examples of politically expedient decisions that had an adverse effect on the environment.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Ask students to prepare a list of public projects within their community.

- a. Determine the purpose and community value of these projects.
- b. Were the decisions to proceed political?
- c. Review news articles on the project.
- d. What segment of the community did the project serve?

Discuss the practice of expressway construction through depressed areas. Review the expressway map and compare the census data to determine if freeways were, in fact, placed through blighted or economically depressed areas.

As a class project, prepare uniform reporting sheets that can be used by students to determine their individual impact on the environment.

Conduct a panel discussion on how consumer practices have direct and indirect environmental impact, covering the following points:

- a. Production
- b. Use
- c. Disposal of waste

Prepare graffiti on poster board on how individual action can have impact on environmental quality.

Prepare a slide presentation on individual action versus environmental quality.

Write a song about environmental quality using popular music as a background.

Review a recent rezoning of land to higher density use.

- a. Describe the rezoning in relationship to adjacent land.
- b. List citizen opposition and major points reported on or discussed.
- c. Have students list potential adverse effects on water quality.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

The student will propose alternatives for at least three examples of expedient behaviors and practices. These alternatives must take into account:

- a. Feasibility
- b. Practicality
- c. Effect on the environment

CONCEPT

HISTORICALLY, MAN HAS VALUED THE PROFIT MOTIVE AND THE ACQUISITION OF MATERIAL WEALTH MORE THAN HIS ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine the ways that man, in the past, has justified the primacy given to the principle of profit in making human and environmental decisions.

Evaluate the harmful effects of the unlimited use of this principle in human history; in particular, he will examine the ways this principle has served man in rationalizing his lack of serious concern with nature and the environment.

Reassess his own attitudes toward the environment and acquire a sense of ecological responsibility to the present and the future.

TEACHING/LEARNING STRATEGIES

List at least three definitions of the profit motive as described by three different authors in Western Society.

Cite examples of man's attempts to give theological bases for the profit motive.

Conduct an open-ended interview with specific reference toward the profit motive with three religious leaders (Jewish, Protestant, Catholic).

Determine to what extent the profit motive operates in his life, citing specific examples of acquisitions or actions which are detrimental to the environment and which do or do not contribute to the profit motive.

List five personal possessions that either directly or indirectly contribute to the deterioration of the environment.

CONCEPT

HISTORICALLY, MAN HAS VALUED PLEASURE REGARDLESS OF ITS EFFECTS ON THE ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Evaluate the relationship between man's striving for pleasure and his attitude towards the environment.

Examine the ecological consequences of the present day increase of leisure time and the vacation industry as the contemporary application of the pleasure principle used in the past history of man.

Project some basic proposals (principles) for the establishment of harmony between man's needs and the respect of the environment in human living.

TEACHING/LEARNING STRATEGIES

Write an essay to explain how the shorter work week and longer work week have contributed to:

- a. decreasing environmental quality
- b. increasing environmental quality

Evaluate, using research data, the relative values of the shorter and longer work week reporting orally to his instructor in a personal conference.

Discuss in a ten minute oral presentation to the class the history of property rights and land use practices relative to the development of recreational sites. He will consider:

- a. marshlands
- b. offshore islands
- c. seashore

CONCEPT

MAN HAS A PROFOUND EFFECT ON HIS ENVIRONMENT. THEREFORE, HE CAN CONTROL, TO SOME DEGREE, HIS OWN DESTINY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Possess an awareness of the profound ecological impact of human activities and of human technologies.

TEACHING/LEARNING STRATEGIES

Discuss at least three scientific discoveries in the twentieth century which have had far-reaching positive effects on the quality of life on this planet.

STUDENT LEARNING OBJECTIVES (Cont'd)

Possess knowledge of at least three scientific discoveries in the twentieth century which have had far-reaching positive effects on the quality of life on this planet; e.g., nuclear fission.

Explore several negative effects for each of the discoveries learned above.

Research a neighborhood that has undergone change, and understand what improvements lead to a better environment.

Comprehend how man has affected his environment to such a degree that his unborn children will have to pay for their ancestor's actions.

Extrapolate from legislative action approved in the last 20 years at least four specific actions that prove man is capable of controlling the environment to some degree.

TEACHING/LEARNING STRATEGIES (Cont'd)

Discuss land use in terms of:

- a. consumption rate of agricultural lands.
- b. New planning schemes
- c. recent legislation

Review a yearbook of agriculture and report on the trends shown therein.

Prepare charts, posters or pictures of how man's progress has altered the environment of their community.

Review information on the number of autos in the United States and the amount of land dedicated to their use.

- a. Invite a city planner to speak.
- b. Invite a transportation planner to speak.
- c. Review your city's master plan to denote what percent of the land is devoted to the automobile.

Use city maps with overlays to show adverse impact of selected environmental degradation factors; i.e., noise from the airport or an expressway.

Assign students to list environmental legislation and individually report on specific aspects of that legislation.

CONCEPT

MAN MUST LEARN TO DISTINGUISH BETWEEN VALUES AND PREFERENCES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the term "value" as this impinges on environmental concerns.

Recognize the ways "preferences" may be differentiated from "values."

TEACHING/LEARNING STRATEGIES

Write and perform a skit with the main characters being "values" and "preferences" to resolve an environmental issue of local concern.

STUDENT LEARNING OBJECTIVES (Cont'd)

Examine the meaning of man's ecological responsibility and thus discover the role of human decisions involved in man's survival.

Draw some practical conclusions from his insights and indicate some immediate applications of his relationship to nature and human environment.

TEACHING/LEARNING STRATEGIES (Cont'd)

Build a model of the ten block area of your neighborhood changing ten characteristics in the model, which in your opinion prove to be improvements in the quality of that environment.

List five ways in which man has affected his environment to such a degree that his unborn children have to pay for their ancestors' actions.

Extrapolate from legislative action in the last 20 years at least four specific actions that prove man is capable of controlling the environment to some degree.

VALUE SYSTEMS

Alternative #2

OVERVIEW

This module attempts to convey the message that man's influence on the environment is in relationship to the values he possesses. To understand the central theme of this module, it is important to comprehend the fact that individual and societal values have not always been in the best interests of preserving a quality environment. Further, with an understanding of past values, and the implications that these have had for current environmental problems, hopefully, some alteration to the predominant set of values throughout the world may occur. Additionally, this module should provide opportunities for the student to identify and clarify his current values in light of present and future environmental concerns.

CONCEPT
A MULTIPLICITY OF CONFLICTING VALUE SYSTEMS EXISTS WITHIN VARYING CULTURES THROUGHOUT THE WORLD.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explain the meaning of human values and value systems.

Identify the most basic human values and give some examples of their practical applications in varying cultures.

Understand the reasons for the crisis of human values in contemporary society.

Identify some basic human values and explain the role these values play in shaping man's attitudes toward nature and the environment.

TEACHING/LEARNING STRATEGIES

Chart the differences that exist between conflicting value systems as they pertain to agricultural procedures. (e.g., Peruvian vs. American)

- a. sketch a diagram of agricultural garden plots in each system
- b. describe agricultural practices in each
- c. cite advantages of each.

Identify by a research project, one economic, one political, one sociological, one spiritual value relating to personal interaction with the environment.

Research two value systems in the United States which are in varying degree of conflict with the maintenance of a viable environment. (e.g., counter-culture)

CONCEPT

OUR ENVIRONMENTAL ACTIONS (INDIVIDUAL AND SOCIETAL) ARE THE RESULT OF THE VALUES WE AND OUR SOCIETY ACCEPT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize the influence of values upon our individual and social actions relating to our environment.

Discern the ways society develops and transmits a value system and thus influences the individual's actions regarding the environment.

Evaluate the utilization of mass media in promoting and changing human values and thus influencing society's ecological concerns.

TEACHING/LEARNING STRATEGIES

List five actions taken this morning that impinge upon the environment. Relate each action to our values.

Describe five TV commercials which attempt to create values in conflict with our environment.

Identify values promoted by TV programs which support the concept of a quality environment. The student will indicate some practical influences of these programs on his own actions during the last two weeks.

CONCEPT

VALUES ARE THE RESULT OF HISTORICAL, ENVIRONMENTAL, RELIGIOUS, POLITICAL AND OTHER SOCIETAL INFLUENCE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the different sources of values of both the individual and society; in particular, he will explain the ways many values originate from institutional, environmental, historical, religious, political, and societal factors.

TEACHING/LEARNING STRATEGIES

Present orally three (historical, environmental, religious, political) values which demonstrate man's continuing exploitive view of his interaction with the environment.

Compare political systems, both in this country and throughout the world, that are having positive or negative effects on the environment.

Contrast the values held by the Catholic Church toward birth control with those held by the Zero Population Group.

CONCEPT

SOME CURRENTLY ACCEPTED VALUES ARE IN CONFLICT WITH RESPONSIBLE ENVIRONMENTAL ACTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Describe the conflict that exists between many currently accepted values and a responsible attitude toward man's natural environment.

TEACHING/LEARNING STRATEGIES

Write a skit to depict how "keeping up with the Joneses" can destroy all hope for a balance with nature.

Gather information on three business practices in American society which are in direct conflict with environmental quality.

Research three practices of the construction industry which are in conflict with environmental quality.

List four practices of the transportation industry which are in conflict with environmental quality.

Survey and report on practices of a student's own neighborhood which are in conflict with environmental quality.

CONCEPT

THE ENVIRONMENTAL CRISIS OBLIGES MAN TO RE-EXAMINE HIS VALUES AND WHERE NECESSARY ALTER THEM IN ORDER TO INSURE MAN'S SURVIVAL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Evaluate the relationship between the environmental crisis and human values.

Identify many specific aspects of this profound crisis in human living.

TEACHING/LEARNING STRATEGIES

Write an essay to compare the impact of value systems which characterize the people of two selected works, (e.g. Orwell's 1984, Skinner's Walden II, Beyond Freedom and Dignity, Vonnegut's Player Piano, Reich's Greening of America, and Toffler's Future Shock.)

STUDENT LEARNING OBJECTIVES (Cont'd)

Pursue an analytical approach in studying environmental problems.

Examine values in light of the ecological imperatives of our times.

TEACHING/LEARNING STRATEGIES (Cont'd)

Outline four precepts or practices (one each of spiritual, economic, social, and political) which could be applied in personal life to increase chances of survival.

Given a situation wherein being appointed the Director of the Environmental Protection Agency by President Nixon, having been asked to issue a statement to the Congress concerning five values which we must have in order to enable man to conquer environmental problems and to insure man's survival, draw up such a statement.

Write a letter to the Secretary General of the United Nations on the need for an international concern with the crucial relationship between the international travel and tourist industry and the environment.

VALUE SYSTEMSAlternative #3OVERVIEW

The history of the 20th century for the most part shows that the technologically advanced societies have regarded a steadily improving standard of living for their masses based upon economic growth and industrial development as their main collective value. Ecological considerations have had a low priority among societal values. Consequently, the quality of man's environment has degenerated because societies have failed to reckon with the long range consequences imposed by their hierarchy of values.

CONCEPT

INTERRELATIONSHIPS BETWEEN VALUE SYSTEMS AND ECOLOGICAL DECISIONS SHOULD BE A BASIS FOR SETTING ENVIRONMENTAL PRIORITIES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify community attitudes toward ecological problems.

Assess changes in values within the community, and indicate the impact of each of these upon current environmental problems.

Evaluate the rationale for, and the environmental impact of major community projects, noting the values which were brought into play.

TEACHING/LEARNING STRATEGIES

Lecture on procedures for polling and the development of survey sheets.

Assign a reading list of text for the other material that will assist a student in preparing survey sheets.

Discuss the statistics involved in doing a survey.

Have students prepare a survey sheet which would be used by the class and tested on other students. A student should prepare a list of at least 20 questions that could be asked on individual ecological problems within their community.

A student should define the role which the news media, the educational community, and environmental activist groups have played in changing community entities.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

- Guest speakers should be invited from:
- a. Public relations firms to discuss the basic techniques used by such a firm in selling an issue.
 - b. A public polling firm to discuss polling techniques.
 - c. A representative of an environmentally active group to discuss what he considers effective means of modifying ecological attitudes.

CONCEPT

THERE IS A HIERARCHY OF VALUES THAT AFFECTS ENVIRONMENTAL DECISIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Given a local environmental decision, establish a hierarchy of values that might have led to the decision.

Given a specific renewal program, which has been completed, critically evaluate the values that emerged in all phases of the program.

TEACHING/LEARNING STRATEGIES

Conduct a class research project into the general orientation of the community in terms of its historical development, its major industry, and governmental structure for providing services to its citizens, concentrating on the prevailing values associated with these activities.

- Conduct a panel discussion, a class seminar, or individual presentation on:
- a. The economics of their community.
 - b. Transportation in their community.
 - c. Government services provided in their community.
 - d. Health services provided in their community.
 - e. Aesthetic considerations such as parks, open spaces.
 - f. Cultural facilities within their community.

Invite a guest speaker to prepare a lecture, or ask that individual papers be presented based on the current City or County budget or proposed budget, and from this data determine how budget

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES (Cont'd)

considerations denote community values. Further, these deductions should be compared to what is perceived to be the general goals and objectives of the community. Thirdly, the students should discuss and list what they feel should be the priorities for their community.

CONCEPT
NEW VALUES MUST BE COMPATIBLE WITH A SINGLE ENCLOSED ECOSYSTEM.

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES

The student will be able to:

Understand what is meant by an environmental impact study, and be able to recognize the major factors associated with conducting such an impact study.

Conduct environmental impact study as a class project of a shopping center, an expressway interchange, or a housing development. Consider the following:

- a. Develop for student involvement a worksheet upon which to record data. Worksheet should include positive values of the project reviewed. For example, better transportation, needed housing, economic value and human convenience, in addition to the negative environmental impact.
- b. Develop a list of trade-offs for the selected project.
- c. What alternatives are available?
- d. What were the overriding priorities for the establishment of that particular facility?
- e. Prepare individual reports to include slides and movies or interviews on the project selected for study.
- f. Select a panel of individuals to view presentations to determine a consensus for or against the project.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Develop hypothetical case on the expansion of a freeway, or an urban renewal project.

Evaluate the hypothetical case by developing an environmental check-list to include the following:

- a. The economic value of the project to the community.
- b. The social value of the project to the community.
- c. The social-economic sector of the community the project would serve.
- d. The health impact of the project.
- e. The aesthetic considerations.

On the other hand, the negative factors of the project or decision should be evaluated in terms of total cost to the community, disruption of the existing social, economic or environmental structure. Consideration should be given to the long-range overall environmental impact of the decision.

CONCEPT

ENVIRONMENTAL DECISIONS SHOULD BE BASED UPON A CAREFUL ANALYSIS OF ECONOMICAL, AESTHETIC, AND SOCIAL COSTS AND BENEFITS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine how the planning process works within their community, and how projects such as expressways and recreational facilities are given priority rating.

Analyze the prevailing values within the community, and relate these to current environmental projects and ecological concerns.

TEACHING/LEARNING STRATEGIES

As a class project develop a small reference library covering urban renewal projects and publications put out by urban renewal agencies, master plans, etc.

Review data provided by agencies and compare with actual existing situations. Prepare individual reports or a joint class report on the progress being made in restoring the quality of life in the urban areas.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Develop a slide presentation on existing conditions in areas scheduled for urban renewal, areas that have experienced completed urban renewal programs, and third, areas of similar characteristics to those classified for action by urban renewal agencies.

Ask guest speakers from the official agencies involved in specific urban renewal programs to discuss the merits of their program, their goals and accomplishments.

Conduct interviews with social workers, building inspectors, or other field personnel working within specified renewal areas. Prepare a report from these interviews listing what they feel to be the most serious problem. In addition, interviews should be arranged with actual residents of the area to provide insight into what they feel the problems are and what they see as priorities for action. The final class report should include the differences of opinion noted, the common goals, and action being taken.

Provide a reading list of articles from journals or magazines covering environmental issues or pollution control topics.

From assigned reading material, have students report on the international implications of air pollution at the U. S.-Canadian border.

Have students discuss the environmental impact of SST aircraft.

Review publications of the World Health Organization for examples of pollution crossing international boundaries.

Review literature on the Detroit-Windsor area industrial pollution problem.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Contact the office of your Congressman for copies of Congressional reports or studies related to international pollution problems.

Lecture and panel discussions, or have students prepare reports on how the U. S. has, or may have been, placed at a competitive disadvantage on the World economic market because of its environmental control measures.

CONCEPT

HIERARCHICAL VALUES AFFECTING ENVIRONMENTAL DECISIONS MUST BE EXAMINED IN THE LIGHT OF SOCIETAL IMPACT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize the hierarchy of values that might have led to a specific local environmental decision.

Identify political decisions that have affected the environment.

Evaluate the values that were used in the design of a specific and completed renewal program.

Detect projects having environmental impact, and from evidence in his community, point out where his value priorities may differ from those of the community.

TEACHING/LEARNING STRATEGIES

Select a particular community project and determine the hierarchy of priority of the following:

- a. jobs
- b. better transportation
- c. flood control
- d. public service
- e. increased tax base
- f. political expediency
- g. special interest pressure on the part of community development plans
- h. need to protect public health

Invite a guest speaker from the Corps of Engineers to discuss environmental impact statements, and their value in permitting citizens' input.

Invite a Public Works director to speak or conduct an interview with him over the phone discussing the value of an environmental impact statement and asking whether he feels that these statements are worth the high cost of development.

Describe the economic orientation of the community and state.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

List the ten major industries or largest employers within your community.

Describe where the majority of housing is located and its relationship, if any, to agricultural land being taken out of production.

Determine and review the local and state Transportation Master Plan to determine how expressway corridors were developed.

Have students prepare an individual check list of their priorities for environmental maintenance or improvement. Once prepared, the students should select individual projects in the community and judge them against community standards.

Conduct a brainstorming session on environmental priorities.

Develop a presentation to be given to a primary grade class concerning environmental values. Students should prepare graphs and charts related to local issues.

Invite a speaker from the local office of Housing and Urban Development to discuss urban renewal.

Conduct a field visit to an urban renewal area. Class should be broken into task forces with specific assignments in mind to determine:

- a. If the community is aesthetically pleasing.
- b. If adequate green space has been allowed.
- c. If adequate parks were evident.
- d. If traffic patterns were conducive to quiet living.

Prepare reading list of material of HUD publications and assign to individual students to report back to the class.

Prepare slide presentation with narrative about the community immediately adjacent to their school, or their neighborhood, or the downtown area.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Determine potential environmental impact of:

- a. an electronics plant
- b. a filling station
- c. a large office building
- d. a small office building in a residential area
- e. a shopping center
- f. a power transfer station

Conduct a brainstorming session on methods to reduce the environmental impact of the parking lots in and around the students school.

Discuss the potential of banning parking lots or converting parking lots into green space.

CONCEPT

EMERGING VALUE STRUCTURES MUST STRENGTHEN THE CONCEPT OF A SINGLE ECOSYSTEM.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand that solutions to environmental problems must oftentimes be considered from a worldwide perspective.

Value changes that will allow sound ecological maintenance and planning must represent a unity of values the world over.

Recognize the potential environmental impact of international action.

Compare environmental values that were present in preceding decades to those values which are presently being displayed on an international basis.

TEACHING/LEARNING STRATEGIES

Prepare a scrapbook of news articles from magazines and newspapers which cover the Stockholm Conference on Environment.

Prepare individual reports on the role and position of the developed nations at the Stockholm Conference and compare this to the position taken by the under-developed nations.

Discuss from available sources the international implications of the Alaska pipeline.

Review at least one air pollution incident which has had international significance. Information can be obtained from air pollution textbooks.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Conduct a brainstorming session on environmental values. A student should be required to read reference material before participating. Suggested books would be Rachel Carson's Silent Spring.

CONCEPT

INTERNATIONAL ENVIRONMENTAL DECISIONS SHOULD BE BASED UPON A CAREFUL ANALYSIS OF ECONOMICAL, AESTHETIC, AND SOCIAL COSTS AND BENEFITS.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES

The student will be able to:

Analyze economic, aesthetic, societal and environmental costs and benefits of environmental actions at local, state, regional, national and international level.

Recognize progress not accomplished at the expense of the environment and specifically impinging on natural resources.

Identify natural events that have had a global impact on the environment.

Identify actions by man that have had a global impact on the environment.

Conduct a role-playing session assigning specific roles to students-- economics, aesthetics, and environmental advocates using specific local examples. Repeat the same activity for an international issue.

Prepare a presentation using examples and audio-visual aids to determine man's specific role for international environmental action.

Conduct an environmental survey of their community which will highlight those factors that enhance the quality of the environment.

Invite a guest speaker from the local department of environmental health to discuss insect and rodent control and the use of pesticides.

Prepare audio-visual presentations to exemplify the use and distribution of specified pesticides within the environment.

VALUE SYSTEMSAlternative #4OVERVIEW

This module deals with the principle that the status of the environment reflects the predominant human value system that is at play in a particular area. It is apparent that man's values in the past have substantially been based on the concept of economic expediency with little regard for ecological considerations. Only until recently has man in any appreciable numbers expressed concern for the condition of the environment. Understanding and changing values represents the key to preserving a sound environment for the future.

CONCEPT

MAN'S CONDUCT TOWARD THE ENVIRONMENT IS BASED ON HIS PREVAILING SET OF VALUES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand that establishment of ecological priorities cannot be accomplished without a reference to basic human values.

Understand that the value system of the individual determines his attitudes and actions towards ecological problems and that the values respected in a community have a great influence on the community's reactions to ecological problems.

Discover that an ecological decision is the outcome of a value judgment made by the community and the individuals involved.

TEACHING/LEARNING STRATEGIES

Survey persons in his neighborhood for evidence of changes in attitudes toward ecological problems in the community.

List five values reflective of his community and indicate the impact of each upon the environment.

Evaluate the rationale for and the environmental impact of a major community project, noting the value judgments made.

CONCEPT

POLITICAL DECISIONS DEALING WITH THE ENVIRONMENT RESULT FROM A COLLECTIVE HUMAN VALUE SYSTEM

STUDENT LEARNING OBJECTIVES

The student will be able to:

Project environmental decisions and an environmental policy based on the predominantly collective values of a particular area.

Understand that the genuine respect of these basic human values should be the first principle in establishing ecological priorities.

Appreciate how a political or economical environmental decision is the reflection of value judgments.

Determine why the establishment of ecological priorities involves human values and a hierarchy of basic human values.

TEACHING/LEARNING STRATEGIES

Chart a hierarchy of values that might have led to a specific local environmental decision.

Rank six political decisions that affected the environment and relate them to students' own hierarchy of environmental values.

Research and evaluate the values that were used in the design of a specific and completed renewal program.

Rank a list of projects having environmental impact, and from evidence in the community point out where students' priorities differ from those of the community.

CONCEPT

CHANGES IN VALUES AND ADDITION OF NEW VALUES MUST ALIGN WITHIN A GIVEN ECOSYSTEM.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explain why man can establish new values and change old values by adapting them to a particular environment.

TEACHING/LEARNING STRATEGIES

Analyze an international document concerning ecology for evidence of a unit of values.

List one change in environmental values that has taken place on earth during the preceding decade.

STUDENT LEARNING OBJECTIVES (Cont'd)

Evaluate the international concern with the environment from the perspective of basic human values; e.g., life, freedom, culture, health, truth.

TEACHING/LEARNING STRATEGIES (Cont'd)

Develop a statement of the potential environmental impact of a particular international action.

Write a five page essay on the relationship between human values and ecological priorities. As a conclusion for this essay, the student will indicate the most basic ecological priorities.

CONCEPT

A CAREFUL ASSESSMENT OF AESTHETIC, ECONOMIC, AND SOCIAL COST/BENEFIT MUST PRECEDE ENVIRONMENTAL DECISION-MAKING.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Examine critically important environmental decisions according to their economical aesthetic, and social motivation and impact.

Appreciate an environmental policy that regards man as a responsible guardian and not an exploiting master of nature and environment.

TEACHING/LEARNING STRATEGIES

Research economic, aesthetic, and societal costs and benefits of environmental actions at local, state, regional, national, and international levels.

Identify in essay form the way man's role has slipped from dominion to stewardship.

List five examples of progress not accomplished at the expense of the environment and specifically impinging on natural resources.

Cite two instances in the local community of evidence indicating that drastic modifications must be made in current analysis of the societal and environmental costs and benefits.

Critique an article in a periodical concerning a world-wide "eco-issue."

VALUE SYSTEMSAlternative #5OVERVIEW

This module emphasizes the need for thorough evaluation of one's values with the objective of achieving value changes where indicated. Man must realize that his values determine his thoughts and actions. These values must be based on knowledge, both historical and present, and projections of the future. From this knowledge, a value system of ecological priorities could be formulated to become the laws of the world.

Everything in our mental, physical and spiritual power should be done to establish a set of environmental values that will synthesize the inter-relationship of everything we think and do in our biosphere. To understand values is to understand the condition of the environment and to project what the future holds regarding future quality environmental planning and maintenance.

CONCEPT

VALUES THAT WILL PERMIT SOUND ECOLOGICAL DECISIONS SHOULD BE HIGHLIGHTED IN SCHOOL CURRICULA.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize values that are transmitted through various school curricula.

Comprehend the interrelationship of values in every subject.

Understand the importance of educational institutions presenting positive values that are in harmony with life and our biosphere.

Understand how media promote and give priority to values.

TEACHING/LEARNING STRATEGIES

Interview and discuss with educational personnel how values can be included with material essential to various courses.

Detail the role that various disciplines play in establishing values that are independent of each other--but must be correlated and made interdependent.

By referring to tests in use, isolate the subject matter that in fact advocates destruction of our biosphere.

Prepare a model inter-disciplinary course that interfaces with other courses.

CONCEPT

ECOLOGICAL VALUE SYSTEM TO BE EFFECTIVE MUST BE BASED UPON WORLD-WIDE HISTORICAL EVENTS AND FACTS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify values that have been detrimental to the environment.

Identify the historical factors that were instrumental in forming values that have been detrimental to the environment.

Understand the most important sequence of events that have established our 20th century values.

Identify the short and long-range effects of this development upon man and the environment.

TEACHING/LEARNING STRATEGIES

Interview the people who play an influential role in maintaining present values.

Detail the value justifications of the following:

- a. detergents
- b. plastics
- c. strip mining

Search out the value judgments behind the above developments.

List detrimental environmental results of some of the current community activities; e.g., development project, new roads, etc.

Read Lewis Mumford's "Pentagon of Power."

Construct an historical progressive chart that pinpoints the lack of sound ecological values.

CONCEPT

ECOLOGICAL VALUE SYSTEMS SHOULD BE PLANNED, JUSTIFIED, DOCUMENTED AND SOMEHOW BE ENFORCEABLE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Project several ecological value priorities with accompanying justifications and facts.

TEACHING/LEARNING STRATEGIES

From the students' experiences, have them describe an ecological value, detailing the reasons.

STUDENT LEARNING OBJECTIVES (Cont'd)

Determine methods of establishing and enforcing effective ecological values.

TEACHING/LEARNING STRATEGIES (Cont'd)

Program systems to insure the success of transmitting sound ecological values.

Write some laws that will insure that sound ecological values will be adopted.

CONCEPT

ECOLOGICAL VALUE SYSTEMS MUST BE GIVEN TOP PRIORITY IN OUR TECHNOLOGICAL DEVELOPMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify technological values and understand the effects these values have on the environment.

Project eventual results of technology not geared to a quality environment.

Understand the need for establishing values compatible with a sound environment in all future technological undertakings.

TEACHING/LEARNING STRATEGIES

Conduct interviews with executives in industry who determine technological programs and delineate their values.

Read Barry Commoner's "The Closing Circle."

List the detrimental results of technology on the environment that are now commonly known.

Compile from interviews the values of responsible people in the following disciplines:

- a. economists
- b. sociologists
- c. technologists
- d. politicians
- e. educators.

Establish a consortium of the above people to write a set of values consistent with the needs of man and our biosphere.

BELIEF SYSTEMSAlternative #1.OVERVIEW

This module will demonstrate that man is capable of managing his environment by developing an informational base and by making appropriate environmental management decisions.

Man has traditionally viewed himself as master of the environment. Many religious traditions and governmental institutions have been based on this view of man as the dominant force in the ecosystem.

CONCEPT

WESTERN TRADITION HAS GENERALLY EQUATED PROGRESS WITH GROWTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand historical growth patterns within his environment as these relate to:

- a. population growth trends
- b. housing development
- c. industrial growth
- d. institutional growth

Correlate world population growth patterns with economic and technical progress.

Differentiate between concepts of growth held by Western and Eastern cultures.

TEACHING/LEARNING STRATEGIES

Using case studies from anthropology, divide class into small groups for analysis. Classify, using the following:

- a. dominion or mastery over nature
- b. subjugation to nature
- c. harmony with nature
- d. stewardship or trusteeship

(See Kluckhohn & Strodtbeck, Variations in Value Orientations.)

CONCEPT

MAN HAS TRADITIONALLY HELD THAT NATURE WAS HIS ADVERSARY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

Invite representative from major

STUDENT LEARNING OBJECTIVES (Cont'd)

TEACHING/LEARNING STRATEGIES (Cont'd)

Understand man's minute role as a biological entity in the primitive natural environment and the consequent "paranoid" feelings.

Determine the adversity between man and his environment.

conservation-oriented agencies such National Forest Service and National Park Service. Topic: The conflict between aesthetic and economic values in agency ideologies.

CONCEPT

MAN AS A PART OF THE TOTAL ENVIRONMENTAL SYSTEM ALTERS NOT ONLY NATURE BUT ALSO OTHER MEMBERS OF HUMANKIND.

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES

The student will be able to:

Determine personal beliefs regarding man and nature in coexistence.

Project viable ways for effective human interaction to result in positive programs for environmental issues.

Understand the several ideologies which have shaped the modern world.

Role-play a skit written as a class to amplify beliefs of classmates regarding a widespread ecological issue; i.e., population control, land use planning.

Chart the population and the per capita income of the five most populous countries of the world.

Write a brief essay exploring needs for an "ideal" social group living in harmony with one another and nature.

CONCEPT

ACCUMULATION OF ECONOMIC RESOURCES HAS TRADITIONALLY BEEN A PRIMARY GOAL OF MAN

STUDENT LEARNING OBJECTIVES:

TEACHING/LEARNING STRATEGIES

The student will be able to:

Acquire an understanding of the conflict between aesthetic and economic values.

Debate whether the Judeo-Christian belief system encourages and justifies environmental exploitation and degradation.

Inventory resources of local community which may be both economic and aesthetic resources.



BELIEF SYSTEMSAlternative #2OVERVIEW

This module examines the rationale for the role of man and his relation to the environment. The ultimate basis for this rationale is in a system of beliefs. Belief systems vary from culture to culture. Many of these belief systems have had a direct effect on the condition of the environment. Some of these implications have been negative. This suggests that alternatives to individual beliefs may be necessary in the cause of environmental preservation.

CONCEPT

SOME BELIEF SYSTEMS VIEW MAN AS AN ECOLOGICAL DOMINANT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the components of anthropocentric societies and ways in which the environment is affected by these.

Analyze the ecological implications of the Judeo-Christian belief systems.

Acquire knowledge of the emergence of the materialistic ethic in:

- a. the United States
- b. other nations.

TEACHING/LEARNING STRATEGIES

Review case studies of various societies to identify their beliefs.

Role-play the various aspects of Judeo-Christian belief systems, contrasting those strongly evident with those in the process of change.

CONCEPT

SOME BELIEF SYSTEMS VIEW MAN AS PART OF A LARGER WHOLE--INTERACTING WITH, BUT NOT DOMINATING NATURE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify non-anthropocentric belief systems.

Determine how man and the environment are viewed in various belief systems.

TEACHING/LEARNING STRATEGIES

Research various cultures and identify the dominant theme in their belief systems.

CONCEPT

THERE IS A RELATIONSHIP AMONG ATTITUDES, BELIEFS, VALUES AND INSTITUTIONS OF SOCIETY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the concept of an institution through readings, discussions, and lectures.

Determine how institutions relate to various belief systems.

Identify and cite various institutions' influence on the environment.

Determine how the environment affects the institution.

TEACHING/LEARNING STRATEGIES

Lecture on available evidence regarding the role of attitudes in determining final outcome of environmental decisions.

Examine environmental attitudes on a specific local issue by having the class interview decision makers regarding their:

- a. personal attitudes on the issue
- b. opinions on what they believe others to prefer
- c. opinions as to what others should prefer

Examine opinion polls (National Opinion Research Center, Center for Survey Research) for questions which relate to environmental attitudes.

Set up experimental situation where opinions on an issue are surveyed prior to the exercise. Allow for discussion, exposure to new information, and have peer interaction. Re-evaluate attitudes to see if there were any changes in basic positions.

THE MYTHS OF TECHNOLOGYAlternative #1OVERVIEW

This module presents a definition, discussion, examination and analysis of some myths of technology. It attempts to develop a questioning analytical attitude toward statements which are indeed "myths."

Economic growth increases material wealth, but it has a growing number of unfortunate side effects - each individual tries to increase his own benefits within an increasingly crowded environment. Growth is as deeply entangled in our economic thinking as rain dancing is in other societies.

Too often technological progress has been equated with growth, change, exploration rather than a real improvement in the quality of life. Technology has the wherewithal to reduce the degradation of the environment. The question is posed as to how industry can be made to do this with least disruption to mankind.

CONCEPT

THE FUTURE OF MAN MAY DEPEND ON THE LIMITATIONS AND CAPABILITIES OF TECHNOLOGY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize political forces that allow environmental decisions to occur.

Identify in the community how technological projects are permitted to advance and how they are prevented from being implemented.

TEACHING/LEARNING STRATEGIES

Investigate the acceptance by a local governing body of a detrimental technological project. What were the forces behind such an acceptance? What role did economics play? Can a good case be built to reverse the decision? (e.g. photographs, research evidence, etc.)

CONCEPT

TECHNOLOGICAL CHANGE HAS BOTH BENEFICIAL AND DETRIMENTAL EFFECTS ON THE QUALITY OF LIFE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explore examples of recent

TEACHING/LEARNING STRATEGIES

Discuss the benefit to our society of strip-mining as opposed to the disadvantages. Include economic,

STUDENT LEARNING OBJECTIVES (Cont'd)

technological developments potentially beneficial to the quality of life, and potentially detrimental to the quality of life.

TEACHING/LEARNING STRATEGIES (Cont'd)

ethical, industrial factors in response.

Take a field trip to the site of a recent technological development and evaluate the good and bad effects on the quality of life.

Research through books, pamphlets and correspondence the advantages and disadvantages of strip mining.

CONCEPT

MAN'S SURVIVAL IS ENDANGERED BY THE MISUSE OF TECHNOLOGY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Project a hypothetical day in the life of a student his own age in the year 2000 assuming man's current reliance upon technology.

Understand possible biological adaptation man would have to evolve in order to survive his environment if the present rate of pollution continues.

TEACHING/LEARNING STRATEGIES

Write a short play about life in the year 2000 based on current technology.

Draw on large charts possible biological adaptations needed by man to survive pollution.

CONCEPT

THE CONSEQUENCES OF TECHNOLOGY MUST BE REVIEWED IN TERMS OF HUMAN VALUE AND SOCIAL IMPACT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the needs for water in the local community for the next 25 years, taking into account population trends, aesthetics of recycling industrial consumption, personal needs and financial costs.

TEACHING/LEARNING STRATEGIES

Write a report on local water needs for the next 25 years, considering population, aesthetics, recycling, recreation, finances.

List specific things that an individual can do to maintain a healthy environment.

The Myths of Technology

Alternative #1

STUDENT LEARNING OBJECTIVES (Cont'd)

Acquire knowledge of personal sacrifice to be made in order to alleviate and maintain a positive environment.

Determine humanizing technology as suggested by some contemporary writer (ex. Fromm's Revolution of Hope).

TEACHING/LEARNING STRATEGIES (Cont'd)

Read two or three contemporary books on humanizing technology.

THE MYTHS OF TECHNOLOGY

Alternative #2

OVERVIEW

This module deals with a breakdown of the so-called myths or beliefs about technology. The material in the module will be compared with the actual detailed facts about technology. This comparison will bring out the misconceptions attributed to the ideas people have about this technology, and the fallacies within the technology itself.

The attitudes of people and the role of technology will be specified and related to the economic, political, social, personal, and environmental effects on man and the ecosphere. (Everything is connected to everything else - everything must go somewhere - every gain is won at some cost.) The interrelatedness of all events between man, nature, and technology will be developed to emphasize the circular pattern of nature which must be incorporated within our societal pattern of life.

CONCEPT

MAN RELIES ON TECHNOLOGY TO SATISFY HIS PERSONAL, SOCIAL, ECONOMIC, AND POLITICAL NEEDS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the effects a myth (belief) of technology has on his natural, economic, political, social and personal life.

TEACHING/LEARNING STRATEGIES

Compile through interviews, questionnaires and discussion statements or beliefs (myths) about the ability of specific technology to solve environmental problems.

List and chart myths of technology that are expected to solve problems in the following areas:

- a. political
- b. economic
- c. social
- d. health
- e. personal
- f. esthetics
- g. moral
- h. recreational
- i. advertising
- j. materialistic
- k. others

The student will then through class discussion determine the most important factors behind the beliefs detailed above.

CONCEPT

MAN SHOULD RECOGNIZE TECHNOLOGICAL DEVELOPMENT FROM THE IDEAL TO ITS PRACTICAL REALITY FOR SOLVING ENVIRONMENTAL PROBLEMS FROM ITS IDEA STAGE THROUGH ITS EVENTUAL BREAKDOWN.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Comprehend the realities of technology and its effect on his total life pattern.

Understand the genesis, development, production, use and disposal of technology in complete and specific detail.

Understand the economic advantages or disadvantages of technology according to beliefs and facts.

Research all political issues related to technology process.

Study the short and long term natural implications of this technology.

Recognize health problems created by technology.

Realize the social effects of technology.

TEACHING/LEARNING STRATEGIES

Trace and list through interviews and correspondence the complete and specific path of various technology advances from:

- a. idea or conceptual stage
- b. research and development
- c. engineering specifications
- d. purchasing procedures
- e. materials necessary
- f. manufacturing process
- g. packaging
- h. shipping
- i. advertising
- j. sales
- k. consumer use /
- l. disposal
- m. other

Discuss the economic advantages and disadvantages of these technology projects. List the political ramifications, if any. Trace and list the short- and long-range effects on the ecosphere, i.e. toxic, depletion of natural resources. Discuss the effects on world health. Illustrate social implications. Itemize and detail the worth of these technological projects in these terms:

- a. manpower used
- b. energy consumption (type and amount)
- c. product life expectancy
- d. disposal technique used

CONCEPT

TECHNOLOGICAL MYTHS AND THE FACTS MUST BE SEPARATED AND UNDERSTOOD, EACH FOR ITS OWN EFFECT ON MAN'S ECONOMIC, POLITICAL, SOCIAL AND ENVIRONMENTAL WORLD - HISTORICALLY, CONTEMPORARILY, AND FUTURISTICALLY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Compare the facts with the myths in regard to various technological advancements.

TEACHING/LEARNING STRATEGIES

Chart and compare beliefs versus facts about specific technologies in relationship to the following:

- a. economic
- b. sociological
- c. personal
- d. political
- e. ecospherical
(environmental)

Determine through discussion the factors that established beliefs not in keeping with the facts.

Delineate the important considerations relevant to technology and establish a viable method of differentiating fact from belief or myth.

CONCEPT

AN ECOLOGICAL RELATIONSHIP EXISTS AMONG EVERYTHING, ESPECIALLY TECHNOLOGY

STUDENT LEARNING OBJECTIVES

The student will be able to:

Develop understanding of man's relationship to technology.

Understand the historical development, function and use of technology.

Assess the effects technology has had on the various patterns of life.

TEACHING/LEARNING STRATEGIES

Read Techniques and Civilization by Lewis Mumford and The Closing Circle by Barry Commoner. Draw some conclusions, in essay form, showing the circular pattern of which all technology is a part.

Detail through research previous methods of fulfilling the function technology replaced.

STUDENT LEARNING OBJECTIVES (Cont'd)

Relate technology to the natural and organic process of existence.

Understand integration of technology with the natural and reproductive cycle of the ecosphere.

Be aware of the interrelated (ecological) effects technology beliefs and needs have upon every facet of historical, present and future relationships with the ecosphere.

TEACHING/LEARNING STRATEGIES (Cont'd)

Discuss the changes of lifestyle produced by specific technology.

Chart the long-range effects of technology on the ecosphere.

THE MYTHS OF TECHNOLOGY

Alternative #3

OVERVIEW

This module deals directly with the misconception that technology will solve all of our present problems. The generally held belief that in the end technology will rescue us from the trends of environmental devastation is examined. Because of this feeling, man's behavior reflects his conviction that somehow, man's ingenuity will make all well for the future.

There are real limits to what technology can be expected to do to relieve present environmental pressures. These limits must be fully understood so man can alter his actions, which in the end will really be the only true solution to environmental problems.

CONCEPT

TECHNOLOGICAL LIMITATIONS AND CAPABILITIES MUST BECOME PUBLIC KNOWLEDGE TO ENCOURAGE WISE DECISIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explain the relationship between man's survival and the uses of technological achievements.

Explain and give examples of the power of technology.

TEACHING/LEARNING STRATEGIES

Draw a map of the immediate neighborhood and show on it the location of the four most basic technological resources in this area; in addition to this, indicate through the use of symbols on the map the harmful side effects of these technological resources.

Illustrate (place, date, time, participants, issues, etc.) of a political entity in the local community accepting a destructive technological proposal because of the lack of public organization, apathy, or economic pressure.

Illustrate (time, place, date, participants, etc.) of a political entity in the local community favoring a positive technological proposal. Delineate the reason for this acceptance.

CONCEPT

MAN MUST KNOW HOW TO ASSESS TECHNOLOGICAL CHANGE (BENEFICIAL AND DETRIMENTAL EFFECTS) SINCE THIS AFFECTS THE QUALITY OF LIFE

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the different effects of technology on the quality of humans living in the past and in the present.

TEACHING/LEARNING STRATEGIES

Identify in writing three long-range beneficial effects of space exploration achieved through the efforts of technology.

Write a four-page essay on the negative effects of space exploration on a competitive basis between the United States and the Soviet Union.

Evaluate after research the beneficial and the harmful effects of strip-mining by technological means. Take into account the economic, ethical, industrial, and human factors involved.

CONCEPT

UNWISE USE OF TECHNOLOGY MAY, IN FACT, ENDANGER MAN'S SURVIVAL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Develop understanding of the misuse of technology today.

Explain how the misuse of technology endangers both the quality of life and man's survival.

TEACHING/LEARNING STRATEGIES

Spend one hour walking in the center of a city in order to observe the phenomenon of noise and air pollution due to the necessary presence of automobiles. After this, sit down in the closest park for a period of fifteen minutes in order to relax and thus observe the effects of the walk. The next day, give an oral report twelve minutes in length to the class on observations and experiences, emphasizing the harmful and beneficial effects of the walk.

TEACHING/LEARNING STRATEGIES (Cont'd)

Outline a hypothetical day in the life of a student in the year 2,000 assuming that man's current reliance on technology continues.

Present orally the possible biological adaptation man would have to evolve in order to survive his environment if the present rate of pollution continues.

CONCEPT
ACCEPTABILITY OF A SPECIFIC TECHNOLOGICAL ADVANCE MUST BE WEIGHED AS TO ITS IMPACT ON HUMAN VALUES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the need for and the ways of humanizing technology in order to improve the quality of human living and to secure man's survival.

Analyze the relationship between the sciences and the humanities and explain the impact of this relationship on the environment and on the future of man.

TEACHING/LEARNING STRATEGIES

A group of students will present a panel discussion on the problem of humanizing technology as suggested by Erich Fromm's Revolution of Hope and by Herbert Marcuse's One-Dimensional Man.

The student will outline personal sacrifices that might be involved in protecting the right relationship between man and nature.

The student will write a five-page essay on Erich Fromm's suggestions for humanizing (according to his latest book, Revolution of Hope); he will also give five examples of the humanization of technology which can be implemented in his home or at his school.

The student will write a report on the need for water in the local community for the next 25 years, taking into consideration population trends, esthetics of recycling industrial consumption, personal needs, and financial costs.

TEACHING/LEARNING STRATEGIES (Cont'd)

Read individually and discuss in small groups the article "Genetic Engineering" (John V. Tunney, Meldon E. Levine, Saturday Review, August 5, 1972). The groups will identify four basic differences between the mentality of the sciences and the mentality of the humanities according to the suggestions of the article mentioned. In addition to this they will explain the consequences of the misunderstanding between these two mentalities in the area of genetic control as suggested by some scientists.

Finally, each group will present five proposals designed to prevent the abuses of genetic engineering and the unethical experimentations on human beings.

Have the students draw pictures or take photographs of a factory, a high school, and a suburban home with their respective immediate surroundings (e.g. vegetation, landscaping, beauty). By comparing these three pictures, the student will explain the reasons for the difference in the respective surrounding environments and thus explain the mentality reflected in them. Finally, the student will indicate possible improvements that are responsive to the needs of each instance examined and to the life of man and the environment.

Write a letter to congressmen on two immediate ways of protecting the environment.

Write a short essay and a five-line poem on how and why Lake Erie is dying.

CONCEPTS OF CHANGE

Alternative #1

OVERVIEW

The main intention of this module is to discover the meaning of change as a law of human living and of the environment. Man is puzzled by the fact that he himself and his environment are in a continuous state of flux and transformation and that at the same time both man and environment endure. Thus, in explaining the reality of man in the world, the human mind sees a dynamic tension between change and permanency in the lives of man and nature. Analysis of this dynamic tension shows that growth and progress in the world can be understood as the result of the struggle between the tendency to change and the tendency to remain the same.

This module also will identify the different types of change experienced or observed by man: the physical, the chemical, the biological, the psychological, the social, the personal, and the cosmic changes. On all these levels man can explore the changing and the permanent aspects of beings in general and the changing and permanent qualities of man and his environment in particular.

Today man experiences not just the importance but also the acceleration of the process of change in human living and society and even in the environment. Such an acceleration of change, to a large extent, is due to man's own activities and to his intervention in the life of the environment. Man is shocked by this change and his adaptability is put to a crucial test. In the final analysis, the very human quality of living and the survival of man and the environment is at stake in the process of rapid change.

The solution to the problem of change in the life of contemporary man cannot be just a political one precisely because the problem of change itself is not just a political one. The problem of change involves man's attitudes, values, and his convictions about his own nature and the nature of reality altogether. The solution cannot consist in slowing down the process of change but rather in humanizing change and in strengthening man's adaptability and developing a balanced flexibility of his values and attitudes.

CONCEPT

CHANGE IS A BASIC LAW OF NATURE THE PROCESS OF CHANGE AND TRANSFORMATION, HOWEVER, IS BALANCED BY SOME ENDURING STRUCTURE OF REALITY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the meaning of change and to interpret change as the basic quality of all beings and especially of man.

TEACHING/LEARNING STRATEGIES

Have the students describe the changes that have taken place in the life of their families, in the backyards of their homes, and on the beaches they like to visit, during the last six months.

List three examples of how their friends have changed their attitudes toward abortion in the last two years.

TEACHING/LEARNING STRATEGIES (Cont'd)

Illustrate pictorially the changes that have taken place and the things or events that have endured on the street where the students live.

Have the students describe the changes that have taken place in the social lives of their friends, in the qualities of their automobiles, and in the weather during the last two weeks.

Illustrate the types of changes a person undergoes from the age of nine through the twenty-first year of life.

CONCEPT

DYNAMIC TENSION BETWEEN CHANGE AND PERMANENCY IS THE SOURCE OF GROWTH IN THE LIFE OF MAN AND THE ENVIRONMENT

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine the process of change and transformation and the balance of unchanging conditions in relationship to the structure of reality and man.

Become aware of the dynamic tension between the changing and the unchanging aspects of the life of man and the environment.

Analyze the principle of dynamic tension as a source of growth or a danger to the survival of man and the environment.

TEACHING/LEARNING STRATEGIES

Describe to the class the changing and the unchanging qualities of family life.

Write on the phenomenon of oxidation as a phenomenon of change and permanency.

Research the nature of man's psychological development as a process of change and resistance to change.

Read some fragments of Heraclitus and Anaximander and explain how their understanding of nature was based on the experience of change and permanency in nature.

List five physical phenomena as exemplifying a process of change and permanency at the same time.

Chart how the growth of a plant is a process of change and permanency.

CONCEPT

DIFFERENT TYPES OF CHANGE INCLUDE: PHYSICAL, CHEMICAL, BIOLOGICAL, PSYCHOLOGICAL, HISTORICAL, ATTITUDINAL, INTELLECTUAL, SOCIAL AND INDIVIDUAL CHANGES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Cite the different kinds of change that exist.

TEACHING/LEARNING STRATEGIES

List examples of biological change in man.

Illustrate basic psychological changes in the growth of the adolescent.

Role play the attitudinal changes experienced during the taking of a course in environmental studies.

List as many human values as possible which are undergoing a process of change in the world of today.

Illustrate two examples of how society's attitude is changing toward the environment.

Have the students simulate two months in the Soviet Union and then return to their home in the United States. After two weeks of 'being back home again', the student will write an essay regarding his:

- a. views on Communism
- b. views on the Western world
- c. evaluation of American Democracy
- d. ideas on education
- e. political attitudes toward the Communist nations
- f. criticism of the American way of life
- g. ideas on freedom and work

List three changes in our way of thinking which would change our attitudes toward the environment.

CONCEPT

ACCELERATION OF THE PROCESS OF CHANGE IS A SOURCE OF CONCERN TO MAN AND A CHALLENGE TO HUMAN ADAPTABILITY

STUDENT LEARNING OBJECTIVES

The student will be able to:

Grasp why there is a great amount of resistance to change in human living in spite of the need to find a new relationship to the environment.

Determine and explain the reasons for the contemporary phenomenon of the acceleration of the process of change as a source of human concern and a challenge to man's adaptability.

TEACHING/LEARNING STRATEGIES

Illustrate four experiences of resisting change.

Explain why so many people would resent and resist, in their own way, a changeover from the American to the metric system of measurement.

Each member of the class will be asked to change his seat in the classroom or his roommate in the dormitory. Each will describe his reasons for internally resisting such a change even though he externally obeyed the order. Finally, each will evaluate the reasonableness or unreasonableness of his resistance to such a change.

Conduct a survey on the effects of the frequent change of domicile on the:

- a. entire family
- b. pre-school children
- c. school-age children
- d. the social attitudes of the family and on the parents in particular
- e. the political attitudes of the parents

Write a three-page essay on the ways the accelerated process of change in urban living contributes to social tensions.

CONCEPT

THE UNDERSTANDING OF THE MEANING OF CHANGE CANNOT BE THE OUTCOME OF A POLITICAL ANALYSIS ALONE IT REQUIRES SOCIAL, SCIENTIFIC, PHILOSOPHICAL AND CULTURAL ANALYSIS AND INTERPRETATION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Examine critically the different aspects of the problems of change.

Grasp that a political analysis cannot give an adequate analysis of the phenomenon of change and that a thorough study of the meaning of change in both man and the environment requires a social, scientific, philosophical, and cultural analysis.

TEACHING/LEARNING STRATEGIES

Read and give an oral report on Charles Reich's The Greening of America.

Organize a panel discussion on Toffler's Future Shock and examine the practical applications of this author to the problem of education and politics in contemporary society.

Present a ten-minute oral report on Erich Fromm's Escape from Freedom.

List four reasons for people's changing views regarding marriage and the size of the family.

Illustrate three basic reasons for people's changing attitudes toward higher education in general and toward having a college degree in particular.

CONCEPTS OF CHANGEAlternative #2OVERVIEW

This module explores the different aspects of man's reactions resulting from the tremendous amount of change occurring around him. It is quite apparent that satisfactory resolution of environmental problems will require social, political, economic, cultural, and scientific-technical changes. The purpose of this unit is to introduce students to the various dimensions of change which can then be applied to specific areas. Change requires more than readjustment. Developing comprehensive and feasible alternatives for constructive environmental action presupposes an understanding of the dynamics and limits of social and technological change. Misconceptions about the nature of change can only lead to unrealistic attitudes, opinions, and hopes for environmental improvement.

CONCEPT

FROM THE STANDPOINT OF MAN AND THE ENVIRONMENT, CHANGE IS CONSTANT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Critically compare various usages of the terms "growth" and "maturation" in:

- a. a physical-organic context
- b. a social-institutional context

Develop analytic skill in detecting metaphors of growth, maturation, decay and death as applied to the analysis of environmental problems.

Distinguish qualities which make for successful adaptation.

Appreciate the difficulty, in the short term, of distinguishing major change from adaptation and variation.

Determine the distinction between coping with an environmental problem and changing basic patterns of behavior to eliminate or resolve the problem.

TEACHING/LEARNING STRATEGIES

Evaluate a local agency's policies with regard to the environment in terms of its ability to adjust to change.

Analyze your own ways of adapting to differing circumstances.

Review books of leading environmentalists and analyze with regard to concepts of change. (E.g. Dubos; Ehrlich.)

CONCEPT

ALL FORMS OF CHANGE INVOLVE "A SUCCESSION OF DIFFERENCES IN TIME IN A PERSISTING IDENTITY." (Robert Nisbet)

STUDENT LEARNING OBJECTIVES

The student will be able to:

Analyze social and technological change with regard to discrete environmental phenomena.

Identify environmental consequences associated with social change.

Determine examples of the following types of change: social, political, economic, cultural, attitudinal, scientific, technological. Analyze the succession of differences in a persisting identity. (E.g. social change in the family.)

TEACHING/LEARNING STRATEGIES

Present a multi-media project which examines change with regard to the following phenomena:

- a. suburban landscaping and placement of home
- b. patterns of urban land use
- c. attitudes toward trees
- d. the functions of the bathroom

Conduct individual research projects in which students examine changes regarding any one of the following: climate, soil, water, air, forests, wilderness, recreation patterns, attitudes toward predators, etc.

Invite a social planner to class to discuss environmental impacts of social change in your community.

CONCEPT

CHANGE CAN BE VIEWED AS CYCLICAL, LINEAR, AND THE RESULT OF HISTORICAL CIRCUMSTANCE.

STUDENT LEARNING OBJECTIVES

The student will be able :

Acquire knowledge of the typical view of man-nature relationships in Greek or Eastern cultures, emphasizing basic cultural attitudes toward change in man, nature, and society.

TEACHING/LEARNING STRATEGIES

Review Crane Brinton's Anatomy of a Revolution. (Metaphor of growth applied to revolutions)

Invite a guest lecturer to class to discuss the philosophy of history, and historical conceptions of change.

STUDENT LEARNING OBJECTIVES (Cont'd)

Understand the idea of progress as a manifestation of the linear conception of change.

Understand the idea of decline as a manifestation of the linear conception of change.

Appreciate the nature of an historical account of change which attempts to give as complete a picture of the actual events without resorting to metaphor.

TEACHING/LEARNING STRATEGIES (Cont'd)

Have students interpret an environmental problem from each of the following perspectives: all change is cyclical; change is directional and linear; change is the product of historical circumstance and unique individual actions.

Conduct a class discussion centered around the famous French saying: "The more things change, the more they stay the same." How would this aphorism apply to our ways of dealing with environmental problems?

CONCEPT

SOCIAL CHANGE IS GENERALLY ASSOCIATED WITH SOME FORM OF CRISIS WHERE THE INDIVIDUAL OR GROUP IS UNABLE TO CONTINUE CUSTOMARY AND ORDINARY BEHAVIOR.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify environmental crises which are forcing people to change their ordinary way of living.

Determine factors which influence perception of a situation as a crisis which demands change or as a problem causing an inconvenience.

TEACHING/LEARNING STRATEGIES

Have students write an essay on circumstances which made them change at some point in their life.

Conduct a group discussion of perceptions of environmental problems and their relationship to demands for change.

Conduct a survey of the student body to determine if students perceive environmental issues as a crisis or inconvenience.

CONCEPT

THE AGONIES ASSOCIATED WITH THE CONSEQUENCES OF CHANGE ARE RARELY ACCEPTED IN GOOD GRACE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the difficulty of people

TEACHING/LEARNING STRATEGIES

Describe the personal impact of the following changes upon a typical middle-income American family:

STUDENT LEARNING OBJECTIVES (Cont'd)

in gracefully accepting change in their life style.

Identify the difficulty of changing a basic attitude toward the natural environment.

Document the upheavals and personal agonies caused by a change which improves environmental quality, (e.g. building moratorium which is linked to improved waste treatment facilities; increased cost and maintenance for vehicular air pollution control, etc.)

Explore relationship between the "scapegoat" phenomena and rapid social change.

TEACHING/LEARNING STRATEGIES (Cont'd)

- a. automation
- b. requirements for year-in-advance reservations to camp in national parks and forests due to over-taxed facilities
- c. elimination of phosphate and enzyme detergents in attempts to improve water quality
- d. increasingly toxic levels of air pollution in urban centers of employment

Have students describe personal experiences in dealing with change.

Interview neighbors and other students regarding their receptivity to fundamental environmental changes which have personal costs as well as benefits (e.g. decreasing air pollution by not building more electrical power plants).

Interview industry executives who believe they are taking the brunt of the new environmental awareness.

CONCEPT

MAJOR FORMS OF CHANGE IN THE MODERN WORLD ARE ASSOCIATED WITH THE RISE OF INDIVIDUALISM, THE INCREASING POLITICIZATION OF SOCIAL ACTIVITIES, THE SECULARIZATION OF SACRED NORMS, AND THE SPEEDUP OF SCIENTIFIC AND TECHNOLOGICAL INNOVATION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand why people increasingly look to government and collective solution to solve environmental problems (politicization).

Understand the "Tragedy of the Commons" (G. Hardin) as a typical situation in dealing with common-property resources such as air and water.

TEACHING/LEARNING STRATEGIES

Present short lectures on major types of change in the modern world.

Arrange large group projects which attempt to work out environmental consequences of major processes of change. General problem: To what extent are the various environmental crises a product of modernity: Is a degraded environment the price of progress?

STUDENT LEARNING OBJECTIVES (Cont'd)

Identify ways in which individualism has increased demands upon an overloaded ecosystem.

Appreciate the impact of the secularization of modern life in lifting restraints upon man's use of the environment for strictly human and worldly purposes (secularization; anthropocentrism).

Determine environmental changes associated with the speed-up of scientific and technological innovation (atomic energy; mass produced auto; satellite communications; subdivision housing, etc.)

TEACHING/LEARNING STRATEGIES (Cont'd)

Have students write papers on the application of the tragedy of the commons analysis to various common property resources.

CONCEPT

CHANGE MUST BE UNDERSTOOD IN RELATION TO THE DOMINANT TENDENCIES TOWARD PERMANENCE, PERSISTENCE, FIXITY, HABIT, CUSTOM, AND ADAPTATION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Appreciate some of the basic human dispositions which make people conservative; e.g., disposition to enjoy the present rather than the hazards of an uncertain future; the relationship between age and reluctance to change; preferring the familiar to the unknown or changing; the set of relationships and attachments which make people feel at home in the world; and the tendency of most people not to go looking for trouble.

Understand how customs, habits, and traditions permit us to adapt to environmental problems rather than drastically changing our ways of acting.

TEACHING/LEARNING STRATEGIES

Have the students cite personal records of agonies caused by a change in one's own life.

Examine crucial areas such as population norms, pollution of air, water, and sound. Analyze in terms of habits, customs, adaptations to lethal hazards, persistent but outdated institutions, and sheer inertia--all of which inhibit constructive change.

Examine three cases where local positive environmental action was taken. What were the crises which precipitated change?

Analyze photographic records of the evidences of environmental change which occurred during the past five years.

Conduct a library research project tracing change with regard to one element of the

STUDENT LEARNING OBJECTIVES (Cont'd)

Appreciate the role of habit, custom, routine, and familiarity in one's own life.

TEACHING/LEARNING STRATEGIES (Cont'd)

environment (e.g., urban space utilization; weapons technology; micro-climatic change, etc.)

EARTH AS AN ENERGY SYSTEMAlternative #1OVERVIEW

This module can best be introduced by referring to a direct quote from: Resources and Man, Committee on Resources and Man, Natural Academy of Sciences, Natural Research Council, W. H. Freeman and Company, 1969, page 157.

"Into and out of the earth's surface environment there occurs a continuous flux of energy, in consequence of which the material constituents of the earth's surface undergo continuous or intermittent circulation. By far the largest source of this energy flux is solar radiation, a small fraction of which is captured by the leaves of plants and stored as chemical energy. This chemically stored solar energy becomes the essential biological energy source for the entire animal kingdom. In particular, it supplies the energy required as food for the human population.

During geologic history, a minute fraction of the organic matter of former plants and animals became buried in sedimentary sands, muds, and slimes, under conditions of incomplete oxidation. This has become the source of our present supply of fossil fuels - coal, petroleum and natural gas."

CONCEPT

THE SUN IS THE EARTH'S PRIMARY ENERGY SOURCE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define energy.

Understand the relationships of the earth to the sun, specifically the amount of energy received and distributed from the sun.

Identify the forms of solar energy affecting the earth.

Determine factors which affect the receipt of solar energy.

Explore the different sources of energy affecting the earth, and indicate their relative importance.

TEACHING/LEARNING STRATEGIES

List and detail all the ways that man uses energy to do work, including generation of power, transportation, etc.

Relate the modes of work above to so-called "energy resources."

Devise a means to measure heat that can be trapped directly from solar flux.

Consider and show ways how fuels, which contain carbon and hydrogen, are formed.

Using any means at his disposal, and any knowledge, the student can trace

STUDENT LEARNING OBJECTIVES (Cont'd)

Explain earth's ability to retain and radiate heat.

Determine the distribution of solar energy by the earth's system.

TEACHING/LEARNING STRATEGIES (Cont'd)

the energy contained in any "energy resource" back to its ultimate source (e.g., the bond energy in coal).

The student will illustrate with a written report, or a diagrammatic presentation:

- a. The role of photosynthesis in incorporating energy into forms which can be utilized to do work.
- b. The role of photosynthesis in putting carbon in burnable form to use as fuels.
- c. How the sun plays a role in hydropower generation.

CONCEPT

NON-BIOLOGICAL ENERGY FLOWS AFFECT LIFE ON EARTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the hydrologic cycle.

Define the terms: evaporation, condensation, transpiration, and precipitation.

Understand conduction, radiation, convection, and advection.

Explain the effects of conduction, radiation, convection, and advection on the biosphere.

Determine factors that upset energy receipt and distribution.

Understand how non-biological energy systems affect life in their community.

TEACHING/LEARNING STRATEGIES

Diagram the hydrologic cycle and relate the cycling of water (transpiration, evaporation, etc.) to energy flow.

Discuss radiation and convection as means of energy transfer in relation to earth as a closed or open system.

Demonstrate the second law of thermodynamics by:

- a. determining temperature change near a light bulb.
- b. measuring temperature of a car exhaust.

Discuss possible changes in patterns of rainfall due to local heating.

Illustrate the hydrologic cycle by constructing a solar still, and

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

letting the water run down a small grade (i.e., a mock-up hydropower cycle.)

Record and evaluate temperature changes (or other heat changes) which occur near motors of various kinds.

Show how changes in ambient temperature and rainfall could affect the climate and water resources of a city (using diagrams, slides, etc.)

CONCEPT

THE ENERGY FLOW THROUGH THE ECOSYSTEM IS VERY IMPORTANT TO LIFE ON EARTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the physiological process by which solar energy enters the biosphere.

Understand the energy flow through an aquatic and/or terrestrial ecosystem.

Determine the value of decomposer organisms to the flow of energy in the biosphere.

Explain how O_2 demand by living organisms is related to the energy flow through them.

Project the formation, storage, and use or expenditure of a fossil fuel.

Estimate, given certain data about present population growth, usage and supply, the decade when one of the fossil fuels will be completely expended.

TEACHING/LEARNING STRATEGIES

Discuss the origin of fossil fuels and how they are used to do work.

Discuss energy flow through the biogeochemical cycles.

Relate energy storage and transfer through food chains.

Diagram one of the biogeochemical cycles, clearly showing energy flow.

Make an exhibit charting energy transfer in a food chain, clearly showing loss of energy at each upward step.

Show how energy is returned to the non-biological systems from the biological system.

CONCEPT

THERE ARE ALTERNATIVE SOURCES OF ENERGY THAT ARE POTENTIALLY AVAILABLE TO MAN.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine alternative energy sources that are potentially available to man.

Identify the utilization of each source and explain the economic feasibility of each.

Identify the process in the formation of each of these sources.

Project the pollution consequences of each of these sources.

Determine present reserves and future consumption of each of these sources.

Explore the future problems of energy sources and possible solutions.

TEACHING/LEARNING OBJECTIVES

List the major energy sources available to man, and discuss them in terms of:

- a. power (energy/time)
- b. waste products
- c. thermal efficiency
- d. conservation of non-replaceable natural resources
- e. other side effects
- f. attainability on a large scale, and the projected time scale for this.

By means of a chart and exhibit, take each energy source which has been suggested: fossil fuel, chemical solar, MHD, nuclear (fission), fusion, geothermal, hydropower, tidal, metabolic, and diagram its source, power potential, thermal efficiency, side effects on the environment, and availability.

EARTH AS AN ENERGY SYSTEMAlternative #2OVERVIEW

This module deals with the fact that all processes of the earth require energy expenditure. In other words, the earth is an open energy system representing a constant flux of energy in process. Man, in utilizing energy, always experiences some degree of "energy loss." As man converts energy from the sun (the major energy source available) either directly or indirectly, wise management is essential in order to assure the least amount of energy waste.

CONCEPT

MAN'S UTILIZATION OF ENERGY INEVITABLY RESULTS IN A LOSS OF ENERGY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the energy flow in the growth/decay cycle of an animal or plant; e.g., corn, wheat, rabbit.

Understand the energy flow in the manufacture and use of a battery.

Understand the Law of Conservation of Energy.

TEACHING/LEARNING STRATEGIES

Laboratory observation on food chains.

Examine use of the food vs body weight relationship to illustrate the Law of Conservation of Energy.

Diagram energy flow in a food chain.

Research from prepared list on chemistry and physics of a battery.

Demonstration of battery construction.

Personal data evaluation from food intake and body weight over one week to one month period.

Compare the amount of wheat required to produce one pound of body weight taken directly or through beef.

Research on power consumption vs. cooling capacity of air conditioning units.

Laboratory experiment with refrigeration system.

Diagram of energy balance for the refrigeration system.

CONCEPT

THE EARTH IS AN OPEN ENERGY SYSTEM.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Illustrate what is meant by an open energy system.

Explain how the earth maintains a narrow range of temperature, equilibrium.

TEACHING/LEARNING STRATEGIES

Student forum on the consequences of a "closed" energy system earth.

Laboratory demonstrations of heat transfer processes.

Investigate why a room air conditioner does not extract as much heat from the room as it rejects to the outside air, and explain the effect on the environment.

CONCEPT

MOST ENERGY AVAILABLE TO MAN COMES DIRECTLY OR INDIRECTLY FROM THE SUN AND MAN CHANGES ITS FORM TO SUIT HIS NEEDS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Distinguish between direct and indirect solar energy.

Identify the mass and energy balance for the various types of conversion of nuclear to electrical energy.

Differentiate energy forms within a home and where they come from.

Explore the unavoidable losses in the production and distribution of electric power.

Outline "Ten Commandments" for intelligent use of energy in the home.

TEACHING/LEARNING STRATEGIES

Research from prepared list the uses of direct and indirect solar energy.

Demonstration of utilization of both types of solar energy.

Student lecture with diagrams and flow chart of a simple power plant model.

Student forum for comparison between different energy uses in homes.

Written analysis of the effect of removing any three energy sources from the student's home.

Visit or research a power plant operation to determine power plant efficiency, turbine efficiency, transmission losses, etc.

Trace changes in public and personal attitudes toward the use of energy.

The student will decide if his survival in a cold climate depended on a single candle, would he burn it or eat it. Why?

CONCEPT

BIOLOGICAL SYSTEMS ARE ENERGY DEPENDENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify raw materials required for photosynthesis and describe the role of chlorophyll as a light trap.

Justify the statement that respiration is the reverse of photosynthesis.

Contrast aerobic and anaerobic respiration in terms of energy transfer.

Defend or refute the statement that ATP is the universal energy currency for a cell.

Illustrate the bioenergetics of an ecosystem by constructing a food pyramid or food chain.

TEACHING/LEARNING STRATEGIES

Laboratory experiment demonstrating photosynthesis.

EARTH AS AN ENERGY SYSTEM

Alternative #3

OVERVIEW

This module deals with man's need for and subsequent utilization of energy. The module also emphasizes the fact that the earth is essentially a closed energy system, which operates because of a constant energy input from the sun. Due to the inherent inefficiency of transferring energy from the sun into man's needs, thermal pollution becomes a threat to environmental quality. Resourceful utilization of energy becomes mandatory if the environment is to be balanced and of high quality in the years ahead.

CONCEPT

ENERGY ACQUISITION AND UTILIZATION HAVE DETERMINED THE DEVELOPMENTAL COURSE OF CIVILIZATION.

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES

The student will be able to:

Compile a short list of "developed" nations and identify the energy sources providing the historic and current basis for development.

Understand the major cultural steps in the development of human society in terms of the dominant energy source(s) utilized in each of the following:

Relate the development of machines which use combustion as an energy source to:

- a. hunter - gatherer
- b. agrarian
- c. industrial
- d. post industrial

- a. power and energy demands
- b. changes in life style
- c. advances in manufacturing technology

Identify events that altered the development of man as a result of an increase in man's utilization of energy.

Relate the development and use of synthetic products to power and energy demand.

Determine coal and water power resources, correlating the resources with industrial/social activity.

Formulate a hypothetical course of civilization in which per capita power consumption decreases rather than increases.

Discuss how energy changes influenced the start of the industrial revolution.

STUDENT LEARNING OBJECTIVES (Cont'd)TEACHING/LEARNING STRATEGIES

Explain historical interrelationships of human population growth pattern with man's technological ability to harness energy.

Parallel the development of energy sources with the growth of the U. S. as an industrial nation.

CONCEPT

ENERGY FROM THE SUN IS MODIFIED AND TRANSFERRED IN THE ECOSYSTEM.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES

The student will be able to:

Understand how the energy from the sun is released when coal is burned.

Explore the cyclic activities which demonstrate the changing form of solar energy sources in plant/animal communities and human fuel consumption activities.

Explain how the major energy flows into, through, and out of the earth's biosphere and the overall ecosystem.

Identify the steps used by the plant kingdom to transfer sun's energy to chemical energy.

Make a diagram showing how solar energy enters into the photosynthetic reaction and is thus incorporated into living systems.

Show how energy is transferred through the food chain to successively higher organisms. (Energy is not "modified.")

CONCEPT

AS ENERGY FLOWS FROM ONE LEVEL TO ANOTHER, A DEGRADATION OCCURS IN A REDUCED AMOUNT OF USABLE ENERGY WITHIN A DEFINED SYSTEM. (SECOND LAW OF THERMODYNAMICS)

STUDENT LEARNING OBJECTIVES

The student will be able to:

Project immediate action if his continued existence in a cold climate depended only on a candle, whether to eat it or burn it.

Estimate how much heat loss to a particular system is incurred when:

- a. fossil fuel, such as coal is burned to provide electrical energy.
- b. nuclear fuel (uranium and plutonium) is used to provide electrical energy
- c. waterpower
- d. solar energy is converted to electricity.

Understand the second law of thermo-synthetics, stating the implications with respect to generation of heat.

TEACHING/LEARNING STRATEGIES

Since only 1/10 of original energy sources is moved from one level of a food chain to another, calculate the amount of wheat necessary to produce 100 lbs. of human weight if the wheat is first consumed by beef cattle.

Using any common machine as an illustration, show the proportion of energy which is converted to work, and evaluate what is dissipated into the environment as heat.

Discuss the thermal efficiency of various modern uses of power.

Discuss the second law of thermodynamics; i.e., heat cannot be transformed into work at 100% efficiency, and its implications if there is a continued increase in per capita power consumption.

CONCEPT

EXCESS HEAT IS RELEASED INTO THE ENVIRONMENT DUE TO MAN'S INEFFICIENT USE OF ENERGY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand how the mechanics of an automobile energy system is wasted in the form of heat.

TEACHING/LEARNING STRATEGIES

Discuss how the generation of solid waste is related to excess heat generated under the second law of thermodynamics. Also discuss the second law as a general expression of "lack of faith in technological miracles."

STUDENT LEARNING OBJECTIVES (Cont'd)

Compare the metabolic generation of heat in a biological system with that of a steam generation in a nuclear power plant.

Identify ways heat loss is dealt with in our industrial civilization; e.g., heat loss is dissipated from internal combustion engines by means of a liquid radiator or heat vanes or fins on the cylinder heads.

Identify major processes whereby man has inadvertently generated thermal pollution.

TEACHING/LEARNING STRATEGIES (Cont'd)

Design laboratory experiments to demonstrate how energy production by nuclear fusion is illustrative of the operation of the second law.

Discuss thermodynamic efficiency for each of the known or projected ways of producing power:

- a. conventional generating plants
- b. nuclear hydropower
- c. geothermal
- d. MHD
- e. solar power
- f. tidal power
- g. fusion

CONCEPT

MAN'S CONSUMPTION OF ENERGY RESOURCES IS INCREASING AT A RAPID RATE RESULTING IN SIGNIFICANT ENVIRONMENTAL THERMAL EFFECTS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the tremendous rate of increase in the uses of energy from the past to the present day and have some knowledge about the projected use of energy for the future.

Explain what is meant by thermal pollution and the consequences it has on the environment.

TEACHING/LEARNING STRATEGIES

Prepare a position paper as to whether or not the local community should propose a new shopping center.

Research government and scientific publications to determine the rate of increase in the use of energy.

Correlate the direct effects of heat on the aquatic system by measuring the O₂ content of water at varying degrees of temperature in an artificial lab condition and in a thermally stratified lake environment.

Make a chart of heat radiation from a major city in your area, including the major power uses.

Make an exhibit showing the effects of waste heat over a major city on weather patterns and water availability.

ENVIRONMENTAL PERCEPTION

Alternative #1

OVERVIEW

The module on environmental perception is "considering the process of living." The perception of the living processes in our environment, and that the resources of earth are not limitless, began with a few individuals and has now become a worldwide concern. This concern, with implications for human survival, is relatively new when measured against man's existence as a species. Man throughout most of his existence has dealt with his natural environment on a competitive basis. However, his unique physical features and mental capacities have enabled him to shape his environment and alter the processes of evolution. Man's early struggle for survival dictated that he master natural elements and use resources for survival and improvement of his living conditions. Seemingly, the overabundance of natural resources has led man to be very wasteful.

Man's new-found perception of earth as a closed system with finite resources has led to the realization that human survival will depend on a worldwide cooperative effort to control waste and degradation of all earth's resources, as well as nurturing of resources necessary for life. Human survival depends on appreciation of earth's limits and the understanding of ecosystems. Equally important is the development of an environmental awareness in the redirection of human life-style and technology.

Environmental protection, while a responsibility of political leaders, scientists, and technologists, will be of little avail unless earth's human inhabitants develop a better understanding for the delicate balance of natural processes that support life. Man must develop perception of life in a closed system where he is not the dominant proprietor of earth's resources, but an integral part of that system on which he is totally dependent.

Modern man's perception is colored by his seeking the "good life" through economic development. Developing countries are seeking to obtain the American standard of living. Their goals and course of action will give low priority to long-range environmental quality when weighed against the short-range human comfort and economic goals. Environmental crises will become more apparent as countries with large populations become larger consumers.

CONCEPT

EARTH'S RESOURCES ARE FINITE. ALTHOUGH EARTH IS A CLOSED SYSTEM, MAN'S CONVERSION OF RESOURCES FREQUENTLY RENDERS THEM NON-RECOVERABLE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Develop a basic understanding of natural resources and their distribution on earth.

Distinguish between renewable and non-renewable resources.

Understand how resources become non-recoverable.

Develop an understanding of how our life styles affect environmental quality.

Develop an understanding of land as the resource.

TEACHING/LEARNING STRATEGIES

Review maps which show deposits of minerals in the U. S. and the world.

Discuss how man mines mineral resources from areas of concentration and distributes them over the face of the earth, rendering them non-recoverable.

Lecture on the rate Americans are consuming natural resources, especially the non-renewable minerals and oil, and further, discuss the philosophy of consumption.

Review literature on the world oil reserves.

Follow the process of iron mining and the use of iron. Discuss why industries frequently prefer to mine virgin deposits rather than recycle.

Select films whose themes revolve around natural resources, their mining and processing. Specific sources are the films available through the U. S. Dept. of Interior and Dept. of Agriculture, as well as Humble Oil Co. and Gulf Oil Co.

Prepare lists of renewable and non-renewable resources.

Review the literature on projected uses of natural resources and compare to current American life styles.

Discuss how the current composition of automobile bodies makes them difficult to recycle.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Discuss the need to develop a systems approach in the nation's manufacturing processes so that waste products are manufactured with the ultimate design that when their useful life is ended they will be more readily recycled.

Provide examples of life styles that have consumed open space and land. Special note should be given that suburban living has consumed land at an increasing rate and in many cases the methods for land use contribute to the overall degradation of the environment.

Through class discussion, review how priorities and life styles have failed to adequately consider the value of land as a natural resource.

CONCEPT

MAN IS PART OF EARTH'S ECOSYSTEM IN WHICH HE STRONGLY INFLUENCES THE DIRECTION AND DESTINY; FURTHER, HE IS AN INEXTRICABLE PART OF THAT PROCESS UPON WHICH HE IS TOTALLY DEPENDENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand how ecosystems work.

Understand how man has altered his ecosystem by industrial development, and/or exploitation of resources.

Understand how man's well-being is tied to his interaction with his environment, by discussing how pesticides, air pollution, or other environmental degradation has affected man's food supply or health.

TEACHING/LEARNING STRATEGIES

Lecture on the meaning of ecology.

- a. Use the definition provided by Webster and compare to other definitions found through the literature.
- b. Use charts and movies to demonstrate the meaning of ecosystems.
- c. Develop an audio-visual presentation on ecosystems.

Prepare individual reports on specific ecosystems, using charts and providing detailed descriptions of individual components.

STUDENT LEARNING OBJECTIVES (Cont'd)

Develop a basic understanding of biosphere through discussion of how man has accelerated alterations in the chemistry of the biosphere.

TEACHING/LEARNING STRATEGIES (Cont'd)

Provide a list of reading material on the ecological concepts.

Prepare a class project, such as an ecology coloring book that can be used as a hand-out or as material to demonstrate ecology to a younger group of students.

Lecture on the ecosystem of the Florida Everglades, using information from:

- a. Department of Interior
- b. University of Miami publications
- c. Newspaper articles

Conduct a class seminar or panel discussion on the value of chemicals to man's health and the adverse impact of their accidental dispersion into the environment.

Lecture on the biosphere from available literature. The lecture should include audio-visual aids that will provide the student a perception of the thin layer that encompasses all life on earth.

Conduct a panel discussion on the biosphere, assigning various components to individual students.

Select reading assignments on the biosphere. Ask the students to relate the assignments to perception of their environment.

Discuss how pesticides and their residues have found their way into human tissue and pose potential danger to our health.

CONCEPT

EARLY MAN'S STRUGGLE FOR SURVIVAL HAS PUT MAN IN THE ROLE OF AN ADVERSARY TO NATURE'S PROCESSES. HIS UNIQUE PHYSICAL AND MENTAL CAPACITIES HAVE GIVEN HIM THE ABILITY TO ALTER HIS ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand how man's impact on the environment has changed as his skills and technology have progressed.

- a. Discuss the primitive culture and compare the impact to that of modern man.
- b. Discuss the development of one or more aspects of modern technology, underscoring the impact on the environment and how man's goals for economic development and technological advancement have conflicted with the quality of life.

Describe examples of how man has shaped his environment, specifically topography, air quality and water quality.

TEACHING/LEARNING STRATEGIES

Develop brief reports for use in seminar discussion on the development of man, using references from the encyclopedia, anthropology books, or the Time-Life series on the development of man.

Prepare posters showing the demands on the environment placed by man pre-historically, during the Middle Ages, and in the 20th Century.

Select movies that describe the development of technology, and ask students to discuss in seminar session the specific points covered that have had significant effect on environment today.

Conduct a class visit to an historical museum noting the various machinery of the last century and life styles noted.

Conduct a class seminar to review the life styles of their impact on the environment of the 18th or 19th century.

Describe open-pit mining in the United States. Assign individuals to review specific aspects of legislation to control strip mining in the United States.

CONCEPT

THE APPARENT ABUNDANCE OF NATURAL RESOURCES HAS ENDOWED MAN WITH THE LUXURY OF WASTE. HOWEVER, LUXURY IS A DEBT WHICH MUST BE PAID AS POPULATIONS INCREASE BEYOND THE NATURAL ABILITY OF THE ENVIRONMENT TO RECOVER AND AS RESOURCES BECOME SCARCE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Demonstrate an understanding of how man has squandered his resources, specifically:

- a. open space
- b. farm land
- c. animal life
- d. water

Describe the value of environmental features:

- a. clean air
- b. vegetation
- c. animal life
- d. water
- e. insects

Understand how in the United States the concept that we could not destroy our environment because there would always be more land and resource has affected the quality of life.

TEACHING/LEARNING STRATEGIES

Prepare an audio-visual presentation on how they would go about reducing the consumption of water.

Review a city or county map prepared 25 or 50 years in the past. Compare that map to today's on the ground community and discuss what apparent values were placed on open space, farm land, and wildlife.

Prepare a class display that can be transferred to other locations describing the value of clean air, vegetation, animal life, water, and insects to the environmental quality of their community.

Discuss biological pest control.

- a. Invite a guest speaker from the Department of Agriculture research laboratories to talk on the program to use biological controls and non-chemical methods to control forest pests.
- b. Research literature for specific examples of insects that help to protect man's crops.

Research literature on the "Dust Bowl."

- a. What political factors lead to responsible farming practices?
- b. Prepare graphs on land destroyed.

Review modern large farming practices and discuss the potential impact on:

- a. natural ecosystems
- b. wildlife
- c. potential crop damage

CONCEPT

ENVIRONMENTAL PROTECTION IS A MAJOR RESPONSIBILITY OF GOVERNMENT, HOWEVER, IT MUST BE A PARTICIPATORY PROCESS IN WHICH EARTH'S CITIZENS HAVE A BASIC UNDERSTANDING AND FEEL A RESPONSIBILITY FOR MAINTAINING THE DELICATE FABRIC SUPPORTING LIFE ON EARTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Project examples of how environmental ethics or concern for ecological balance by citizens has protected some nonrenewable aspect of our environment.

Understand how lack of citizen concern or understanding has led to destruction of ecosystems or components thereof which are important to man.

Provide examples of how the educational system could best serve to develop an environmental ethic in students.

Identify issues that have come to public decision or vote in which citizens were required to determine the direction in which their community would move.

- a. Was environmental awareness necessary for a sound decision?
- b. Did goals conflict with environmental quality?

TEACHING/LEARNING STRATEGIES

Prepare a news clipping file on citizen eco-action and analyze clippings to determine focal point that raised citizen response.

Invite a local conservation organization speaker to discuss environmental losses in your community.

Prepare slides and documentation on an example of environmental destruction in a particular area.

Develop as a class project a narrated slide presentation on the student's community or a specific ecosystem within the community.

Discuss grade school's environmental education programs in your community. (Have students interview teachers and administrators.)

Review a recent bond issue concerning parks, water and sewers or highways to determine the emphasis placed on environmental quality.

CONCEPT

THE LIFE SUPPORT SYSTEM FOR EARTH IS THE BIOSPHERE. IF THE BIOSPHERE IS ALTERED BEYOND REPAIR, THERE IS NO OUTSIDE SUPPORT TO COME TO OUR AID.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the parameters of the biosphere.

Compare the biosphere to a space ship.

Compare the biosphere to a balanced aquarium.

Understand the hydrocycle.

Discuss the role of the atmosphere in protecting life on earth.

Describe the greenhouse effect.

TEACHING/LEARNING STRATEGIES

Lecture on the concept of the biosphere using charts or other visual material.

Develop as a class project an audio-visual display that demonstrates the various components of the biosphere.

Prepare charts on the hydrocycle. Prepare audio-visual presentations on the greenhouse effect.

Develop a demonstration of the greenhouse effect.

Compare the thin mantle that supports life on earth, by the use of visual aids and charts, to distances in the universe or to the depth of water in a quart jar, or to skin of an orange.

CONCEPT

HUMAN VALUES SHAPE ENVIRONMENTAL PERCEPTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Describe his perception of the environment in his community.

Describe how overriding goals such as economic or flood control are perceived to be in the best interest of a community.

Discuss the value of open space within an urban setting.

Discuss the value of wilderness areas and wildlife.

TEACHING/LEARNING STRATEGIES

Have students do an environmental perception survey of their own home site or the block in which they live or the school grounds.

Have students delineate their own predominant values and have them relate them to local environmental issues.

ENVIRONMENTAL PERCEPTION

Alternative #2

OVERVIEW

This module examines some of the origins of differences in environmental perception and the impact of these differences on the environment. Differences in perception between individuals or groups of individuals are rooted in socially learned biases. These differences complicate the resolution of environmental problems since there may be little agreement as to what constitutes a problem, or what solutions are feasible.

CONCEPT

MANY ENVIRONMENTAL PROBLEMS STEM FROM A SOCIETY'S FAILURE TO PERCEIVE THE ENVIRONMENT IN A HOLISTIC MANNER WHERE THE NATURAL AND THE MAN-MADE ARE COMPLEMENTARY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the necessity of viewing the environment from a holistic approach.

Identify a number of factors that the society apparently failed to take into consideration in relation to selected problems such as the Aswan Dam, the Four Corners power plant, the construction of an interstate highway system, the impact of "concentrated" agricultural techniques (feed lots, etc.) or other problems in their own area.

Demonstrate his knowledge of the impact on the environment of a variety of local and national environmental issues.

TEACHING/LEARNING STRATEGIES

In groups, students should design an audio-tutorial lesson for local environmental problems, using any of the audio-visual materials available to them; e.g., audio cassettes, selected readings, etc. Each audio-tutorial set-up is to include an evaluation device. The emphasis on this exercise is to have students take into account all discussions pro and con relating to a particular environmental problem.

Have students make an exhaustive list of all issues relating to a particular environmental project; such as the development of a new nuclear power plant, expansion of an interstate highway system, new land development projects, etc.

CONCEPT

WITHIN A GIVEN SOCIETY, RESOURCES BECOME RESOURCES ONLY WHEN THE SOCIETY PERCEIVES THEM AS SUCH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify that point in time at which certain presently defined resources were perceived as resources by U. S. society, e.g., oil, uranium, aluminum cans, arid land, etc.

Describe the need or technological development taking place that changed the perception of society from "non-resource" to "resource."

Determine specific sociological implications of the change in perspective for various resources.

Identify specific international implications of the change in perspective resources.

TEACHING/LEARNING STRATEGIES

Simulation game. In the middle of the room pile a number of "resources"-- stones, Lincoln logs, greenery, artificial grass, toy animals, toy cars, cans of water, sand, pieces of plastic on metal, etc. Divide the class into small groups. Each group can start with a specified number of items from the common pool. The task is to build a "new town," or planned community. Each group is free to innovate technologically to meet the needs of their community. After the initial allocation of resources, no new items are to be added to the common pool. Items remaining in the common pool are available to each group only through barter and exchange. One group is to be responsible for the common pool of resources and to handle the transactions of barter and exchange. Groups may also barter independently with each other.

CONCEPT

AN INDIVIDUAL'S PERCEPTION OF THE ENVIRONMENT IS ROOTED IN SOCIALLY-LEARNED BIASES, AS WELL AS UNIQUE INDIVIDUAL EXPERIENCES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define "perception."

Identify different worldwide viewpoints, behavior patterns, or attitudes that result in the maintenance or nurture of a healthy environment.

TEACHING/LEARNING STRATEGIES

Arrange a panel discussion between a psychologist, a sociologist, a philosopher, and an economist. Discuss the holistic implications of Man and Environment. Students should be permitted to freely question panel members and should be encouraged to prepare a list of questions in advance, based on both the objectives and general interest.

STUDENT LEARNING OBJECTIVES (Cont'd)

Understand psychological, sociological, metaphysical (philosophy, religion, etc.) and economic factors in U. S. culture that influence man's treatment of the environment either positively or negatively.

Project examples of the effect of each of the factors listed above. These effects or consequences may be either positive (resulting in a healthy environment) or negative (resulting in environmental degradation).

Identify at least three personal experiences that changed his perception of the environment:

- a. Students should attempt to identify the origin of the initial attitude or perception.
- b. Students should describe the change in perception (from what to what).

TEACHING/LEARNING STRATEGIES (Cont'd)

In small groups, students should brainstorm on personal experiences that changed their perception of the environment. Changes in perception often result from seemingly trivial experiences. During brainstorming, no idea or thought can be rejected--all are to be recorded. It would be useful, also, to identify perceptions held by students that are somewhat different from those of their parents, grandparents, friends, and other associates.

CONCEPT

DISPARITIES IN ECOLOGICAL PERCEPTIONS EXIST BETWEEN DIFFERENT GROUPS (BOTH BETWEEN DIFFERENT SOCIETIES OR DIFFERENT SUB-GROUPS WITHIN A SINGLE SOCIETY). THESE DISPARITIES OFTEN CREATE OBSTACLES TO THE RESOLUTION OF ENVIRONMENTAL PROBLEMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize the basis for varying points of view on environmental controversies.

Understand that environmental issues are multi-facet and that individual and group perceptions reflect one's social and economic orientation.

TEACHING/LEARNING STRATEGIES

Analyze the testimony from a public hearing on an environmental issue in their area. (If the results of the hearing are not known, students should not be given this information.) The names of individuals and the company, agency, or organization the individual represents should be deleted, and should become available to students only after the analysis is completed. Based on the testimony alone, students should attempt

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

to characterize each individual who testified in an attempt to identify the perspective from which the testimony was offered.

Submit their analysis of the testimony. This analysis should include:

- a. Their characterization of the perspective from which each individual testified.
- b. Identification of individuals who were not properly characterized, based on a review of complete hearing records in which individuals and the agency or organization they represent are identified.
- c. Elements in the testimony that contributed to mischaracterization, where appropriate.

Put together a set of pictures or slides that can be used in class or with other groups of people to identify differences in environmental perception. For each picture, the viewer should answer a set of objective or multiple choice questions that can be readily tabulated. Most colleges have a computer program for survey analysis to summarize results. The questions might include such information as (1) sex, (2) ethnic group, (3) occupational category, etc., or other factors students believe will influence perceptions. Then for each picture, the questions might include such things as: (1) Do you recognize an environmental problem in this picture? (2) If there is a problem, is it from "very important" to "not very important?" (3) Does this problem (if any) have any direct effect on your life, etc.? Then ask viewers to rank order the problems from (1 - 5) "most important" to "least important."

CONSERVATION OF VITAL RESOURCES.Alternative #1OVERVIEW

This module seeks to determine the place of renewable natural resources in man's environment and the importance of conservation of these resources. Renewable natural resources are interrelated and are an integral part of man's environment. His activities affect these resources either positively or negatively. Attempts will be made to point out some of man's past errors and some of the losses and disasters that have occurred as a result of ignorance, greed or thoughtlessness. The need for long-range planning in this area will be stressed.

CONCEPT

MAN'S RENEWABLE RESOURCES INCLUDE AIR, FORESTS, GRASSLANDS, SOIL, WATER AND WILDLIFE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define the term renewable natural resources and identify the renewable natural resources.

TEACHING/LEARNING STRATEGIES

List the renewable and non-renewable natural resources.

Cite reasons (from at least one of the list of non-renewable resources) for belief that exhaustion of certain non-renewable resources will become critical to the maintenance of quality and/or quantity of human life on earth within the next 50 years.

Write a rationale to classify fresh water supply as renewable or non-renewable.

CONCEPT

CONSERVATION IS THE WISE USE OF NATURAL RESOURCES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Compare the concept of preservation with conservation.

TEACHING/LEARNING STRATEGIES

Select a local issue involving a conflict between those interested in preservation or conservation and those interested in exploitation of a local natural resource. For this issue:

STUDENT LEARNING OBJECTIVES (Cont'd)

Appreciate the need for wise use for each of the renewable natural resources.

TEACHING/LEARNING STRATEGIES (Cont'd)

- a. Clip out and file all articles involving the conflict that appear in a local newspaper for one month.
- b. Identify as many groups as possible who have taken public stands on the conflict and indicate which side of the issue they support.
- c. As much as possible, determine who will profit from each of the opposing courses of action.
- d. List the epithets used by each side in describing the proponents of the other view.
- e. After completing some of the above, take whichever position your study has led you to believe is the correct one, and prepare a text for a two-minute speech designed to persuade decision-makers to adopt your view of the issue.
- f. List the most logical decision-makers (individuals or governmental bodies) before whom this speech should be given.
- g. Since you will be better informed than many partisans and many decision-makers, write a letter requesting time on the agenda of the decision-makers to give your speech. If your request is granted, give your speech.

For each of the renewable resources, list an example of wise use and an example of what you consider unwise use.

Select a level of government (local, county, state, or national) and for that level list the specific or individual agency, if any, responsible for each of the renewable resources. HINT: The phone book in your city, the county seat, the state capital city, or in Washington is a good source of such information.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Find comments in the press evaluating or criticizing how some state or federal agency is doing its job in conserving natural resources. HINT: Among the more controversial agencies are: Soil Conservation Service, U. S. Forest Service, Bureau of Land Management of the Department of the Interior, Army Corps of Engineers, and the Atomic Energy Commission.

CONCEPT

RENEWABLE NATURAL RESOURCES ARE INTERRELATED AND ARE AN INTEGRAL PART OF MAN'S ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine interrelationships between the renewable natural resources.

Project examples of aesthetic contributions of each renewable natural resource.

Identify a contribution of renewable natural resources to his physical environment.

TEACHING/LEARNING STRATEGIES

Write a short paper on aesthetic contributions of each renewable natural resource.

For any set of three renewable natural resources; e.g., forests, soil, or water, describe in detail the effect of each resource and its use on the quantity and quality of the other two resources in the set.

Walk through any park of your choice, taking notes on how any of the renewable resources contributed to your enjoyment of the walk.

List demands placed on the supply of natural resources for maintenance of the immediate environment.

CONCEPT

MAN, AS A RESULT OF IGNORANCE, GREED AND THOUGHTLESSNESS, HAS CAUSED THE ENVIRONMENT GREAT HARM.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify several organisms that are extinct, or nearly so, due to man.

Understand the reason or reasons why an organism may become extinct.

Explore the misuse of renewable natural resources which has had calamitous effects.

TEACHING/LEARNING STRATEGIES

List organisms that have become extinct or severely reduced in numbers through each of the following activities of man.

- a. direct, intentional slaughter
- b. habitat modification
- c. unintentional poisoning

Obtain a current list of endangered species. HINT: Your local Audubon Society, Sierra Club, or other conservation organizations might be helpful here.

Name and describe fully an activity of man which, for private profit, reduces our supply of one or more natural resources, while at the same time it degrades the quality or quantity of other natural resources.

CONCEPT

INTELLIGENT CONSERVATION PLANNING REQUIRES CONSIDERATION OF A MULTITUDE OF FACTORS AND THEIR LONG-RANGE IMPLICATIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the agencies which are involved in long-range planning for conservation of renewable natural resources.

Understand how many agencies have cooperated in solving a common conservation problem.

TEACHING/LEARNING STRATEGIES

Prepare a list of conservation organizations active in your region, and through direct contact with an officer or member (list his name, address, phone number, and title, if any) determine and record specific activities of each of three such organizations.

Attend a meeting or participate in some activity of one of the conservation organizations.

STUDENT LEARNING OBJECTIVES (Cont'd)

Given a case study of a conservation measure, identify social, political, economic and health factors and their long-range implications.

TEACHING/LEARNING STRATEGIES (Cont'd)

From the newspaper, or any other source, document the cooperation of combinations of conservation organizations and more than one unit of government in seeking solutions of a conservation problem.

For some specific natural resource problem or environmental "hassle," identify social, political, economic, health, or other factors you might note which have or had to be considered in attempting resolution of the problem on a long-term basis.

CONSERVATION OF VITAL RESOURCES

Alternative #2

OVERVIEW

This module highlights the importance of understanding the basic ingredients of the earth necessary for the continued survival of mankind. Vital resources may be categorized as being either renewable or non-renewable. This represents a continuum rather than a dichotomy. If man is to survive as a species with a life style commensurate with today's standard of living, he must be aware of the resources required to do so. These resources may be living or non-living; renewable or non-renewable; regenerative or reusable. When making an intelligent decision regarding the conservation of a vital resource, man must be able to recognize the interrelationships of other vital resources. In addition, man must also be aware of the many social, political, and economic implications involved when he makes a decision of this kind.

CONCEPT

RESOURCES ON THIS PLANET ARE FINITE. THE RESOURCES MUST BE PRESERVED BY RECYCLING, REUSE AND INTELLIGENT UTILIZATION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Distinguish between renewable resources and non-renewable resources.

Identify those resources which can be recycled and those which cannot.

Distinguish between reusable, recyclable, and biodegradable resources.

TEACHING/LEARNING STRATEGIES

Classify the following resources as renewable or non-renewable:

Petroleum	Air
Forests	Phosphate Deposits
Coal	Water

Research at least two other examples of each class of resource.

For some resources, we have as much (or more) of a problem of quality of resource as of quantity. Explain this statement, citing examples in class discussion groups.

List some common materials which are recyclable.

Examine the containers and packaging in a supermarket and then list examples that are:

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

- a. non-recyclable, not (usually) reusable, and not biodegradable.
- b. unnecessary
- c. reusable
- d. recyclable

CONCEPT

AN INTERDEPENDENT RELATIONSHIP EXISTS BETWEEN LIVING AND NON-LIVING RESOURCES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Select an animal or plant species and identify ways these species are dependent upon non-living resources.

Discuss the principle of natural extinction of a species (those that appear to have a rationale explanation and those which are not explainable.

Explain the water cycle, carbon cycle, oxygen cycle, and nitrogen cycle.

Understand how fossil fuels were formed.

Project examples of plant communities and animal communities which are ecologically and economically important to man.

Understand why a fresh water marsh near a city can be beneficial to man.

TEACHING/LEARNING STRATEGIES

List two or more species which apparently became extinct through natural causes.

Name a species that apparently became extinct through the action of man.

Obtain a list of endangered species from one of your local conservation organizations (Sierra Club, Audubon Society, Wildlife Federation, etc.) and list any of these species still found in your state.

Sketch the water cycle, carbon cycle, and nitrogen cycle.

Describe which of these cycles would be most disturbed by large amounts of DDT in the ocean. Why?

List fuels which are included in the term "fossil fuels."

Explain why they are called "fossil fuels."

Discuss devices or activities of man which are the three greatest consumers of these fuels.

Obtain (perhaps from a library) an estimate of the number of years the world's known petroleum deposits will last before they are exhausted.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Discuss the ecological and economic importance of a saltwater marsh.

Describe a man-induced stimulation of growth of a plant community which, in turn, has caused problems for man.

CONCEPT

ENERGY IS AN OPEN SYSTEM AND IT IS NOT RECYCLABLE; THUS, LIFE DEPENDS UPON A CONSTANT INPUT OF ENERGY THROUGH THE PHOTOSYNTHETIC PROCESS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Describe the flow of energy through an ecosystem.

Determine why biological producers are independent of consumers but the reverse is not true.

Examine how man's technology is dependent upon the non-renewable resources of stored energy in fossil fuels.

TEACHING/LEARNING STRATEGIES

Discuss the ultimate source of energy to ecosystems.

Diagram the flow of energy through an ecosystem.

List classes or organisms which are producers. List what they produce.

Discuss why biological producers are independent of consumers, but not vice versa.

Aside from producers and consumers, research other large classifications of organisms based on feeding habits. HINT: They do not eat live organisms.

Through personal observation or inquiry by phone or letter, determine what major energy sources are used by the three largest industries in your city (or state).

From your local electric power company, obtain information on their past, present, and projected future consumption of fossil fuels. Also, ask them what fraction of the heat energy appears as usable electric power--and what happens to the rest of the heat.

Identify two forms of transportation (air, rail, barge, ship, truck) which seem to bring the greatest tonnage or value (state which) to your community. List the source of energy used by each.

CONCEPT

POLITICAL AWARENESS OF THE PRINCIPLES RELATED TO CONSERVATION OF VITAL RESOURCES IS PARAMOUNT. IF THE LIFE STYLE IS TO BE PRESERVED OR IMPROVED.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize where and when conservation of vital resources is needed in the local community.

Describe and discuss an economic restraint on appropriate political action.

Identify instances in the local community where present practices must change if resources are to be conserved.

TEACHING/LEARNING STRATEGIES

Prepare a list giving the name and address of the U. S. and state representatives and senators representing the district in which you vote (or live).

Research some local ecological atrocity or environmental controversy to have a definite, knowledgeable opinion on the matter.

Share a conviction and reasoning with one of those named as representative or senator by writing him a letter.

For a given problem, identify all possible economic issues that are involved.

List economic restraints which might prevent a local group of private citizens from adequately presenting the public's case in a public interest vs. private profit environmental hassle.

Conduct a play around the theme "It would be nice to clean up pollution, but it will cost too much."

Pick a local, state, or national issue where there is controversy concerning the proper use of natural resources (examples: strip mining; clear cutting of forests; logging of national forests at rates greater than replacement rates; damming of free-running rivers for navigation, power, flood control) and conduct a series of debates highlighting the pros and cons of the issue selected.

Project the proposed use of a variety of resources over a span of 10, 50, and 100 years. What is your estimate of the future for this resource and of the effect of such long-continued use on the environment.

CONCEPT

SIGNALS INDICATING THAT VITAL RESOURCES ARE IN JEOPARDY MUST BE MADE PUBLIC.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify those vital resources that are in jeopardy of being depleted under existing practices.

Identify ways and means in which the public may be informed of the seriousness regarding the use of natural resources.

TEACHING/LEARNING STRATEGIES

List four instances of depletion of resources in your state.

List any of the resources identified which are capable of recovery from their depleted state.

Among state's resources not listed as depleted, name some projected to be on the depleted list in 50 years.

Give several examples of depletion of natural resources resulting from pollution.

List instances where the quality of a resource is in jeopardy.

CONCEPT

INDIVIDUAL LIBERTIES MAY HAVE TO BE RESTRAINED FOR THE PRESERVATION OF LIFE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Demonstrate awareness of possible restraints on individual freedom by describing areas of restraint that are to be considered to be most appropriate to the conservation of vital resources.

Describe the need for legal enforcement of restraints designed to conserve vital resources.

TEACHING/LEARNING STRATEGIES

Discuss restraint of human freedom which has long been accepted to control land use.

Suggest some further restraints of human behavior that may be necessary for environmental protection; e.g., flood plains, estuaries, wilderness areas.

Determine what sort of restraints are enforced in the state to protect certain living things.

Write on limitation of freedom seen as desirable or necessary in order to help solve the following:

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

- a. electric power shortage
- b. air pollution
- c. population explosion
- d. water pollution
- e. sound pollution
- f. scenic pollution

CONSERVATION OF VITAL RESOURCESAlternative #3OVERVIEW

This module stresses it is essential that man understand and act upon his knowledge of the interdependence necessary for survival of the earth resource system. It is important that man understand that the earth is a closed natural system in regard to matter. Categories such as renewable or non-renewable, living or non-living, regenerative or reusable, cyclic or non-cyclic facilitate identification and understanding of the world's vital resources. An intelligent understanding of man's role in this interdependent system (such as effects of control) is essential for effective management of resources. It is vital to understand the problems encountered economically, politically and sociologically in planning solutions for effective management.

CONCEPT

VITAL RESOURCES CAN BE CLASSIFIED AS LONG TERM AND SHORT TERM, CYCLIC AND NON-CYCLIC, BIOTIC AND ABIOTIC.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Describe what is meant by vital resources.

Understand the various sub-classifications of resources:

- a. cyclic and non-cyclic
- b. biotic and abiotic
- c. long term and short term
- d. reusable

Explain the hydrologic cycle.

TEACHING/LEARNING STRATEGIES

Define, compare, and contrast the following terms describing resources, giving examples:

- a. vital resources
- b. cyclic vs non-cyclic
- c. long term vs short term
- d. biotic and abiotic
- e. reusable
- f. hydrologic cycle

CONCEPT

THE EARTH IS A CLOSED SYSTEM. IT IS AN ISOLATED MATERIAL SYSTEM IN SPACE IN WHICH, MATTER IS CONSERVED AND ENERGY CAN BE ADDED ONLY FROM OUTSIDE THE SYSTEM.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

Identify the nature of ecosystems by

STUDENT LEARNING OBJECTIVES (Cont'd)

Explain ecosystems as follows:

- a. their components
- b. the flow of energy through them
- c. factors leading to stability or instability
- d. the flow of matter through them
- e. the interactions between ecosystems
- f. the effects of man on them

TEACHING/LEARNING STRATEGIES (Cont'd)

consideration of the following questions: (It would be well to pick a particular ecosystem, identify it and use it to give examples where asked.)

- a. Name the three major components of an ecosystem (Hint: consumers, _____ and _____) and for an ecosystem of your choice, identify species, genera, families, or orders of organisms of major importance in each component.
- b. Diagram the flow of energy through ecosystems, comparing a natural system such as a forested river valley with a man-dominated one, such as a cornfield.
- c. Identify some factors which lead to stability or instability of an ecosystem.
- d. Diagram the flow of matter through an ecosystem.
- e. Show the interactions between ecosystems, (you might choose adjacent ones such as the river valley forest and adjacent uplands for ease in answering).
- f. For the ecosystems chosen in the above, show how many of man's activities in one of the ecosystems may drastically affect the form or function of one or both of the systems.
- g. If the activities of man tend to simplify ecosystems and render them unstable (do they?) what does man do to try to restore stability? Give examples.
- h. In view of your answers to questions above, comment on the value of the concept "design with nature." If you need help on this question, go to your library and see what the landscape architect McIlarg has to say in his book "Design with Nature."

CONCEPT

THE EARTH'S RESOURCE SYSTEMS ARE INTERDEPENDENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand resource management sufficiently to:

Identify the relation of supply and demand to the value of natural resources.

Analyze local resource management problems.

Project national or world-wide resource management problems into the future.

Have some notion of the components of a resource management problem (political, economic, social, ecological).

Investigate the relatedness of resource management at the local or state level on national or world systems.

TEACHING/LEARNING STRATEGIES

List several important natural resources of your state or region and for them:

Show the relation of supply and demand to their value.

Discuss any problems associated with their management, extraction, or exploitation.

Make a short cost/benefit analysis for some local or regional resource that is regarded as a regional asset. Pay particular attention to who pays for the subtle costs of pollution, transportation, environmental degradation, price support, etc.

Take a long-range look (100 years or more) at the world's supply of several vital resources. Show written evidence you have done so (by reviewing an article or book, by showing calculations or graphs on the subject, original or otherwise, etc.)

For some controversy over natural resources in your state, briefly discuss the components of the controversy under the following headings, if applicable:

- a. political
- b. economic
- c. social
- d. ecological
- e. other

CONCEPT

MAN INTENTIONALLY OR UNINTENTIONALLY AFFECTS THE EARTH'S RESOURCE SYSTEMS AND MUST THEREFORE INTELLIGENTLY PLAN WORLD RESOURCES MANAGEMENT

STUDENT LEARNING OBJECTIVES

The student will be able to:

Discuss the relation of vital resource management to the subjects of several other modules in this book.

Observe that problems of the environment cannot be viewed in isolation or in a modular format as depicted in this document but rather must be considered as inter-related issues in a total system approach.

TEACHING/LEARNING STRATEGIES

Conduct panel discussions on ways the management of vital resources related to the subject of other modules in this book; e.g., among many others:

- a. all the modules on pollution
- b. population dynamics
- c. value systems
- d. wildlife and man
- e. impact of economic systems
- f. responsibility to future generations

POPULATION DYNAMICS

Alternative #1

OVERVIEW

The self-regulating phenomenon of population growth maintains species and utilizes the available resources in the environment.

The alteration of the natural cyclic mechanics of population regulation has been altered by man's expanding technical abilities.

Awareness of the dynamics of population development and maintenance is an essential factor in understanding the environment, the cause of contemporary social, economic, political and ecological problems within the total environment.

CONCEPT

THE REGULATION OF NATURAL POPULATIONS IS DETERMINED BY THE "CARRYING CAPACITY" OR CAPACITY OF THE LIFE SUPPORT SYSTEM; I.E., ANY AND ALL PROCESSES WHICH TEND TO FACILITATE OR INHIBIT NATURAL INCREASES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Describe how a limit of population growth is reached in one or more specified populations under natural conditions; e.g., number of barnacles on a piling is limited by available space, sea level and tide level, etc.

Research an animal population and report on the change in population size over time and the factors involved in the change; i.e., the passenger pigeon, the horse.

Identify the population control factors using a highly defined closed life support system.

Demonstrate an ability to handle the basic mathematic relation of exponential natural reproductive increase by making population projections from appropriate data and

TEACHING/LEARNING STRATEGIES

Design a field trip to identify several animal populations. In groups, the students should observe the populations (within specified boundaries) and attempt to identify factors that limit the population--space, food, water, predator prey relationships, etc. Observations should be made several times. In addition, students should compile other evidence than that from observations using libraries, resource people in the school and community, etc.

Use the "classical" fruit fly experiment--plot population increase and decrease. Vary the experiment in some bottles by changing or modifying environmental conditions. Let students design their own variations, and compare the results.

With proper supervision, carry out a density estimate of the rat population in a local dump using the Lincoln Index (described in the literature--and fairly simple to execute. Since it involves

STUDENT LEARNING OBJECTIVES (Cont'd)

preparing a graphic display of such computations.

Determine the components within a specified ecosystem which may affect the dimensions of animal populations.

Identify reasons why a rat population in a specific open dumping area will be limiting.

TEACHING/LEARNING STRATEGIES (Cont'd)

"snap" or "kill trapping," students need to be taught how to handle the traps, the animals, etc.)

CONCEPT

MAN HAS EFFECTIVELY RAISED THE CARRYING CAPACITY OF HIS ENVIRONMENT BY TECHNOLOGICAL APPLICATIONS. THIS ACTIVITY HAS HAD SUBSTANTIAL IMPACT ON THE POPULATION OF NON-HUMAN SPECIES AS WELL AS HIS OWN ENVIRONMENTAL QUALITY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explain why it is necessary to control the slaughter of wild fur-bearing animals that historically have been used to clothe man.

Identify examples of man's technological manipulations that have resulted in a short-term or long-term increase in the carrying capacity of his environment. (Consider here such things as food production, construction practices, transportation, fishing techniques, disease reduction and reduction of birth rates.)

Demonstrate the population fluctuations of insect pests when pesticides have been used to control them before and after genetic resistance to the chemicals occurs. Also relate human population size between 1940 to 1970 in underdeveloped countries where DDT has been applied.

TEACHING/LEARNING STRATEGIES

Role play a trial of man by fur-bearing animals on the endangered species list. Different "men" should trial counsels presenting the justification for taking the animals that are sitting as a panel of judges.

In groups, the students might select a different "technological manipulation" that has increased the carrying capacity of man's environment and develop a case study covering (1) the historical development of the technology, (2) how it increased carrying capacity, (3) the effectiveness of this technology in increasing carrying capacity (to date), (4) any deleterious side effects of the technology, and (5) possible long-range consequences of the continued use of this technology.

Consult with local and state officials concerning rodent controls.

Set up one or more fish tanks in which the life-support parameters are in balance.

STUDENT LEARNING OBJECTIVES (Cont'd)

Collect data from the locality which will assess the relation between human population change and the change in population of five selected species of plants or animals (domestic and wild) occupying the same area over the past fifty years.

Identify two species whose population has decreased and two whose population has increased due directly to man's increasing population in the area.

Investigate the effects of environmental alterations that might result from man's technological manipulations on a tank of "tropical fish" when life support parameters have been established. (Consider alterations such as changes in temperature, pH, salinity, nutrient load, or other water-borne technological contaminants.) The student should then be asked to generalize, based on the data, as to the effect of environmental alterations on animal population.

TEACHING/LEARNING STRATEGIES (Cont'd)

Based on knowledge the students have concerning the types of water-borne contaminants that result from man's technology, students should devise experiments to change the tank environments and observe the results. The contaminants selected might be more meaningful if they are chosen on the basis of conditions existing in the students' locale.

CONCEPT

MAN HAS CIRCUMVENTED NATURAL ENVIRONMENTAL RESISTANCE FACTORS AND, TO A LARGER EXTENT, NOW CONTROLS HIS OWN SURVIVAL ABILITIES AT THE GENETIC LEVEL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Submit written evidence that modern medical advances have (1) been used to extend the line of genetically abnormal humans, and (2) developed techniques which have led to increased genetic control over food crops in both developed and underdeveloped nations.

TEACHING/LEARNING STRATEGIES

Invite to class a geneticist or representative of the Public Health Department who can discuss the impact of population mobility and of medical technology on the human gene pool.

Game simulation of natural selection and changes in gene pools.

Natural selection. Divide into two or more groups - select two or more

STUDENT LEARNING OBJECTIVES (Cont'd)

Research and prepare a "position paper" on data assertions and predictions relating to genetic alterations in the human species.

Understand genetic conditions which are detrimental to the human gene pool.

TEACHING/LEARNING STRATEGIES (Cont'd)

"habitats"--grassy fields, room with thick carpet, etc. Use two different colors of toothpicks--one that stands out, one that blends with the background. Scatter toothpicks in habitat.

Collect toothpicks for 30 seconds. Students are predators (or another form of environmental resistance); toothpicks are the prey or organism coping with resistance. Repeat collections in 30 second intervals, keeping a tally of each type of toothpick collected during each interval. Convert the tally into a graph of "mortality" rates for each type of toothpick to show differential survival rates for differential adaptations.

The exercise can be varied by marking some of the toothpicks to represent certain genetic conditions, and the rules can be varied to simulate medical practices, use of insecticides, etc. Again, graphs should be developed to depict survival rates.

CONCEPT

HUMAN POPULATION CONTROL IS ABSOLUTELY ESSENTIAL ON A WORLD-WIDE BASIS.
THERE MUST ALSO BE A MORE EQUITABLE DISTRIBUTION OF THE HUMAN POPULATION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Learn ways in which the World Health Organization can be effective in helping all nations in regard to population control.

Determine major obstacles to birth control in a selected emerging nation in Africa or Latin America. (Consider psychological, sociological, and economic factors as well as religious factors.)

Identify strategies used in mainland China to encourage population stabilization.

TEACHING/LEARNING STRATEGIES

Write the World Health Organization for a report on their "family planning" efforts--their strategies, their successes, the obstacles to be overcome, etc., as well as a general discussion of the impact of population growth in various parts of the world.

Invite a medical doctor or a representative of the Public Health Department or Zero Population Growth to discuss and exhibit (where appropriate) birth control methods and devices, advantages and disadvantages, fallacies in birth control, side effects, methods that seem most promising in underdeveloped nations, etc. If an

STUDENT LEARNING OBJECTIVES (Cont'd)

Determine at least five methods of birth control, the advantages and disadvantages of each, the percentage of effectiveness for each method; and any possible side effects (physical or psychological) for each.

Identify, through research, the centers of population in his own state. Show density where possible. (1) For each population center, evaluate potential environmental problems in the area of water (supply and pollution), air, solid waste management, transportation, housing and educational needs. (2) For each population center, list 5 or more strategies by which population density can be regulated (exclusive of legislated birth control).

Assuming that population expansion seems certain, to degrade the quality of life in the foreseeable future, estimate which aspects of the quality of life will suffer first and offer supporting evidence.

TEACHING/LEARNING STRATEGIES (Cont'd)

abortion counselor can be located, students might be surprised to learn about the failure rate for certain "effective" methods of birth control and factors that contribute to contraceptive failure.

In groups, students might carry out a study of a shopping center to determine environmental impact. Consider traffic volume, estimated air pollutants emitted in the center, solid waste management, electricity consumption, thermal or radiant energy emitted, monitoring for certain air pollutants such as hydrocarbons and particulates, aerosols, carbon monoxide, etc., water consumption, water run-off through drainage systems, etc. A complete analysis is probably out of the question, but selected factors can be monitored with success. Students should be able to use lab equipment on campus--or most communities are now served by state or local pollution control departments that are usually willing to cooperate with students to teach them monitoring and collection techniques as well as to carry out analysis.

Wherever possible, students should make suggestions for strategies by which environmental degradation can be reduced.

POPULATION DYNAMICSAlternative #2OVERVIEW

This module deals with the magnitude of the problem arising from a unprecedented multiplication of the human species and has stirred the concern of people everywhere. The expansion in world populations projected for the remainder of this century is staggering. The impending disaster, foretold by these statistics describes the immediate concern of the world's approximately 3.6 billion population.

CONCEPT

THE POPULATION OF THE WORLD IS INCREASING AT AN ALARMING RATE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Comprehend the magnitude of the world's population.

Analyze the current and projected population trends.

Understand the effects of the agricultural-industrial revolutions on the world's population growth.

Identify geographical locations where changes in death rates have resulted in greatly accelerated population growth rates.

Identify the mechanism or strategy by which the death rate was changed for each of the locations cited above.

Compare population growth curves for various geographic locations, including the U. S. using the most recent figures for U. S. birth rates.

Discuss what is meant by "birth rate".

Discuss what is meant by "death rate".

TEACHING/LEARNING STRATEGIES

From the population growth curve, students should identify specific periods of time in which the population of the world evidenced a marked change. Then, in groups, students should research different periods to determine what events or what developments took place that contributed to the marked change.

Attempt to locate on your own campus one or two foreign students from geographic areas in which problems related to population growth rates are particularly acute and get their points of view on the population problem.

CONCEPT

MANY VARIABLES INFLUENCE BIRTH RATES AND DEATH RATES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Outline the principal sociological variables influencing birth rates in the U. S. and in other geographic locations.

Explain "reproductive potential."

Relate the age structure to the reproductive potential of the population of a particular area.

Determine natural factors that tend to reduce or stabilize human populations when not manipulated by man.

Identify a nation or a geographic location in which specific factors have been acting to reduce population levels.

Identify nations where the population is stabilizing or declining and identify factors contributing to this phenomenon.

TEACHING/LEARNING STRATEGIES

Have a debate on abortion laws. Base the debate on existing models of abortion legislation.

Invite resource persons to the class who can discuss the major obstacles to "family planning" - both in the U. S. and abroad.

Assume the condition that the United Nations or some such body had authority to act within and between nations to resolve problems. Role-play the situation in which a "governing board" with executive and administrative powers to act convenes to hear the cases as presented by representatives of each of the nations identified previously. The governing board is to derive a solution to the problem without (1) infringing too greatly on the rights and/or privileges of individual nations and (2) disrupting too markedly the social structure and economy of individual nations. Some members of the board ought to represent nations that might be required to make sacrifices in order to resolve the problem, and they are to negotiate in terms of protecting the rights, social structure and economy of richer nations.

CONCEPT

ENVIRONMENTAL AND SOCIOLOGICAL PROBLEMS ARE AGGRAVATED BY OVERPOPULATION, AND WILL BECOME MORE ACCUTE IF THE POPULATION CONTINUES TO EXPAND AT ITS PRESENT RATE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the principle of zero population.

TEACHING/LEARNING STRATEGIES

Answer the following questions in relationship to various problems caused by overpopulation:

STUDENT LEARNING OBJECTIVES (Cont'd)

Identify social and environmental problems which would be alleviated by achieving zero population growth.

Distinguish between environmental problems caused by population growth rates and problems aggravated by growth rate.

Evaluate the Malthus Theory as it relates to today's environmental problems.

Hypothesize possibilities for increasing the world's food supply in the future.

TEACHING/LEARNING STRATEGIES (Cont'd)

- a. If the world's population stabilized tomorrow, would this problem "go away"?
- b. Are other factors in human population dynamics, in addition to growth rate, involved in resolving this problem?
- c. If so, identify the factors.

Arrange a panel discussion between representatives of appropriate social agencies, police, public health, welfare, etc., who can identify major social problems in your own area, and from appropriate organizations or agencies who can identify the major environmental problems in your own area. For each of the problems identified, attempt to determine the impact of population growth rate on the origin and solution of these problems. Is it possible to identify areas of conflict in which the solution to one problem only aggravates or complicates the solution to another? Can you identify areas in which trade-offs are necessary?

Students might, individually or in groups, select a social or environmental problem and make a report to the class on the relationship of the problem to human population dynamics.

Each student is to bring to class the report of a research study suggesting a promising way to increase the world's food supply, and describe the study to the class.

CONCEPT

THE WORLD'S PRESENT POPULATION SITUATION AND FUTURE PROSPECTS DICTATE THE NEED FOR POPULATION CONTROL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Discuss what is meant by carrying capacity.

TEACHING/LEARNING STRATEGIES

Have students identify and evaluate resource materials or methods of population control and develop an annotated bibliography. At a specified time, as many of

STUDENT LEARNING OBJECTIVES (Cont'd)

Demonstrate his knowledge of the social, psychological and economic factors involved in achieving population stabilization.

Discuss the relative efficiency of different methods of birth control.

TEACHING/LEARNING STRATEGIES (Cont'd)

These materials as possible should be made available to the student in his own classroom. Each student should be responsible for providing at least one entry for the bibliography. The annotation should include a description of the type of information other students can expect to find in the resource. The bibliography should include resources such as scientific journals, U.N. reports, films, community resource people, etc.

POPULATION DYNAMICS

Alternative #3

OVERVIEW

This module addresses itself to the alarming rate at which the world's population is increasing. The controversy over the use of various methods of population control is stressed in the unit as population stability or reduction seems inevitable if our environment is to support life in the years ahead.

Population represents a dynamic phenomena brought about by controlled and uncontrolled fluctuations of interacting populations of living organisms. Human population pressure will require a reassessment of past and current beliefs in light of needed population control methods.

CONCEPT

THE WORLD'S POPULATION IS INCREASING AT A FRIGHTENING RATE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the dramatic changes in world population throughout the course of history.

Understand the factors influencing population levels.

TEACHING/LEARNING STRATEGIES

Prepare population graphs for specific periods in history.

Individually or in small groups, the students will collect population data for small blocks of time. Then students will share population data and factors affecting population during that period of time with the class.

Have the students observe a fruit fly population with a closed food supply for one month. Students should record what activities they have witnessed and speculate as to why various phenomena occurred.

CONCEPT

TO INSURE A WORLDWIDE QUALITY ENVIRONMENT POPULATION MUST BE CONTROLLED.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Comprehend why population control is necessary throughout the world.

Understand how man has historically attempted to control population.

Determine the influence that organized religion has had upon population.

Assess various methods man has employed in his attempts to control population.

Discuss how man's entry into a natural predator-prey relationship affects population fluctuation.

TEACHING/LEARNING STRATEGIES

A panel discussion including a minister, a Zero Population Group member, a sociologist, a mother, and a doctor. The panel will discuss population control.

Survey population groups within the community to find out attitudes toward population control.

Given some provocative statements concerning population control, discuss in small groups, and present a consensus to the class.

Have each student bring a poster to class illustrating:

- a. a predator-prey relationship
- b. result of a predator-prey relationship
- c. individual's attitude toward population controls.

The class will discuss how insecticide use in underdeveloped countries has increased food production, and how this has affected population.

CONCEPT

THERE IS AN INTERDEPENDENCY BETWEEN ALL LIVING ORGANISMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the population versus time curve.

TEACHING/LEARNING STRATEGIES

The instructor will describe a population versus time graph, illustrating with examples, and then ask the students to discuss

STUDENT LEARNING OBJECTIVES (Cont'd)

TEACHING/LEARNING STRATEGIES (Cont'd)

Project environmental conclusions to the present worldwide population growth.

possible results.

CONCEPT
POPULATION PRESSURES NECESSITATE A REASSESSMENT OF CURRENT VALUE SYSTEMS.

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES

The student will be able to:

Explain past population trends and relate them to the population pressures of today.

Defend or refute the proposition of zero population growth.

Have students project from their own family size the population of the world increase due to their family in 10 generations.

Assume each learner has the same number of children as parents. Length of one generation is mother's age at birth of middle child. Assume all parents die at birth of new generation (actually some parents will live more than one generation and some children will die before off-spring are born.)

CONCEPT
METHODS OF POPULATION CONTROL ARE BOTH NATURAL AND MAN DEVISED.

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES

The student will be able to:

Identify possible legislative approaches to population control.

Understand advantage and disadvantage of each of the following methods of birth control; contraceptive, abortion, abstinence, homosexuality, euthanasia, infanticide, war.

Collect information on methods of population control.

Set up an information center or small group discussion for persons in the community on methods of population control. This could be done through already established community organizations.

URBANIZATION: THE LIVING COMMUNITYAlternative #1OVERVIEW

This module depicts one of the growing environmental tragedies of the century--the modern city. The city of today's world is creating overcrowding, depletion of resources, waste and sewage management problems, air and water pollution, proliferation of disease, and most importantly the diminishing of the human spirit. Alternative living arrangements to escape present city existence are suggested in this module.

CONCEPT

CITIES EMERGED IN RESPONSE TO MAN'S NEEDS AND REPRESENT A CONCENTRATED ECOSYSTEM.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explain what is meant by urbanization.

Determine what the following have contributed to the growth of our cities:

- a. agricultural revolution
- b. industrial revolution

Understand the multiple components of an urban ecosystem.

TEACHING/LEARNING STRATEGIES

Assemble various definitions of "urban." Class discussion of various definitions focusing upon differences between humanistic definitions of the city (e.g. Mumford) and behavioral definitions.

Chart the living and non-living structure of the urban environment.

CONCEPT

THE CONTINUING CONCENTRATION OF PEOPLE IN URBAN AREAS NECESSITATES IMMEDIATE CONSIDERATION AND CONCERN FOR FINDING METHODS OF IMPROVING LIVING CONDITIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

View a variety of films on urbanization.

STUDENT LEARNING OBJECTIVES (Cont'd)

Understand the results of eliminating slums by replacement with low income housing developments.

Understand what happens to individuals required to move or relocate.

Differentiate between a master plan and a sector plan.

Identify areas within the U. S. where megalopolis are developing.

Evaluate the interrelationships and shared services and facilities of the urban-surburban community.

Explore the concept of regional planning.

TEACHING/LEARNING STRATEGIES (Cont'd)

Debate the issue of cities as the heart of civilization vs. the city as the center of decadence.

Discuss the concept of a model city replacing ghettos.

Study migration patterns of your city. When and where did residents come from? What were the reasons behind major influxes or emigrations? Have students find out the rate of mobility of working families.

Contact professional planners in government and ask for copies of major planning documents (e.g. Land Use Plan, Transportation Plan, Parks and Recreation Plan, Water Quality Plan, etc.) Analyze these in light of future needs for various areas of the country.

CONCEPT

NEW PHILOSOPHIES REGARDING URBAN DEVELOPMENT HAVE EMERGED BECAUSE OF THE INCREASING URBAN CRISES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify urban forms of living prevalent in other nations.

Understand what urban growth means in terms of physical land use.

Identify the sources of alienation found in the city.

TEACHING/LEARNING STRATEGIES

Write to various local government agencies for the costs of providing basic urban services on a per capita basis.

Estimate the cost of setting up a "new town" at the edge of existing development in your city or county. Contact tax assessor for rough estimate of tax gain. Compare revenue generated by development with cost of services.

Using films and novels, have a series of panels which discuss the various urban forms in (a) China, and (b) Scandanavian New Towns.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Present the class with data on matters such as the following:

- a. percent of farmland in your urban area
- b. percent of land used for automobile (streets, parking)
- c. percent of park land and open space
- d. density figures in the suburbs compared with inner city ghettos

Rap session. Air reasons why you (students and faculty) feel the city alienates man from his fellow-man, man from his work, and man from nature.

Read Fellini's La Dolce Vita.

Examine the effects of overpopulation among animals. Invite a psychologist to speak to the class about the "behavioral sink."

URBANIZATION: THE LIVING COMMUNITY

Alternative #2

OVERVIEW

Cities and urban areas historically have developed in geographic locations that best serve man's industrial, commercial and trade needs. Cities have developed with little regard for the total environment. The primary emphasis has been to serve individual and short-term economic goals. These goals and courses of action conflicted frequently with a desirable quality of life.

Cities, while serving many of man's economic needs, have always suffered from environmental crisis. Early cities were plagued by problems of disease, filth, lack of services, overcrowding, and social problems which took their toll directly in human lives. In response to the need for better public health, measures were introduced to control environmentally related diseases. Programs were initiated to protect the water supply, install sanitary sewers, provide for refuse removal, and initiate enforcement procedures over housing and land use. These measures frequently resulted in a significant improvement of the public health through the reduction of disease. However, in many cases such as providing sanitary sewers, it shifted the impact on the environment to a different location. In most respects, modern urban area problems are the same as those experienced 50 to 100 years ago. Only the scope has changed.

Urban areas are artificial man-made systems of concentrated human activities that emulate nature's ecosystems. Cities are man's habitat in which he plays a major role in shaping the environment and in turn is shaped by it. Urbanization trends in which 80% of the people live on less than 2% of the land is creating a significant crisis in our urban areas. Cities serve man as marketplace, social, educational and cultural centers. However, they are facing a mounting inability to provide service to people across the broad spectrum of human activities and thereby the quality of life is being reduced for all citizens of all incomes and all ages.

Urban problems are compounded by the rapid rate of urbanization, uncontrolled growth, spreading city decay and unmet human needs. Typical urban problems concern sewage, housing, transportation, schools, social services, medical care, employment, recreation, environmental health, open space and police protection. In meeting the challenges of urbanization, cities must be considered total systems in order to obtain long-term solutions.

CONCEPT

THE WORLD POPULATION IS BECOMING INCREASINGLY URBANIZED.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

Prepare individual research papers

STUDENT LEARNING OBJECTIVES (Cont'd)

Identify boundaries of urban areas in the U. S. and in other parts of the world.

Recognize the urbanization process in the local community.

Project reasons felt responsible for increased urbanization throughout the world.

Analyze census data and discuss present urbanization trends.

TEACHING/LEARNING STRATEGIES (Cont'd)

based on literature surveys such as the Time-Life series on the Great Ages of Man, and describe historic influences on urbanization.

Prepare charts or other visual aids to denote the urbanization trend in the last century.

Assign task forces to prepare a slide talk presentation on urbanization in their community.

Conduct a seminar on worldwide urbanization trends.

Have class select a film on urban problems to show and then discuss the positive approaches to protecting the environment.

CONCEPT

URBAN AREAS ARE FACING A CRISIS IN MEETING BASIC HUMAN NEEDS BECAUSE OF THE RATE AND EXTENT OF URBANIZATION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Compare urban problems to those of rural settings.

Project how urban sprawl has affected transportation systems.

Understand how transportation systems have changed the face of our urban areas.

Discuss how the cost of urban services has increased over the last ten years.

TEACHING/LEARNING STRATEGIES

Invite an individual from the budget office of local government to discuss how the cost of urban services has increased. The presentation should go beyond inflation cost.

Invite a city planner to discuss how transportation systems encourage urban sprawl.

Plot the cost of urban services per capita as a function of city size.

Discuss how urban sprawl has outdistanced the ability of many communities to provide basic services.

STUDENT LEARNING OBJECTIVES (Cont'd)TEACHING/LEARNING STRATEGIES (Cont'd)

In your community has the transportation system contributed to the formation of bedroom communities? Discuss this in seminar session.

Conduct a role playing session with students facing the following question:

Should a new freeway be built?

Roles: Developer-who owns land in an undeveloped area to be served.

Citizen - who will use to commute to work.

Citizen - whose neighborhood will be cut by new expressway.

Planning Department - justify need.

Remainder of class should prepare a list of questions that should be asked before expressway is approved.

CONCEPT

CITIES HISTORICALLY HAVE BEEN FACED WITH MAJOR ENVIRONMENTAL PROBLEMS, ONLY THE SCOPE AND DEFINITION HAVE CHANGED.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify major urban environmental problems.

Understand the major environmental problems of European cities during the industrial revolution.

Understand environmental conditions of major American cities in the last century.

Determine major improvement in the environment of London, or other cities in the past 50 years.

TEACHING/LEARNING STRATEGIES

Lecture on the public health problem of a major American city 100 years ago. Select material from public health textbooks, or Journal of the American Public Health Association.

Review literature on air pollution in a major city and note how the sources have changed.

Prepare a report based on literature survey on:

- a. Typhoid and basic methods used to control.
- b. Cholera and basic methods used to control.

STUDENT LEARNING OBJECTIVES (Cont'd)

Outline contagious diseases that have been controlled by environmental improvement.

Understand how the sources of air pollution have changed over the past 50 years.

TEACHING/LEARNING STRATEGIESCONCEPT

CITIES ARE A COMPLEX SYSTEM THAT EMULATE NATURAL ECOSYSTEMS

STUDENT LEARNING OBJECTIVES

The student will be able to:

Compare a city to a bacterial colony.

- a. Do they compare in growth curves?
- b. Does the death of center of the colony compare with inner city decay?

Determine how alteration of one aspect of the system affects other parts.

Identify ways environmental stress in one area causes a shift in land use. (e.g. noisy airport.)

TEACHING/LEARNING STRATEGIES

Lecture on population dynamics growth curves.

Conduct simple laboratory project to demonstrate growth in a closed ecosystem.

Conduct a seminar on how segments of our urban ecosystem can become overstressed; using one of the following as examples: schools, housing, services, transportation.

Do a field study project with slides or other audiovisual aids to describe how a particular section of their community is undergoing environmental stress. The study should describe those factors they feel are significant. Further, they should, after review of the facts collected, propose solutions. These solutions, in turn, should be evaluated by the class.

Describe how the natural environment of the total community or specific segment has been altered. Discuss if the change is good or bad.

CONCEPT

BASIC PLANNING TOOLS AND INNOVATIVE APPROACHES CAN BE USED TO GUIDE URBAN GROWTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Describe the urban planning process in a community.

Identify techniques of land use or city planning.

TEACHING/LEARNING STRATEGIES

Obtain a copy of a map denoting land use, or plan of a particular area.

Define planned unit development.

- a. As defined by the American Institute of Planners.
- b. As defined in local ordinance.

Define cluster development.

- a. Is it now used in your community?
- b. How could it be used in student's opinion?

Ask a city planner to discuss his view on the values of HUD and cluster developments. As a follow-up ask a developer to discuss the topic and the constraints in the implementation of such a concept.

The class should prepare a list of the pros and cons of HUD and cluster developments.

- a. Literature review of professional journal.
- b. Review of articles appearing in magazines such as Better Homes and Gardens, March, 1972.

CONCEPT

URBAN AMERICA HAS BECOME HEAVILY DEPENDENT ON THE AUTOMOBILE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

Identify ways the U. S. has become

STUDENT LEARNING OBJECTIVES (Cont'd)

Explain how urban sprawl necessitates multiple cars per family.

Outline present urban transportation systems serving the local community.

Discuss approaches being considered in the local community for mass transit.

TEACHING/LEARNING STRATEGIES (Cont'd)

auto dependent through:

- a. Lecture
- b. Literature Review
- c. Films
- d. Field Trips

Invite a Department of Transportation official to discuss future plans for expressway expansion, or as an alternate, review your particular areas' transportation plan or map showing proposed or existing freeways.

Conduct a class seminar on the merits of proposed expressways and set guidelines of discussion to include environmental impact on air, water, aesthetics, noise and housing.

Evaluate the impact of an existing expressway from the following standpoints:

- a. Who does it serve?
- b. Did it alter the area in which it exists?
- c. Are there better alternatives?
- d. What can be done to make the highway or expressway less of an environmental degradation factor?

CONCEPT

URBAN AREAS CONCENTRATE ENVIRONMENTAL PROBLEMS WHICH HAVE THEIR GREATEST IMPACT ON THE INNER CITY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the functions of a sewage treatment plant.

Understand problems of the inner city or depressed area.

TEACHING/LEARNING STRATEGIES

Invite a city planning official, Model Cities planner, or HUD official to discuss boundaries of depressed areas in your city.

- a. Discuss common factors of these areas.
- b. List what is being done.
- c. Discuss innovative approaches that can be taken to make these areas more environmentally pleasing.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

- d. What could be done to make the residents of the area more environmentally aware of the natural setting?
- e. Would a green space program or additional parks to increase the amount of greenery in the area help to reduce the harshness of the environment?

Invite a health official to discuss the incidence of:

- a. Disease
 - b. Accidents
- in the inner city areas as compared to neighborhoods that are not classified as depressed.

Conduct a seminar and discuss factors considered to be most critical in these depressed areas.

List projects which a student feels could enhance the quality of life in the inner city or depressed area.

Discuss how environmental problems such as noise, congestion, and air pollution are magnified in the inner city or depressed areas.

Read and analyze the U. S. Council of Environmental Quality second annual report that discusses the inner city as an inferior environment.

In order that the students develop an awareness of inner city problems, they should:

- a. Attend a public meeting discussing inner city problems.
- b. Review reports prepared by government agencies on depressed areas or review a Model Cities report.
- c. Determine what some of the positive steps have been in individual communities to provide more green space within the urbanized area.

CONCEPT

CITIES HISTORICALLY HAVE DEVELOPED FOR THE PURPOSE OF SERVING MAN'S NEEDS FOR PROTECTION, COMMERCE, EDUCATION, AND SOCIAL NEEDS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine urban services provided by government.

Identify services that have encouraged urbanization.

TEACHING/LEARNING STRATEGIES

Conduct a seminar on how cities have been designed, asking:

- a. Do they serve man's needs.
- b. What governmental programs perpetuate the urbanized area, and/or enhance the environment.

The recent push for ecological balance and environmental enhancement has been considered by many to be a middle class American movement, which has, in many cases, ignored or failed to deal with environmental factors that directly relate to human health. The above statement should be the topic of a class discussion or seminar.

WATER-SUPPLY, DEMAND AND POLLUTIONAlternative #1OVERVIEW

This module deals with water; its supply and utilization. It stresses the importance of developing an understanding of the water cycle and the uses and abuses of water as it affects daily life. The need for wise and resourceful uses of water is highlighted in the module.

CONCEPT

WATER IS THE BASIS FOR SUPPORT OF ALL LIFE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the unique physical properties of water.

Discuss how water is necessary for the constitution of all living matter (e.g. cells).

Recognize water as an essential component in all levels of biological activity - from the cell to the ecosystem.

Understand that water is a vehicle for movement of vital materials necessary to life by citing examples at both the micro and macro levels of biological activity.

Discuss ways that water serves:

- a. cultural needs
- b. economic needs
- c. technological needs

Recognize the distinct association of water resources and the evolutionary processes responsible for life on earth by giving examples of water-related adaptation in plant life and animal life

TEACHING/LEARNING STRATEGIES

Cite biochemical processes for which water is necessary (e.g. respiration, photosynthesis, metabolism, etc.)

Demonstrate transport properties of water: as a food carrier, waste carrier, etc.

Demonstrate that all reactions in the life cycle need water: they are solution reactions.

Explain the role of water in photosynthesis and respiration.

Present examples of the internal and external water related phenomena.

Show the unique physical and chemical properties of water that enable it to be a universal solvent and to support life.

Construct an exhibit of living things (plants, worms, etc.) and show in this how life stops if there is no water available.

By models and diagrams, show that the basis of the food chain is aquatic life.

Construct an exhibit showing aquatic life and solubility of various nutrients in water at normal temperatures 20°C - 30°C.

CONCEPT

WATER AVAILABILITY IS A MAJOR WORLD WIDE CONCERN.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify major uses of water by man.

Understand the concept of water qualities as it relates to its major uses.

Understand specific practices for reducing water consumption in each of the major uses of water.

Determine procedures for reprocessing water to suitable quality for each major use of water.

Recognize saline and potable waters.

TEACHING/LEARNING STRATEGIES

Discuss the fresh water and salt water distribution over the earth's surface.

Identify water resources for various uses (drinking, irrigation, recreation, industrial use, fishing, etc.) in three different areas in the U. S.

- a. a coastal state with heavy rainfall
- b. an arid, semi-desert inland state
- c. an inland river or lake-bordered state with moderate rainfall.

Calculate the approximate quantity of water consumed in the following activities for a particular area for a specific time period:

- a. personal consumption
- b. food production
- c. industrial use

-Discuss the extent to which rainfall can replenish water supply (e.g. mining water).

Demonstrate, with a model or slide presentation, the conversion of salt water to fresh water.

Make a map of water resources in the U. S. and show on this map how these resources relate to various uses.

Discuss how the quality and quantity of rainfall affect agriculture.

CONCEPT

MAN'S UTILIZATION OF WATER HAS AFFECTED THE QUANTITY AND QUALITY OF WATER RESOURCES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine physically or geographically local sources of water for human use.

Identify local utilization of water and what happens to this water after its primary utilization.

Defend the rights of all forms of life to usable water supplies.

Identify personal or civic activities to halt further deterioration of our aquatic ecosystem and to seek political avenues for the improvement of these aquatic systems.

TEACHING/LEARNING STRATEGIES

Identify major water dam and diversion systems in the U. S. for:

- a. Flood control
- b. Irrigation
- c. Hydropower

Show how human use, both domestic and industrial, changes the quality of a water supply. List the major water pollutants in various regions of the world from:

- a. domestic use
- b. industrial use
- c. agricultural use
- d. recreational use

List the competing demands for oxygen in a body of water.

Construct a model of an irrigation dam and diversion project to show:

- a. How water quality and quantity are affected in the originating stream and in the diversion
- b. Effects of the diversion on upstream and downstream ecology

Show with slides and maps how damming and reservoirs change rainfall and evaporation patterns.

Develop an illustration(s) of the effect of dumping sewage and industrial waste in a river.

Make an exhibit showing the effect of primary, secondary, and advanced treatment on clarity and purity of sewage effluent.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Make an exhibit showing the effect of agricultural runoff on a stream.

By a model, show how a flood-control project affects downstream and upstream ecology.

WATER - SUPPLY, DEMAND AND POLLUTIONAlternative #2OVERVIEW

This module points out the importance of water in maintaining life and the increasing concern over the quality and quantity of available water throughout the world. Man's activities have had an adverse effect on water resources. This module emphasizes the need to understand the water cycle and to be able to recognize and adapt methods to insure that high standards of water quality will prevail for the future.

CONCEPT

WATER IS A BASIC RESOURCE NECESSARY TO SUSTAIN LIFE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize the role of water in the life cycle of organisms ranging from microscopic to human.

Identify ways in which the development of civilization has depended on the distribution of water.

Understand how water supply relates to food production, and vice versa.

TEACHING/LEARNING STRATEGIES

Using examples from each of the following categories, give the percentage of the organisms' total weight in water:

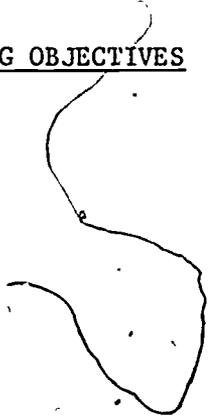
- a. Plant (one leafy, one woody)
- b. Animal
- c. Microorganism

List some adaptations of organisms to restriction of water supply or to high water demand.

Consult a few standard elementary biology texts and from them, compile a list of the biological functions of water most emphasized.

Discuss unique chemical and/or physical properties of water which contribute to its biological functions listed above.

For two or more ancient civilizations, describe how the development of that civilization depended on the supply of water.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Describe the relation between supply of water and distribution of man's activities (other than food-production activity).

List food crops adapted to low water supply.

Identify food crops requiring high amounts of water in their production and/or processing.

Research the term "evapotranspiration" and apply this knowledge to desert agriculture and dry farming.

Discuss: If you were the person making the decision whether or not to build a dam for irrigation purposes in an arid region, such as southwestern U.S., would your decision perhaps depend on how long the project was supposed to last? For example, consider 20 years and 200 years as project lifetimes. Include a list of factors considered by you to arrive at your answer.

CONCEPT

THE NATURAL WATER SUPPLY IS LIMITED BY FACTORS BEYOND THE CONTROL OF MAN, BUT MAN'S ACTIVITIES IMPOSE ADDITIONAL LIMITS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Develop an understanding of the hydrologic cycle.

Identify world systems of water movement.

Analyze per capita water needs and relate them to population trends.

Project water needs in the future for local world wide use.

TEACHING/LEARNING STRATEGIES

Sketch, label and describe the hydrologic cycle.

Identify the world systems of water movement, both oceanic and atmospheric, by drawing them on a map.

Discuss why the following regions are arid:

- a. Southwestern U. S.
- b. Western South America
- c. Southwestern Puerto Rico

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Obtain data on the trend in per capita water consumption over the last few decades in some area of your choice (municipality, water, or sewer district, etc.)

For the above region, or other appropriate nearby region, draw a graph of population growth over the last few decades, including any projections for the future you can find. (Local Chambers of Commerce often have such information.)

From the above data, calculate the total domestic water consumption rates of your region over a period of time.

Using the same slope of increase in consumption vs. time obtained, extrapolate to obtain a projected consumption in the area 50 years hence, expressing consumption in millions of gallons per day (mgd). Try to obtain from any local source (geologist, hydrologist, water commissioner, etc.) an opinion as to the availability of this number of mgd of potable water in the area. Does your projection seem reasonable?

Some areas of the world and of the U. S. already have shortages of potable water for domestic use. Identify some of these areas and explain what attempts are being made to relieve the shortage. Figures on the cost of water in such areas should be included in your answer if possible.

From the answers above, attempt to foresee some limit or growth in the area.

CONCEPT

DEMAND FOR USABLE WATER IS INCREASING DUE TO POPULATION AND TECHNOLOGY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Investigate water quality problems as these pertain to the following:

- a. Industry
- b. Agriculture
- c. Municipal
- d. Individual
- e. Other

TEACHING/LEARNING STRATEGIES

Discuss the impact of various segments of society (Industry, Agriculture, etc.) on water quality, remembering to include examples of each of the following categories, where applicable:

- a. Toxins (poisons)
- b. Nutrients
- c. B.O.D. (Define this term)
- d. C.O.D. (Define this term)
- e. Disease
- f. Other (At least one of the above segments of society should have a major impact in this "other" category.)

Define eutrophication and discuss examples of a body of water in the U. S. which has eutrophied with attendant severe loss in economic and aesthetic values. If there is such a body of water in your state, use it as an example.

CONCEPT

THE AMOUNT OF USABLE WATER IS DECREASING DUE TO POLLUTION; THEREFORE, MAN MUST MANAGE HIS WATER RESOURCES TO ASSURE APPROPRIATE QUALITY AND QUANTITY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine the quantity and quality of water needed in various human pursuits, such as:

TEACHING/LEARNING STRATEGIES

Most states have developed classifications of water quality suitable for various uses and/or have classified their various bodies of water as to their quality. Obtain a copy of

STUDENT LEARNING OBJECTIVES (Cont'd)

- a. Industrial
- b. Personal
- c. Recreational
- d. Agricultural

Outline some of the current water conservation strategies.

Identify the major factors which shape water policy. (Sociological, Economical, Political).

TEACHING/LEARNING STRATEGIES (Cont'd)

one of these classifications and discuss several of the items in it, including defining terms you did not understand on first reading.

In your local library or newsstand, browse through several of the popular or semi-popular science magazines. Try to find suggested strategies for water conservation or for supplementation of supplies. Photocopy the article and mark on it the publication, page, and date of the source from which you copied. Try to find some really "far-out" ideas. Who knows, maybe your instructor may give some special award for the farthest out idea submitted. If you can't find any ideas in print, invent some, but be sure to give yourself credit for the ideas.

For some recent controversy over water quality or quantity, identify sociological, economical, and political aspects of the controversy.

WATER-SUPPLY, DEMAND AND POLLUTION

Alternative #3OVERVIEW

This module is designed to show that although there appears to be an unlimited supply of water, there is a small amount available for man's direct consumption. There are various sources of water which are being abused and depleted by man at a rapidly increasing rate. Man's survival is dependent upon solving the water problem.

CONCEPT

THERE IS A LIMITED AMOUNT OF WATER AVAILABLE FOR MAN'S CONSUMPTION

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine what percentage of the world's total water supply exists in each of the following categories:

- a. world's oceans
- b. sub-surface water on continents
- c. surface water on continents

Estimate the percentage of the world's supply of water circulated annually within the hydrologic cycle.

Understand why only a small portion of continental water is available for man's use.

Compare the amount of usable water in ground water in your community with the amount of runoff in streams.

Determine how the lowering of water tables affects the availability of water from streams.

Explain why the main water problems in most areas are one of maintaining good water quality.

TEACHING/LEARNING STRATEGIES

Set up an evaporation experiment, using different shapes of containers--from large surface area to small surface area. Monitor evaporation over a fixed period.

Compare evaporation rates for different surface areas.

Set up containers in different humidity conditions by leaving some containers open, others with partial or total covering so that water vapor is trapped.

Compare evaporation rates under different humidity conditions. A number of different comparisons can be made--temperature, air currents, etc.

Design an experiment and data sheet to derive a reasonable estimate of evaporated losses of water. Set up different experiments and combine the information to derive the estimate.

STUDENT LEARNING OBJECTIVES (Cont'd)TEACHING/LEARNING STRATEGIES

Learn the natural sources of water for man's consumption.

Define permeable, porous, and aquifer.

Understand how water gets into the ground, how it is stored, and ways man can obtain it for usage.

Identify sources of water other than natural fresh water.

Understand the process of water passage from the atmosphere.

CONCEPT

THE DEMAND FOR WATER IS INCREASING AT A VERY RAPID RATE.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES

The student will be able to:

Discuss the various uses of water.

Compare daily domestic use of water to industrial use in the U.S.

Determine which type of water use is increasing at the most rapid rate.

Compare the average daily per capita water consumption of the U.S. with that of other countries.

Investigate the Los Angeles Basin as a classic example of an area with an unbalanced water demand and water supply.

Either invite resource persons to meet with groups of students and/or send groups to appropriate agencies to gather the following topics of information:

- a. local rainfall levels
- b. average percolation rates of rainfall and surface water into ground water
- c. some rough estimate of the impact of urbanization on percolation rates and run-off rates (from paving over surface area, storm sewers, etc.)
- d. estimated volume of water in local aquifer
- e. water shed or water source for local streams
- f. estimated flow of water in local streams
- g. local rates of water consumption

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

- h. special problems in local water treatment
- i. extent of pollution in nearby water bodies

Project from a list of reliable sources the decade in which local demand will exceed supply.

CONCEPT

MAN'S SELFISH MOTIVES AND LACK OF LONG-RANGE PLANNING HAVE RESULTED IN WORLD-WIDE WATER POLLUTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine reasons for shortages of usable water.

Understand ways in which man's use of water results in its pollution.

Identify specific bodies of water that have been seriously polluted and give examples of those that have been cleaned up.

Learn one way in which ground water becomes polluted and how that problem might be solved.

Understand the passage of water from home until it becomes part of the natural supply.

TEACHING/LEARNING STRATEGIES

Investigate water problems in a particular community and suggest ways they might be solved.

Obtain a record of the number of water pollution citations issued locally; the number of citations that resulted in court action; the decision of the court, including time schedules for correcting the problem and the fine or penalty, if any.

Role play a court hearing for a water pollution violation. For involvement of more students, use a jury trial. Assign a judge, jury, prosecuting and defending attorneys, representative from the citing agency and the cited individual, industry or municipality. Use as much of the real data as possible.

CONCEPT

INTELLIGENT WATER MANAGEMENT INCLUDES REDUCTION IN WATER USE, MAINTENANCE AND PRESERVATION OF WATER RECHARGE AREAS, POLLUTION CONTROL, AND WATER RECYCLING.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Discuss the implications of a water recharge area.

Determine the extent of development or urbanization planned or existing in various recharge areas.

Identify legislation designed to protect the water recharge areas.

Identify and describe ways to prepare water for reuse by man.

Determine what plans, if any, are being made in various communities for the recycling of water.

TEACHING/LEARNING STRATEGIES

Research on a map the water recharge area for local water supplies.

In groups, students should prepare a teaching demonstration on water management for use in classrooms at nearby elementary schools. Students should specify the objectives of the demonstration, design the demonstration, and prepare a simple method of evaluation to measure the effectiveness of the demonstration in terms of stated objectives. The demonstration should be used in one or more elementary classes--this is usually very easy to arrange.

WATER - SUPPLY, DEMAND AND POLLUTIONAlternative #4OVERVIEW

This module deals with water - supply, demand and pollution. It is designed to develop awareness of the factors causing the problem; methods of defining the problem; the scope of the problem; and the means of alleviating the problem.

CONCEPT

WATER IS A BASIC RESOURCE NECESSARY TO SUSTAIN LIFE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the role of water in the life cycle of organisms ranging from microscopic to human.

Identify ways in which the development of civilization has depended on the distribution of water.

Determine how water supply relates to food production.

TEACHING/LEARNING STRATEGIES

Illustrate historical emergence of cities in relationship to the historical development of water transportation.

Construct an exhibit of living things depicting the fact that all are dependent on water to support life.

CONCEPT

THE NATURAL WATER SUPPLY IS LIMITED BY FACTORS BEYOND THE CONTROL OF MAN.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the hydrologic cycle.

Identify world systems of water movement.

TEACHING/LEARNING STRATEGIES

List the utilization of local water resources by any local community.

Construct a model showing to what extent water can be diverted from natural channels and the side effects of such diversions.

Using a map, show the effect of local rainfall on water supply.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

With a map and exhibit, show how water from local sources is distributed among uses in a community.

List the major sources of water supply on earth.

Discuss the distribution of fresh and salt water on the earth.

CONCEPT

DEMAND FOR USABLE WATER IS INCREASING DUE TO POPULATION INCREASE AND TECHNOLOGY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Analyze water needs and relate them to population trends.

Project water needs in the future for local and world-wide use.

TEACHING/LEARNING STRATEGIES

List the uses of water subdivided into:

- a. domestic
- b. agricultural
- c. industrial (for local industry)

Show how increases in population density of a given area:

- a. make demands on the water supply for various uses
- b. alter the availability of water

Consider several different industries with respect to their use of water and the increase in the use of their product with advances in technology and rises in the standard of living.

Discuss the uses of water in power generation, and the water pollution therefrom, including thermal pollution, effluent water from particulate and SO₂ scrubbing, etc.

Make a graphic presentation of increase of various water uses with population increase.

Select a single industry whose output has increased markedly with advances in technology (e.g., the aluminum can

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

industry), and make a chart exhibit showing this industry's use of water and its resulting pollution.

Diagram the use of water in electric power production.

CONCEPT

THE AMOUNT OF USABLE WATER IS DECREASING DUE TO POLLUTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

List five natural ways in which the various segments of society pollute water:

- a. Industry
- b. Agriculture
- c. Municipal
- d. Individual

TEACHING/LEARNING STRATEGIES

Discuss the major water pollutants: BOD, acidity, turbidity, dissolved and suspended solids, heavy metals, and bacteria and how they are increased by growth and concentration of:

- a. Urban centers
- b. Agriculture and feedlots
- c. Power generation
- d. Industries

Make an exhibit for a single industry showing its major pollutants, how they affect levels of pollutants in the stream, how they can be controlled, and describe any other factors adversely affecting the environment.

Make an exhibit showing the increasing pollution of a given waterway in the local area (e.g., the Potomac River, Biscayne Bay, San Francisco Bay) over the century 1870-1970.

CONCEPT

MAN MUST MANAGE HIS WATER RESOURCES TO ASSURE QUALITY AND QUANTITY FOR THE FUTURE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

Discuss an example of reversal of

STUDENT LEARNING OBJECTIVES (Cont'd)

Determine the quantity and quality of water needed in various human pursuits.

Outline current water conservation methods.

Identify the major factors which shape water policy. (Sociological, economic, political).

TEACHING/LEARNING STRATEGIES (Cont'd)

progressive degradation of a waterway by proper management (e.g., San Diego Bay, the Delaware River, Lake Tahoe).

Discuss management methods which can be used to reverse the trend toward degradation in a badly polluted body of water like Lake Erie or Lake Apopka.

Discuss management methods that can keep a relatively clean body of water from being degraded (e.g., the upper Colorado River).

Discuss the alternative methods of sewage disposal and their effects on the environment.

Construct an exhibit showing how a very heavily polluted lake can be cleaned up by proper management.

Put together a slide show on a clean-up case history (e.g., San Diego Bay).

Construct an exhibit showing how a clean body of water can be maintained by proper management.

WATER-SUPPLY, DEMAND AND POLLUTIONAlternative #5OVERVIEW

This module summarizes the critical issues germane to man's dependence on water. Because water is an absolute necessity, man must recognize that water exists on earth in a fixed amount. Further, only a small fraction of the world's water supply is fresh water, which at the present time man is able to make available for his own use.

With the rise in the standard of living, the per capita demand for water is increasing more rapidly than the increase of population. Man will imperil the quality of life in the future unless he overcomes his capacity to foul and mismanage his limited water supply.

CONCEPT

WATER IS AN ABSOLUTE NECESSITY FOR TECHNOLOGICAL PROCESSES AND THE PRESERVATION OF LIFE.

STUDENT LEARNING OBJECTIVES

- The student will be able to:
- Identify physical or chemical properties of water which account for its uniqueness.
 - Explain the biological uses of water.
 - Explain the technological uses of water.
 - Relate each physical property of water to biological and technological uses.
 - Project possible reactions of organisms to water shortage.
 - Discuss the climatic consequences if there were no large bodies of water on earth.

TEACHING/LEARNING STRATEGIES

- Visit or call some nearby industries to find out how or for what purposes they are using water. Then, for each industry, determine which of the chemical or physical properties of water is facilitating that technological process. While in contact with the industry, find out in what condition the used water is returned to environment.
- Go outdoors and see how many examples you can find of water as a solvent, water giving off or absorbing heat, etc.
- Compare the climate of England with the climate of maritime Canada at the same latitude and account for the variations.

CONCEPT

MAN'S WATER SUPPLY IS LIMITED AND IS UNEQUALLY DISTRIBUTED ON THE EARTH'S SURFACE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Describe the hydrologic cycle.

Discuss the amount of the world's water supply in relation to:

- a. Salt water
- b. Fresh water (surface and underground)
- c. Ice
- d. Water vapor

Understand why the amount of water available to man is necessarily limited by the hydrologic cycle.

Determine the effect of plants on the hydrologic cycle.

Identify the recreational uses of water in the local community.

Understand how a fixed amount of available water affects social values.

Identify areas in the U.S. where water shortages are most acute.

Explain why certain areas of the U.S. and the world have experienced water shortages.

TEACHING/LEARNING STRATEGIES

Set up an evapo transpiration experiment to determine the effect of vegetation on evaporation rates. Set up several containers containing equal volumes of water. Have one container with no plants added, then with a variable number of plants. Monitor water losses and plot a graph. This measures only loss rate; vegetation also has a positive impact on water retention in soil, which should be discussed.

Game simulation. Take students on an all day field trip to a "deserted" area where there is no available drinking water. Take a fixed amount of water, but an inadequate supply for the group. The "setting" is to be an island, the group are survivors from a shipwreck. Students are to divide into groups to deal with problems of survival in this setting. As the day wears on, how is the problem of inadequate water handled? Do students develop a process for control of maintenance? Do they devise ways to capture or trap water? Do they look for succulent foilage, etc. What happens to their behavior? Do any of the students become aggressive or belligerent and attempt to take over control of the water supply? What social values evolve? Is it decided to sacrifice one group before other groups, etc.

CONCEPT

THE PER CAPITA DEMAND FOR WATER IS INCREASING MORE RAPIDLY THAN POPULATION GROWTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify demands made on water supply today which were not demands 25 years ago.

Determine devices which increase water demand today.

Identify industries that use large volumes of water in their industrial processes.

Identify industrial water uses in production processes.

Determine the condition of the water from a particular industry when it is returned to the environment.

Determine the rates of water consumption over the past 20 years for each of the following:

- a. Agriculture
- b. Industry and business
- c. Domestic and home use

Determine in which sector of the country and the world the rate of consumption of water is increasing most rapidly.

TEACHING/LEARNING STRATEGIES

Select a particular building and do the following: Collect water from a dripping faucet. How much is collected in a fixed time interval? How many faucets are dripping? Calculate the volume of water dribbled away within the building. Extrapolate data to larger community.

Select one magazine aimed at housewives and tally the number of advertisements aimed at a product or a process that tends to increase domestic use of water. Also count the number of advertisements that include even the slightest hint of conservation of water in the home.

List water consumptive devices in students' homes (e.g. toilets, washers, dishwashers, sprinkling systems, etc.) Devise a method of estimating the volume of water used in a particular building in a single day by each device. Also, calculate total water use in a year's span of time.

Visit or call some nearby industries to find out how or for what purpose they are using water. Then, for each industry, determine which of the chemical or physical properties of water is facilitating that technological process. While in contact with the industry, find out in what condition the used water is returned to environment. Talk to management. Observe effluents. Talk to appropriate pollution control agencies about particular industries, the nature of their effluents, progress in pollution control, etc.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Go outdoors and see how many examples you can find of water as a solvent, water giving off or absorbing heat, etc.

CONCEPT

MAN HAS MISMANAGED HIS LIMITED WATER SUPPLY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Delineate or define the uses of water that could be categorized as "misuse."

Determine ecological consequences of constructing dams across moving water bodies.

Provide arguments in favor of constructing dams as they relate to water conservation, and to general conservation practices.

Delineate the "unnatural" substances (pollutants) found in water which make it difficult to purify.

Understand the impact of local industry on local water supplies.

Learn the factors which led to the current status of Lake Erie and identify existing parallels relating to a local body of water.

Project where drainage of wetlands has resulted in undesirable ecological consequences.

Explain ways that agricultural use of water results in serious problems of water management.

Understand long-range effects of irrigation of land.

TEACHING/LEARNING STRATEGIES

Students might volunteer to cooperate with a pollution control agency to monitor effluents or water conditions at a particular site. Usually agency representatives will show the students how to collect a proper sample, how to label it, and often encourage students to come to their laboratories to observe or learn procedures for analysis.

Students may want to carry out their own analysis and keep records to submit to appropriate agencies indicating that a problem exists, or that a problem is being corrected. A number of water analysis test kits are available for routine tests. Students should organize their results in a format that would be acceptable as evidence in a court of law.

If agricultural areas are convenient, design some simple experiments to test for some of the water problems identified by students (eutrophication, salt build-up in soil, etc.)

CONCEPT

WATER AVAILABILITY CAN BE INCREASED BY ELIMINATION OF ORGANIC AND INDUSTRIAL POLLUTANTS THROUGH PROPER TREATMENT, RECYCLING AND JUDICIOUS USE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine ways in which he can personally help improve the quality of water.

Understand the major steps in the treatment of drinking water.

Identify novel ways of increasing the amount of fresh water available to man.

Define primary, secondary, and tertiary sewage treatment, and list residues that probably remain in the water following each level of treatment.

TEACHING/LEARNING STRATEGIES

Evaluate the effectiveness of the local sewage disposal facility.

Outline the steps by which specific industries can make their water re-usable.

Conduct a panel discussion on why man must adjust his living pattern and life style to the available water supply.

Design a detailed plan for optimal water management in your community.

AIR POLLUTIONAlternative #1OVERVIEW

This module depicts man in search of improved life styles and more acceptable human environments. Because of this drive, man has inadvertently or without sufficient concern expelled numerous pollutants into the air. This air pollution has now raised grave concern in the areas of (1) physical health, (2) mental health, (3) aesthetics, (4) economic values and (5) other natural life. Due to the natural movement and extent of air movement, the extent of air masses and the tremendous increase in the production of air pollutants, the problem is no longer a parochial concern.

The air pollution problem is planetary in scope and consequently a knowledge of it is important in the education of every individual. We must understand the reciprocal nature of man's activity and social values which motivate his activities. The student should be aware of his personal responsibility specifically for air pollution control and generally for all other pollution controls.

CONCEPT

A KNOWLEDGE OF THE NATURE OF THE ATMOSPHERE IS FUNDAMENTAL TO UNDERSTANDING THE PROBLEM OF AIR POLLUTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine origins of air pollutants and with this knowledge discern the atmospheric conditions and predict the path of the pollutants.

Identify contributing atmospheric conditions of a given pollution phenomenon.

Understand influences of the sun, land formation, and water.

Determine the gases normally found in the atmosphere.

TEACHING/LEARNING STRATEGIES

Pre-test for basic knowledge.

Introductory lecture:

- a. Resource person (air pollution control expert or local weather man)
- b. Film on atmospheric conditions

Watch weather program on TV, gathering from it two potential pollution problems.

Class exercise using a weather map with overlays to trace the path of pollutants.

CONCEPT

AN UNDERSTANDING OF THE SOURCES OF AIR POLLUTANTS IS NECESSARY FOR MAKING DECISIONS ABOUT POLLUTION CONTROLS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify air pollutants, specifying their common name, chemical name, source, and effects on man and his environment.

Identify local sources of air pollution and describe each in terms of the pollutants' characteristics and potential hazards.

TEACHING/LEARNING STRATEGIES

Write a survey questionnaire and administer it during several "Man on the Street" interviews. These should be conducted by the students to determine public awareness of air pollution.

Given major sources of air pollution (transportation, industry, power plants, space heating and refuse disposal) compare the amounts of different pollutants produced by each major source.

CONCEPT

AIR POLLUTION CAN HAVE HARMFUL EFFECTS ON MAN'S HEALTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Discuss historical examples of physical harm from air pollution.

Identify how physical health conditions can be aggravated by severe air pollution.

Understand the effects of air pollution on man's respiratory system.

TEACHING/LEARNING STRATEGIES

Class debate on the need for automobiles and their effect on air pollution.

Lab demonstration on:

- a. Physiograph with cigarette smoker
- b. Artificial respiration (on dummy)

Project a number of air pollutants, rank these in order of potential danger to good health.

CONCEPT

AIR POLLUTION AFFECTS SOCIAL, ECONOMIC, AND POLITICAL INSTITUTIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Devise a plan for communicating the actual and potential dangers of air pollution to various groups.

Delineate political and legal steps to deal with various air pollution crises.

TEACHING/LEARNING STRATEGIES

Given a possible air pollution crisis, delineate (considering economic and social costs to all parties concerned) three political, administrative or legal steps to deal with the crisis.

Attend an air pollution control commission meeting in a particular area.

Game Simulation--Commission meeting with roles assigned as follows:

- a. Politician
- b. Industrialist
- c. Environmentalist
- d. Citizen
- e. Media representative

CONCEPT

A KNOWLEDGE OF CONTROL TECHNOLOGY IS NEEDED IN ORDER TO MAKE SOUND DECISIONS FOR SOLVING AIR POLLUTION PROBLEMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify mechanisms used for air pollution control.

Identify which technological controls would be effective for specific air pollutants.

TEACHING/LEARNING STRATEGIES

Demonstration of monitoring control devices using models, with appropriate field trips.

Invite director of local air pollution control to speak to class.

Chart for a determined period of time a daily account of air pollution index.

Identify and bring to the attention of the public pollutants in the local area (e.g., letters to the editor).

AIR POLLUTIONAlternative #2OVERVIEW

This module deals with the nature of the atmosphere as essential to understanding air pollution. There are a number of air pollutants having a variety of sources. These pollutants have complex interactions with each other and the environment, and meteorological conditions affect their accumulation and dispersal.

There are a multitude of ways in which air pollution affects inhabitants on earth. Individual concern and action are mandatory for effective air pollution control.

CONCEPT

UNDERSTANDING THE NATURE OF THE ATMOSPHERE IS ESSENTIAL TO AIR POLLUTION CONTROL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the composition of the atmosphere.

Outline the major gases in the atmosphere.

Understand how components of the atmosphere are important to biological processes.

Define the "greenhouse" effect.

Explain some processes of heat transfer as they relate to air pollution control.

Discuss the importance of particulate matter in the atmosphere.

TEACHING/LEARNING STRATEGIES

Answer the following questions in a brief discussion:

- a. What are the constituents of the atmosphere?
- b. What is the nature of meteorological patterns in the atmosphere?
- c. Is the earth's atmosphere an open or closed system?

Draw several temperature profiles of the atmosphere in various locations in the U. S.

Discuss gases in the atmosphere interacting with living systems.

CONCEPT

THERE ARE A NUMBER OF AIR POLLUTANTS WITH A VARIETY OF SOURCES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify major processes which produce air pollution.

Identify the major pollutants introduced into the atmosphere.

Understand sources of atmospheric pollutants.

Identify the most important source of atmospheric pollutants in the local community.

TEACHING/LEARNING STRATEGIES

Identify the major industrial sources of air pollutants, and discuss each source and the major pollutants it emits. Consider especially sources of SO₂, oxides of nitrogen, hazardous materials, particulates, and any special pollutants characteristic of the area in which he lives.

Discuss the major emissions from the internal combustion engine.

Discuss emissions from electric generating plants.

Discuss natural sources of emissions into the air.

Discuss emissions arising from disposal of solid wastes.

CONCEPT

METEOROLOGICAL CONDITIONS AFFECT THE ACCUMULATION AND DISPERSAL OF POLLUTANTS, AND CONVERSELY THIS PRINCIPLE IS ALSO TRUE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine the major factors that contribute to the development of a thermal inversion.

Understand the differences between a cyclonic and an anti-cyclonic condition on the accumulation or dispersal of pollutants.

TEACHING/LEARNING STRATEGIES

Discuss the nature of temperature inversions and its role in trapping pollutants.

Write a brief essay on the nature and limits of cleansing mechanisms for the air.

Show, by a diagram and model, the effect of particulate pollution on rainfall patterns near major industrial centers.

STUDENT LEARNING OBJECTIVES (Cont'd)

Define the importance of topographic features as they relate to the accumulation or dispersal of pollutants.

Explain the source, the effect, and the suggested removal by meteorological conditions of pollutants which are known to be harmful to man.

Understand why the so-called "heat island of a city" affects the accumulation or dispersal of atmospheric pollutants.

Determine the function of CO₂ in modification of global climatic patterns.

TEACHING/LEARNING STRATEGIESCONCEPT

THERE ARE A MULTITUDE OF WAYS IN WHICH AIR POLLUTION AFFECTS THE INHABITANTS ON EARTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine ways that air pollution affects the organs of the human body.

Learn how air pollution can add agents to the foods which are harmful to the body.

Determine the psychological and physiological effects of air pollution.

Determine cases where air pollution has been very detrimental to planning growth.

Explain how air pollution might bring another ice age.

TEACHING/LEARNING STRATEGIES

Research and write a paragraph discussing the effects on health and on plant life of the major air pollutants.

Discuss the effect of sulphur dioxide on materials of various types.

Detail methods to determine the health effect of a given pollutant.

Take a given pollutant (e.g. SO₂) and detail its effect as an air pollutant and, if controlled, as a water pollutant.

Discuss the effect of various pollutants on photochemical smog.

STUDENT LEARNING OBJECTIVES (Cont'd)TEACHING/LEARNING STRATEGIES

Approximate the total medical cost in the U. S. per year directly related to air pollution.

CONCEPT

AIR POLLUTION CONTROL NECESSITATES INDIVIDUAL ACTION.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES

The student will be able to:

Outline in detail ways in which your daily activities contribute to air pollution and consider ways to lessen the effect.

Recognize the need to use public transportation, to join a car pool, or use alternate modes of transportation.

Discuss how your individual action can affect the air pollution due to:

Identify ways to express concern to the community about air pollution.

- a. The aluminum industry
- b. The styrofoam industry
- c. The automobile industry

Voluntarily reduce air pollution in his immediate environment (e.g., stop outside burning).

Detail how individual action affects legislation and enforcement against pollution.

Identify local organizations involved in air pollution control.

Project procedures for legally acceptable courses a private citizen may take to reduce air pollution.

Determine the role of individual action as a prerequisite to private and public collective action.

FOOD AND DRUG POLLUTIONAlternative #1OVERVIEW

This module deals with the apparent damage caused by some of the modern methods of food and drug production. In an effort to make food more attractive and less fragile to harvest and to preserve food for long periods of storage, certain chemicals are added during growing, harvesting and processing. Long-term effects of these additives on consumers and on the environment in general are difficult to assess. An attitude of caution must be fostered in the general public about the types of foods and drugs used.

CONCEPT

FOOD IS NECESSARY FOR LIFE, AND URBAN LIVING REQUIRES TRANSPORTATION OF FOOD OVER LONG DISTANCES RESULTING IN LONG PERIODS OF STORAGE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand what types of food the body needs, and how and where these foods are grown.

Determine availability, transportation, and storage time in various food markets.

TEACHING/LEARNING STRATEGIES

Draw several biochemical pathways for each food in the body, including one each for carbohydrates, fats and proteins.

Make an exhibit of the physiological effects of:

- a. protein deficiency
- b. vitamin deficiency
- c. general malnutrition

Compare the average daily American diet with the average world diet with respect to total intake and protein intake.

Make a chart showing metabolic requirements of children, adolescents, young adults, middle-aged adults and senior citizens.

Take several fresh items now on the market and chart the distances they must be transported.

CONCEPT

MANY FOODS REQUIRE CERTAIN CHEMICAL ADDITIVES TO LOOK ESTHETICALLY PLEASING.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Discuss the attitudes of various groups of consumers with respect to appearance and texture of food.

Understand attitudes toward ready availability in stores, seasonal availability, shelf life, and waiting time for restocking.

TEACHING/LEARNING STRATEGIES

Consider the fresh foods (meat, dairy products, vegetables) which you buy locally. For at least three of each, find where they are grown, how far they must be transported, and how long they must be stored.

Do a survey in your immediate neighborhood on acceptance of only seasonal availability of certain fresh foods.

Arrange an exhibit and survey your immediate neighborhood regarding acceptance of several foods in samples that have been picked green, artificially ripened, and treated with preservative vs. those which have field ripened and remained untreated. Some examples are:

1. tomatoes
2. peaches
3. hot dogs (colored and uncolored)

Analyze your own shopping habits with respect to:

- a. acceptance of short-season availability,
- b. ability to wait if an item is not stocked
- c. appearance of fruits and vegetables

CONCEPT

THE LONG TERM EFFECTS OF FOOD ADDITIVES ON HUMAN HEALTH HAVE NOT BEEN FULLY DOCUMENTED BUT WHAT INFORMATION IS AVAILABLE HAS NOT BEEN ENCOURAGING.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine effects on human physiology of common food additives and preservatives.

TEACHING/LEARNING STRATEGIES

Compile all available data on physiologic effects of:

- a. some common emulsifiers
- b. SO₂

STUDENT LEARNING OBJECTIVES (Cont'd)

Recognize conclusive data in determining dangers of food additives as opposed to inconclusive studies.

TEACHING/LEARNING STRATEGIES (Cont'd)

- c. artificial ripening agents
- d. DES
- e. BHT
- f. NaNO_2

Write a paper on the recent controversy over use of MSG in baby food.

Make an exhibit of effects of various pesticide residues on the human body.

Discuss the chemistry and physiological effects of diethylstilbestrol, and why it is used to fatten beef cattle.

Discuss and diagram the process of artificial ripening.

Debate the pros and cons of using the following additives and preservatives in food:

- a. sulfur dioxide (for preservation of dried fruit)
- b. some common thickeners and emulsifiers
- c. diethylstilbestrol
- d. butylated hydroxytoluene (BHT)
- e. monosodium glutamate
- f. sodium nitrite

CONCEPT

CAUTION SHOULD PREVAIL IN THE CHEMICAL TREATMENT OF FOOD.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine for several given foods and preservatives what would happen to the appearance and shelf-life if preservatives were not used, and what corresponding health benefit there would be.

Some examples are:

- a. dried apricots, without SO_2
- b. yogurt, without added emulsifier
- c. lunch meat, without NaNO_2
- d. bread, without preservative
- e. unbleached flour

TEACHING/LEARNING STRATEGIES

Write a paper on what you think would be necessary to gain acceptance of fruits and vegetables with visible blemishes if they are not artificially ripened or contaminated by additives.

Make an analysis of the shelf life of:

- a. three packaged items
- b. three fresh items

and how each depends on the use of preservatives.

Conduct a survey in your immediate

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

neighborhood on the awareness of the use in food treatment and of adverse physiological effects of:

- a. sulfur dioxide
- b. BHT
- c. sodium nitrite
- d. artificial ripening agents

Bake two batches of bread, one using a preservative commonly used by commercial bakeries, the other without. Discuss the results as regards flavor and shelf life, and which you prefer, and why.

FOOD AND DRUG POLLUTIONAlternative #2OVERVIEW

This module deals with the premise that certain chemical additions are generally considered prerequisite to obtaining efficient agricultural yields and insuring proper preservation of our food. However, other chemical additions are strictly consumer oriented and their inclusion in our foods is questionable at best and may indeed constitute a health hazard. Stricter control over the marketing and merchandising of our foods is suggested along with continued experimentation to identify toxic agents added to our food.

CONCEPT

THE USE OF CHEMICALS IN AGRICULTURE LEAVES POTENTIALLY HARMFUL RESIDUES IN FOOD CHAINS OF BOTH MAN AND OTHER BIOTA.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the various types of fertilizers, pesticides, antibiotics, and hormones used in the production of foods.

Explain the detrimental effects of various pollutants through the natural food chains.

TEACHING/LEARNING STRATEGIES

Lecture on the eutrophication effects of nitrites, nitrates, phosphates, and metallic ions often found in fertilizers.

Report on present legislative controls concerning use of hormones in meat production.

Lecture on what is meant by biological magnification through a food chain.

Research how DDT and the heavy metals can serve as case studies of biological magnification through predatory birds and fish.

Use the seminar technique to have a medical doctor:

- a. explain the possibility of infant methemoglobinemia resulting from nitrite or nitrate contamination of food or water;
- b. explain the physiological results of contamination of foods or water with metallic ions.

Debate the hard vs. soft pesticides issue and list the common ones in present use under each category.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Research the extent of the present use of antibiotics in producing meat.

Research the history or present use of stilbestrol (or diethylstilbestrol) in:

- a. chickens
- b. pigs
- c. cattle

CONCEPT

CHEMICALS WHICH ARE ADDED TO FOODS FOR PRESERVATION, FLAVOR ENHANCEMENT AND IMPROVEMENT OF APPEARANCE OFTEN CONTAIN SUBSTANCES THAT ARE POTENTIALLY INJURIOUS TO HEALTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the major categories of chemicals added to foods and reasons for adding.

Relate the chemical additives to their possible effects on men's homeostatic mechanisms.

TEACHING/LEARNING STRATEGIES

Display foods which have chemicals added and foods which have no additives.

Have students look up:

- a. common names of additives
- b. chemical names of additives
- c. reason for adding specific additives to particular foods

Bring in foods which have additives and test foods for their shelf lives.

Compare foods which have different additives to determine which additives are the most effective.

Invite a speaker from the Federal Drug Administration or other agency to give a talk on legal aspects of food additives.

Write letters to Congressmen on current legislation pertaining to food additives.

Discuss in small groups attitudes of the American public on additives.

Research the GRAS lists and ask students their experiences with chemicals on the list.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Lecture on additives and their effects on humans.

Study case histories of effects of chemicals on humans.

Review newspaper and magazine articles for examples of chemical effects on animals.

Show a film on chemicals and their effects on environment and humans (e.g., film on defoliation).

CONCEPT

INCREASED KNOWLEDGE PERTAINING TO THE EFFECTS OF CHEMICAL ADDITIVES USED IN THE PROCESSING OF FOODS IS NEEDED.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify classes of food additives in various foods.

Recognize the extent of the use of given additives.

Compare the benefits of using chemicals in the production and processing of foods to the disadvantage of their use.

TEACHING/LEARNING STRATEGIES

Visit a food store and identify additives on labels.

Look in the kitchen and identify additives on labels.

Invite speaker from public health agency to talk about government control in protecting food.

Debate on pros and cons of using food additives.

Establish a collection of food labels from foods used in the home.

Interview chemistry and home economics teachers and compare their opinions about food additives.

Find out the acceptable quantity of insect parts in foods.

Make a chart showing classes of food additives.

Visit a food processing plant and study controls over amount of food additives used.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Obtain a DROS list.

Calculate amount of given additives in an average daily diet.

Make a graph showing the extent of use of the given food additives.

Invite a speaker from the field of agriculture to talk about the use of chemicals to increase agricultural yields.

Invite a speaker from the Health Department to discuss chemicals used in processing of foods.

CONCEPT

CONSUMER ACTION, PERSONAL AND THROUGH GOVERNMENTAL AGENCIES, IS NECESSARY FOR PROTECTION AGAINST POLLUTION OF FOOD.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Outline the operation of the Federal Drug Administration and local consumer protection agencies.

Advocate the abolition of harmful additives to foods.

TEACHING/LEARNING STRATEGIES

Have students write a letter to their congressmen giving their views as to how FDA is performing its legal responsibilities.

Conduct library research on food additives and summarize the purposes for their being added to various foods.

Organize a group discussion dealing with pros and cons of food additives.

Lecture on harmful effects of various additives to food substances.

Write a letter to FDA regulatory agencies pointing out harmful effects of various food additives and requesting regulation of their use in food.

Conduct a demonstration, using the overhead projector, on the organization of FDA; legal duties of FDA; organization; personnel and functions of other local consumer protection groups.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Hold a seminar with the following types of speaker presentations:

- a. representative of FDA
- b. president food processing plant
- c. public health official
- d. head of a local consumer protection group

Show film: "Your FDA in Action"

Role-Play the position on food additives of the following:

- a. President of food processing plant
- b. FDA official
- c. farmer
- d. public health official
- e. head of a local consumer protection group

FOOD AND DRUG POLLUTIONAlternative #3OVERVIEW

This module has a central theme revolving around the fact that modern food production emphasizes getting the best yield per acre and the highest pound gain for its animals. The economics of farming require that a farmer use all available technology to maximize his returns. As a consequence, the farmer depends strongly on animal hormones, pesticides, fungicides, herbicides and antibiotics in the production of the food for our nation. Once produced, foods must be further protected from pests, molds, and bacteria. In addition to this, food must be processed, packaged and given sales appeal.

Protecting our food supply from harmful chemical residues and potentially dangerous organisms is a complex task that involves research, surveillance and enforcement. Protection of the food supply from harmful contamination and residues has been a long-time concern of agencies concerned with public health. However, the extensive-use of pesticides, modern agricultural practices and new scientific awareness has given a new dimension to food protection. In addition to the traditional concern of viruses and bacteria, heavy metals, pesticides, growth hormones, antibiotics, PCB's and other potentially harmful chemicals are being discovered in our food supply.

The full impact of the numerous chemicals that are finding their way into food is little understood. Laboratory animals have shown health effects from these chemical residues and in higher concentrations they are a direct human health problem.

CONCEPT

RESEARCH HAS INDICATED THAT MAN'S CHEMICALS WHICH ARE FINDING THEIR WAY TO FOOD CHAINS ARE ALTERING THE EVOLUTIONARY PROCESSES OF MANY ORGANISMS RESULTING IN THE EXTINCTION OF THE ENTIRE SPECIES. THE IMPLICATIONS FOR MAN ARE OBVIOUS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify an organism, a pesticide, and a hormone.

Understand the distribution of organisms, pesticides and hormones in the food supply.

Explain how the extensive use of any of the above may alter other ecosystems.

TEACHING/LEARNING STRATEGIES

Invite a local milk and dairy sanitarian from a local health department to discuss the problem of antibiotics in the milk supply:

- a. Have him discuss testing procedures used by the laboratory to determine traces of antibiotics.
- b. Have a discussion on the precautions now taken to prevent contaminated milk from getting into our food supply.
- c. Have a discussion on the use of pesticides and their regulation in and around dairy animals.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Invite a plant pathologist or a department of agriculture specialist to discuss the role of a plant in absorbing chemicals.

- a. Discuss how mercury, arsenic and lead from natural sources can build up in food plants
- b. Discuss the role of fluoride from pollution sources in the health of food animals
- c. Discuss a case history such as a human mercury poisoning in Mexico that resulted from eating pork contaminated with mercury.

CONCEPT

CHEMICALS USED IN THE ENVIRONMENT AS PEST CONTROL AGENTS AND TO STIMULATE GROWTH OF FOOD ANIMALS HAVE THE POTENTIAL OF CONCENTRATING IN MAN'S FOOD CHAIN.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand how pesticides become magnified in the food chain.

Discuss how water pollution can lead to concentrations of microorganisms in shellfish.

Determine the distribution in the environment of a pesticide, herbicide, or heavy metal which is traceable to man's activities.

TEACHING/LEARNING STRATEGIES

Conduct a literature research on the types of fungicides used on seeds and compare these compounds on the toxicity of their basic ingredient or heavy metal.

Conduct a class seminar to discuss the potential impact of the use of mercury treated seeds in farming on bird life and game birds that may be eaten by man. In addition, the seminar should cover the potentials of heavy metal residues being washed into drinking water supplies and surface waters.

Submit an example of an organically grown food and a commercially grown similar food to a public health lab for analysis of pesticides or heavy metal. Because of the cost in running these tests, it may be necessary to limit the category of pesticide and indicate specifically what heavy metal you desire to test for.

CONCEPT

MODERN FOOD TECHNOLOGY AND AGRICULTURAL PRACTICES HAVE NECESSITATED EXTENSIVE USE OF CHEMICALS TO COMPENSATE FOR THE LACK OF SPECIES VARIETY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify monoculture practices in farming today which have reduced the natural balance of organisms in the ecosystem and increased the need for chemical management of crops.

Determine food distribution practices of one major food producer and how this can contribute to widespread exposure to the general population of potentially harmful residues.

Identify agricultural control practices in modern day farming that now endanger other parts of the human food chain.

TEACHING/LEARNING STRATEGIES

Review the FDA monthly magazine that covers enforcement action, certification of food additives, etc.

- a. Select 1 or 2 for presentation to the class.
- b. Conduct a seminar on everyday food additives, preservatives. Ask a food sanitarian from the health department or a regional representative from FDA to serve as a resource person.
- c. Review selected material on food additives and contamination available from FDA and the Health Department.

CONCEPT

DEVELOPING NATIONS WHICH ARE FREQUENTLY LESS CONCERNED WITH LONG-RANGE ENVIRONMENTAL IMPACT ARE INCREASING THE USE OF MODERN CHEMICALS AT A FASTER RATE THAN THE DEVELOPED NATIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify pesticides which do not biodegrade.

Determine pesticides, herbicides and heavy metal-based fungicides that have been banned in the United States but are used in developing nations.

TEACHING/LEARNING STRATEGIES

Invite a food sanitarian or food microbiologist to discuss bacterial and viral contamination of food. Discussion should cover the relationship of animal diseases to human health and organisms of significant public health concern such as salmonella, schigella, botulism and hepatitis.

Review literature on the distribution of PCB (polychlorinated biphenyls) in

STUDENT LEARNING OBJECTIVES (Cont'd)

Identify state and federal agencies that have jurisdiction over food additives, food quality and the use of pesticides.

Understand the world-wide implications of having other countries not paying attention to controlling food additives.

TEACHING/LEARNING STRATEGIES (Cont'd)

the environment. Specify examples like the 1968 outbreak of chlorocne in Japan, or Yusho disease being traced to the ingestion of PCB contaminated rice oil. Select articles from the American Journal of Public Health for class discussion or other literature discussing unacceptable levels of PCB's in chicken and fish.

CONCEPT

VIRAL AND BACTERIAL CONTAMINATION OF FOOD SUPPLIES CONTINUES TO BE A CONCERN FOR PROFESSIONAL ENVIRONMENTAL HEALTH WORKERS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the functions of environmental health agencies at the state and local level.

Discuss viruses and bacteria that have caused recent public health problems.

TEACHING/LEARNING STRATEGIES

Review articles on food protection from the Journal of Environmental Health and discuss in a seminar setting.

Arrange for field trips to the local FDA laboratory, Department of Agriculture labs and State Health Department labs and facilities.

Federally inspected meat and poultry has been found to be contaminated with salmonella. In March of 1972, the American Public Health Association filed a suit against the FDA to require more stringent regulations and prevent food poisonings. The class should discuss the issue and if possible use guest speakers.

FOOD AND DRUG POLLUTIONAlternative #4OVERVIEW

This module highlights the issues associated with the use of chemicals in the production and processing of foodstuffs. Unwise or unrestricted use of such chemicals results in conditions damaging to the environment and to human health. Control measures will require not only stringent legal regulations but a greater degree of consumer awareness and changes in individual attitudes in relationship to the growing and purchasing of food. The module also deals with the need for medicines and drugs and some potential dangers inherent in their misuse.

CONCEPT

GREATER REGULATION OF THE USE OF CHEMICALS IS REQUIRED TO PRESERVE BOTH HUMAN HEALTH AND ENVIRONMENTAL QUALITY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand various aspects of the world food problems.

Identify necessary daily nutritional requirements of man.

Learn the effects of efficient agricultural production on other aspects of society.

Compare the crop yields between developed and undeveloped countries.

Cite specific instances in which chemicals have increased food production and quality.

Rank pesticide chemical toxicity in order of human and environmental health hazards.

Identify the most persistent chemicals and pesticides used in food production.

Point out environmental and health hazards caused by the unwise use of chemicals in food production.

TEACHING/LEARNING STRATEGIES

Each student should record daily food choices and determine from a given chart the nutritional value of his diet.

Role-play a public hearing on the use of agricultural chemicals. Select several pesticides, fertilizers, hormones, etc. At least one "pro" and one "con" is to speak on each chemical selected. On the basis of evidence presented, the "board" is to make decisions on (1) whether or not the use of a chemical can be continued, (2) if continued, under what kind of regulation, (3) the impact of their decision on the agricultural economy, on the food supply of U. S., etc. The board is to reach a decision based on long-range consequences, economic feasibility, the availability of alternative techniques, etc. The objective here is not only to review the damaging effects of certain agricultural chemicals and possible alternative chemicals or patterns of use, but the frustration of finding an environmentally sound solution and areas of "trade-off".

STUDENT LEARNING OBJECTIVES (Cont'd)

Project food production/acre for various food products.

Discuss research projects which seek alternatives to chemical control of pests in food production.

Identify current research projects which have led to increased quantity and quality of food production.

TEACHING/LEARNING STRATEGIESCONCEPT

DRUGS AND MEDICINES ARE NECESSARY SUBSTANCES, BUT UNWISE USAGE AND MARKETING PRACTICES OFTEN CONSTITUTE A THREAT TO HUMAN WELL-BEING.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Formulate an operational definition of "drug pollution".

Define "drug proliferation" as it relates to marketing practices of drug companies.

Distinguish between the terms "chemical name", "generic name", and "trade name" as they relate to the identification and sale of drugs and medicines.

Learn advantages and/or disadvantages of purchasing drugs by generic name as opposed to a trade name.

Identify uses of prescription or non-prescription drugs that might constitute "drug pollution" or "drug abuse".

Define "synergistic effects".

Define "proprietary drugs".

Identify the regulating agencies for drugs and medicines.

TEACHING/LEARNING STRATEGIES

Invite salesmen from 2 or 3 drug companies to class. Ask them questions such as:

1. How many new drug products they marketed in the 24 months past,
2. How many of these were new drugs and how many were different combinations of widely used drugs
3. Attempt to compare what was in the new drug products of different companies
4. How the products were advertised or marketed
5. The costs for marketing each drug product
6. Statistics on drug reactions in hospitals, etc.

Invite to class or interview several doctors (by phone or in person) relative to:

1. The way he prescribes drugs - trade or generic names - and why
2. How he learns of new drug products
3. Whether he reads the research on the drug product
4. Whether he compares reports by the manufacturer to independent reports, etc.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

5. Statistics on drug reactions in hospitals, etc.

(These two strategies will probably net the student very little factual information but should illustrate the great difficulty in obtaining factual information in this very sensitive area.)

CONCEPT

TO INSURE AGAINST FOOD AND DRUG POLLUTION REQUIRES NOT ONLY LEGAL SAFEGUARDS BUT ATTITUDE CHANGES ON THE PART OF PRODUCERS AND CONSUMERS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify additives found in foods stocked in local supermarkets.

Determine the procedure by which the food additives are placed on the GRAS list of the FDA.

Understand the purpose of food additives.

Identify food additives as a possible health hazard.

Identify issues related to the food and drug industries that suggest more stringent regulations are required. Include the names of agencies responsible for such regulation.

TEACHING/LEARNING STRATEGIES

While at a supermarket, interview several consumers to find the individual's five main reasons for his choice of food products. Find out if the consumer knows the purpose for which additives are put in the food purchased. Find out if the consumer is aware of evidence (if any) that food additives present in the food product he has chosen have been implicated as a possible health hazard.

Randomly select a sample of pharmacies in the area. In groups, visit them to find out:

1. prices on a fixed quantity of specified drugs first by trade name and then by generic name
2. if any of the pharmacies post prices
3. if not, ask why.
4. Ask them if they would be willing to post prices.

Design a "consumer education" strategy or display that would bring to the attention of some segment of the public the information from identifying additives or drugs which are a possible health hazard.

Develop and submit list of prescription drug prices comparing the price of a fixed quantity of several drugs when prescribed by trade name as opposed to generic name.

SOUND POLLUTION.Alternative #1OVERVIEW

This module deals with the fact that noise in the environment is becoming an ever increasing problem. The generation of sound has existed throughout history; however, in present day society the existence of sound has been transferred into noise. Noise, or unwanted sound, has created definite mental and physical problems for the entire biological community. In addition, the problem has been brought into sharp focus through discussions of the economic and social implications. The module will examine the origin and regulation of noise.

CONCEPT

SOUND IS THE TRANSMISSION OF LONGITUDINAL COMPRESSIONAL WAVES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Analyze sound wave patterns in terms of the physical aspects of sound energy.

Recognize decibel levels associated with various noise sources.

Demonstrate ability to calculate and compute quantitative aspects of sound.

Identify examples of noise levels at decibel intervals of 10 db from 10 db to 100 db.

Define sound.

Define the meaning of the following terms:

- a. Sound waves
- b. Decibel levels
- c. Frequency
- d. Quality

TEACHING/LEARNING STRATEGIES

Make an exhibit illustrating propagation of sound through the air.

Discuss the various decibel scales used in measuring sound levels.

Discuss and illustrate a sound wave as an energy carrier.

Discuss the medium of transmission, energy and scales of measurements related to sound.

STUDENT LEARNING OBJECTIVES (Cont'd)TEACHING/LEARNING STRATEGIES

Apply the recognized terminology related to sound to graphic representations of sound patterns.

Acknowledge the survival value of sound by citing specific examples of sound stimulated behavioral activities in both human and non-human life.

Understand (graphically) the idea of frequency.

Define a decibel.

CONCEPT

BIOLOGICAL SPECIES REACT DIFFERENTLY TO SOUND FREQUENCIES.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES

The student will be able to:

Illustrate that sound frequencies are differential in their effects on various animal species.

Understand how the human ear works and label its parts.

Understand the hearing abilities of separate species of animals.

Develop a frequency scale of the range of frequencies audible to various animals (e.g., dogs, birds, and dolphins).

Determine the typical loss in aural ability (reducing frequency range) in humans age 1 to 30 and 30 to 60 years of age.

Make an exhibit of the effect of:

- a. Various noise levels on man and other animals.
- b. Various levels of pure tones on man and other animals.

Discuss the effect on human physiology and psychology of various lengths of exposure to sound levels of:

- a. 35 db
- b. 50 db
- c. db

Make an exhibit illustrating the human hearing range and comparing it with that of several other animals.

Make a chart which demonstrates a frequency scale of the effect of various sounds on animal species.

Identify and indicate the physiological aspects of sound interpretation from a drawing of the sound perception mechanism of various animals.

CONCEPT

THERE IS A RELATIONSHIP BETWEEN THE LEVEL OF NOISE AND TECHNOLOGICAL GROWTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify industries that have potential for damaging the hearing of the workers.

Understand data concerning a National Sound Level (NSL) and Technological Growth. The student will interpret the graph.

Identify sound levels in different parts of the community:

- a. a park
- b. a school
- c. an industrial park
- d. an office
- e. an entertainment center

Explain why industrial and general public use of noise generating devices is increasing for both commercial and recreational activities.

TEACHING/LEARNING STRATEGIES

Make an exhibit illustrating the noise level in db at various lateral distances from:

- a. a freeway
- b. an air hammer in use
- c. a metal stamping factory

With a db meter, measure the noise levels in various areas in and around your house, and relate them to:

- a. home appliances
- b. neighborhood situation with respect to traffic, etc.

Compare the noise levels from various sources in the modern home to that in the home of 30 years ago.

Determine the technological growth and increase of noise levels. (GNP vs Time--1850-1970, and superimpose on average decibel level of a major metropolitan area vs time).

CONCEPT

THE ENVIRONMENT HAS AN INFLUENCE ON THE PERCEPTION OF NOISE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify sources of noise in his neighborhood and state how he responds to each.

TEACHING/LEARNING STRATEGIES

With a db meter, measure and record the noise level at your institution throughout a normal work day. At hourly intervals, write down your perception of the noise around you.

STUDENT LEARNING OBJECTIVES(Cont'd)

Evaluate differential perception levels within and beyond one's own environment.

TEACHING/LEARNING STRATEGIES(Cont'd)

Participate in two "environmental walks"--one in an environment similar to that in which the student's home is located, and another in a relatively different but common residential environment. Evaluate both as to noise perceived.

Given an audio tape of various urban and rural sounds (each at three defined levels of amplitude), realize the relationship (by covering the eyes) and orally rating each sound as pleasant or unpleasant.

CONCEPT

THE WORLD IS EXPERIENCING AN ALARMING INCREASE IN THE AMOUNT OF SOUND, WHICH DICTATES THE NECESSITY FOR NOISE CONTROL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Cite needs for the control of noise pollution.

Identify data from studies on sound intensity and duration as it affects experimental animals and evaluate this data as it may relate to man.

Relate personal attitudes toward noise level preferences with respect to music, motors, and other physiological problems related to noise.

Identify physiological problems related to noise.

Determine a method of reducing the noise level at:

- a. an airport
- b. a foundry
- c. a rock concert
- d. other places which are extremely noisy

TEACHING/LEARNING STRATEGIES

Measure the noise level in a car and discuss whether or not you think it is noisy.

Find two or more situations having noise levels of:

- a. 40 db
- b. 90 db

and discuss any differences in your perceptions.

Make exhibits of some psychological studies of the effect of noise level on work performance.

Secure from appropriate sources in teaching material a tabulation of decibels x time vs physiological effect (hearing loss) in humans.

CONCEPT

MAN MUST RECOGNIZE HIS ABILITIES AND LIMITATIONS GERMANE TO CONTROLLING NOISE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine types of personal protective devices that would control noise individually.

Project examples of how insulation can be used to control noise.

Design a program for industrial noise abatement within the community and defend this plan when challenged on its economic merits.

Participate in political or civic activities to bring about noise pollution abatement.

Understand various health and psychological problems of man directly attributable to a specific noise source (e.g., the car).

TEACHING/LEARNING STRATEGIES

Discuss various strategies for limiting noise levels in the home and in the school.

Discuss to what extent various factors contribute to noise in a downtown area and how these can be mitigated.

Discuss how noise at an airport can be reduced.

Review local regulations concerning noise abatement.

Use an original sound level scale to determine sound levels in various areas.

Given a specific noise problem (e.g., TV, radio, cars, trucks), devise a noise control mechanism for the affected environment.

SOUND POLLUTIONAlternative #2OVERVIEW

This module stresses that man must become aware of the possible physiological and psychological damage which can occur as a result of noise pollution. As society continues to press forward in technological advances, the danger resulting from the increased noise must be recognized. An investigation of the sources of noise should be attempted in order that appropriate courses of action can be formulated. A complete understanding of the problem will require a knowledge of the physical nature of sound and the anatomy and physiology of the human ear.

CONCEPT

TO UNDERSTAND SOUND POLLUTION, A KNOWLEDGE OF THE PHYSICS OF SOUND AND ANATOMY AND PHYSIOLOGY OF THE EAR IS NECESSARY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify components which are necessary for sound to occur and demonstrate that the absence of one of these components results in a lack of sound.

Trace the pathway that sound takes during its passage through the ear to the brain.

Distinguish between the intensity and pitch of sound and describe how each one is measured.

TEACHING/LEARNING STRATEGIES

Make an exhibit illustration of the physics of sound propagation. Define a decibel.

Make an exhibit of the physiology of the human ear, and show how it experiences and is affected by sound.

Make a chart of various db levels, correlating them to perceptions of unpleasantness and pain.

CONCEPT

THERE ARE BENEFICIAL AS WELL AS HARMFUL EFFECTS OF SOUND.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

Discuss the phenomenon of deafness and its effect on learning in children.

STUDENT LEARNING OBJECTIVES (Cont'd)

Identify the sounds considered both psychologically and physiologically beneficial and defend these choices.

Explain the effects of loud noise or sounds of high decibels on the physiology of the ear.

Demonstrate an ability to use sound-monitoring devices.

Cite the decibel level which cannot be exceeded on a sustained basis without permanent ear damage.

TEACHING/LEARNING STRATEGIES (Cont'd)

Categorize the sounds which:

- a. You enjoy
- b. You go out of your way to listen to (e.g., music)

Classify the sounds that you hear into pleasant, annoying, unpleasant categories.

CONCEPT

SOURCES OF SOUND POLLUTION ARE VARIED AND ARE INCREASING AT A RAPID RATE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Use sound monitoring devices to survey community noise.

Identify major sources of noise pollution.

Identify sources of sound pollution which were non-existent 10, 25 and 50 years ago.

TEACHING/LEARNING STRATEGIES

List all of the sources of noise in a specific area, and with a db meter measure the associated noise.

List all of the sources of noise on your campus.

Measure the noise levels throughout the day of a given outdoor area, and list their sources.

CONCEPT

SOLUTIONS TO MOST SOUND POLLUTION PROBLEMS ARE PRESENTLY AVAILABLE AND SHOULD BE IMPLEMENTED.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Investigate the extent to which local governmental agencies have taken steps toward abating sound pollution

TEACHING/LEARNING STRATEGIES

Devise a strategy for reducing the noise level in a home kitchen.

Discuss and illustrate how shielding can reduce noise.

STUDENT LEARNING OBJECTIVES (Cont'd)

Describe techniques that are now in use to reduce sound intensity.

Determine the safety provisions against sound pollution used in a local industry.

TEACHING/LEARNING STRATEGIES (Cont'd)

Discuss all of the ways in which noise heard by a construction worker can be reduced.

Study methods used to reduce noise in some industrial area where this has been done.

SOUND POLLUTIONAlternative #3OVERVIEW

This module deals with sound as an essential part of the environment. Psychological studies of sound deprivation show that the human organism cannot tolerate long periods of silence. Placing the individual in a sound-free environment produces anxiety, increased tension, sweating, and if the situation is prolonged, neurotic or psychotic-like behavior. On the other hand, too much sound is equally harmful. In the situation where the individual's environment is too "noisy", actual permanent physical damage to the hearing mechanism can result. Not all sound which produces physical or psychological problems can technically be called noise. It is important to recognize the distinction between the physical or acoustic definitions of noise and the psychological response to sound when it becomes a noxious stimulus. Thus, it is necessary to examine the physical characteristics of sound as well as the psychological reactions to the sound stimulus in order to determine what constitutes "noise" or "sound" pollution. We must also examine the environments in which sound can be seen as either a physical or psychological pollutant. It is only when the overall relation of sound and its effects on the individual are better understood that there can be an intelligent approach to the problem of "sound pollution".

CONCEPT

PHYSICAL CHARACTERISTICS OF SOUND PRODUCE DIFFERENT PSYCHOLOGICAL REACTIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the technical meaning of sound.

Describe the physical and psychological characteristics of sound.

Relate sound environments to the psychological states they produce.

Relate the physical characteristics of sound to the psychological response of perception.

TEACHING/LEARNING STRATEGIES

Obtain a definition of sound from a textbook on acoustics.

List the characteristics of sound that are purely physical.

List the characteristics of sound that are purely psychological.

Describe psychological states associated with the following:

- a. elevator or background music
- b. automobile noise
- c. prolonged listening to a continuous hum from a home air conditioner
- d. construction noise
- e. loud talking
- f. creaking noises in a quiet house at night

Develop a chart showing the relation of a sound's physical characteristics to the psychological response given for each of the above.

CONCEPT

ALL SOUND IS A RESULT OF A VIBRATORY DISTURBANCE IN A MEDIUM CAPABLE OF ELICITING AN AUDITORY SENSATION IN THE HUMAN EAR.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Analyze the physical characteristics of sound.

Understand the relationship between intensity and frequency in the perception of loudness.

Discover the differences between species with respect to the range of frequencies they can hear.

TEACHING/LEARNING STRATEGIES

Describe the instruments used to measure the physical characteristics of sound.

Define each of the following:

- | | |
|--------------|--------------|
| a. tone | g. loudness |
| b. noise | h. pitch |
| c. sensation | i. intensity |
| d. vibration | j. decibel |
| e. medium | k. timbre |
| f. frequency | |

Analyze pure tones, plotting frequency, and intensity.

Develop a technique for showing how a change in frequency of a tone changes the perception of loudness.

Develop a scale to show the relation of perceived loudness to actual physical intensity measured in decibels.

Diagram the range of noise frequencies to which at least three different species are sensitive.

CONCEPT

SOUNDS ARE CLASSIFIED AS EITHER TONES OR NOISES AND MOST SOUNDS IN THE ENVIRONMENT ARE MADE UP OF BOTH.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify sound from a variety of environmental sources in terms of physical and psychological parameters.

TEACHING/LEARNING STRATEGIES

Analyze sound from at least five different environmental sources in terms of the:

- amount of noise present
- amount of tone present
- intensity of the sound

Sound Pollution

Alternative #3

STUDENT LEARNING OBJECTIVES (Cont'd)

Describe pleasant and unpleasant characteristics of sound.

Determine which sound sources are most likely to produce "sound pollution".

Demonstrate the relation of sound characteristics and their sources to the perception of sound as pleasant or unpleasant.

Define sound pollution.

TEACHING/LEARNING STRATEGIES (Cont'd)

List criteria for judging sound pleasant or unpleasant.

Identify and list in order of importance those characteristics of sound that would be considered pleasant and those that would be considered unpleasant.

Describe sound sources most likely to produce sound pollution.

Describe the criteria used to identify a source as sound-polluting.

Develop a check-list to show the relation of the following to the perception of sound as pleasant or unpleasant:

- a. noise present in the sound
- b. sound source
- c. loudness of the sound
- d. environment in which the sound is heard

Demonstrate how the environment in which a sound is heard can change the listener's perception.

CONCEPT

THE PERCEPTION OF SOUND BY AN INDIVIDUAL IS IN PART A RESULT OF THE ENVIRONMENT IN WHICH THE SOUND IS GENERATED.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Demonstrate how to record and measure sound levels in a variety of environments.

Determine attitudes to sounds generated in a variety of environments and under a variety of controlled situations.

Describe the conditions under which normal levels of sound could cause psychological stress.

TEACHING/LEARNING STRATEGIES

Investigate and analyze the way in which a sound level meter works.

Measure and record with a sound level meter the following environments: living room at home, p.m.; construction site during working hours; juke box in a lounge; ball park during a game; an expressway during rush hour; outside car; inside car, windows closed; crowded office elevator; inside airport terminal; outside-airport but close by; inside a factory during working hours. Compare and discuss the results of this exercise in class.

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES (Cont'd)

Develop a questionnaire or attitude survey to study the psychological effect of certain sounds on various individuals.

Present a sequence of recordings selected to represent:

- a. an urban industrial environment
- b. crowded urban housing area
- c. primary school lunch hour, and
- d. rural environment

to listeners and ask them to rate each on the dimensions of pleasantness or unpleasantness.

Systematically change the loudness of recordings played to listeners and discuss their reactions.

List those conditions under which normal levels of sound would cause psychological stress.

Describe criteria for judging psychological stress in response to normal levels of sound.

CONCEPT

ALTHOUGH "SOUND POLLUTION" CANNOT BE DEFINED IN ABSOLUTE PSYCHOLOGICAL TERMS THERE IS A NEED FOR THE ESTABLISHMENT OF MINIMUM SOUND CONTROL LEVELS IN SOME ENVIRONMENTS.

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES

- The student will be able to:
- Recognize potential sources of sound pollution.
- Understand the problems in establishing criteria for sound control.
- Outline the methods by which noise control programs can be established.
- Evaluate the cost of noise abatement programs.
- Assess the effects of long exposure to sound in a variety of environments.

- List ten potential sources of sound pollution.
- List criteria for judging a sound source to be a potential polluter.
- Develop a set of potential criteria for establishing minimal standards of sound control for the following:
 - a. large factories
 - b. highways
 - c. recreational devices
 - d. home appliances
- Devise a program of noise control for that environment which in the student's

STUDENT LEARNING OBJECTIVES (Cont'd)

Determine the role of government in sound pollution control programs.

TEACHING/LEARNING STRATEGIES (Cont'd)

opinion presents the greatest psychological and physical hazards. Have the students do the same exercise for an environment which is believed to be the least hazardous.

List the major problems in setting up noise control programs.

List those governmental agencies involved with the regulation of sound and noise abatement.

Trace an attempt to establish a noise abatement program and evaluate its success and public response to the program.

Describe the measures that can be taken by the individual in a sound polluted environment to protect his ears and psyche.

Evaluate the economic costs to industry of noise abatement programs in terms of the effects of noise on the performance of the employees.

List those environments in which it will not be possible to establish adequate standard of sound control.

Describe the physiological and psychological effects, if any, of long or repetitive exposure to the following: highway traffic noise; jet engine noise; household appliance noise; rock music; office equipment noise; background music in elevators, restaurants, stores, etc.

Identify the role of the local community in controlling sound pollution,

Describe the greatest obstacles to noise abatement enforcement.

NOISE POLLUTIONAlternative #1OVERVIEW

This module is concerned with the fact that noise levels are doubling every three years. These noise levels can adversely affect many in many ways, ranging from disruption of child performance to causation of physical and mental disturbances. A major problem area is community noise caused by transportation, construction or individual activities which generate excessive noise.

Noise abatement is primarily a local responsibility; however, federal standards and noise criteria are necessary due to the interstate sources of noise generating equipment and devices. Unlike many sources of pollution, there seems to be adequate technology available to control the bulk of community noise.

The Environmental Protection Agency, after extensive hearings, has reaffirmed that exposure to excessive noise can impair hearing, interfere with conversation, sleep and recreation, and the general quality of American life. There is also a possibility that in addition to permanent hearing loss, there are other physiological effects on humans, such as high blood pressure, tension and constriction of the arteries that result from excessive noise exposure.

CONCEPT

NOISE CAN CAUSE MEASURABLE PHYSIOLOGICAL DAMAGE TO THE HUMAN EAR AS WELL AS MENTAL STRAIN WHICH IS LESS MEASURABLE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the physiology of the human ear.

Discuss current issues on noise-related hearing loss.

Identify irritating noise in specific environments.

TEACHING/LEARNING STRATEGIES

Prepare a lecture on the basic physiology of the ear.

Lecture on sound measurement units and discuss human noise perception.

Conduct a classroom demonstration in noise interference with use of the telephone, and watching TV or listening to a radio.

Demonstrate the use of noise measurement equipment.

Invite as a guest lecturer an occupational hygiene engineer to describe precautions taken in the work environment to prevent noise-induced hearing loss.

Assign specific reading material on noise impact on people, control techniques and the use of vegetation in noise abatement.

CONCEPT

NOISE CAN HAVE AN ADVERSE ECONOMIC IMPACT ON A COMMUNITY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize where noise has caused property damage or reduced property values.

Outline precautions to be taken to reduce noise intrusion into a private dwelling and the local community.

Explain how noise can reduce the value of private property.

Demonstrate how urban noise can reduce the value of business property.

TEACHING/LEARNING STRATEGIES

Contact the local Housing and Urban Development office or an architect and ask what percent is added to the cost of construction when building near an airport.

Compare property values of a house in the flight path of a busy airport to a similar unit not influenced by airport noise.

Compare rents within the flight pattern of a busy airport to a similar unit not influenced by airport noise.

Invite an acoustical engineer or architect to discuss how noise can be controlled within a structure.

Review community ordinances on zoning in terms of how they relate to preventing noise conflicts.

Assign research papers to cover aspects of legal proceedings involving airport noise.

Design an out-of-class project to determine what areas in your community are actually or potentially suffering from excessive urban noise.

Research the literature on the cost differential of quiet vs. noisy appliance or yard equipment.

Compare the cost of a quiet muffler to a "standard or noisy muffler" for a motorcycle.

CONCEPT

URBAN NOISE IS MEASURABLE AND CAN BE CONTROLLED TO A GREAT EXTENT WITH CURRENT TECHNOLOGY.

STUDENT LEARNING OBJECTIVES

- The student will be able to:
- Define noise.
 - Understand how sound is measured.
 - Project activities that can be taken to curb urban noise:
 - a. by national government
 - b. by local government agencies
 - c. by the individual
 - d. by the educational community

TEACHING/LEARNING STRATEGIES

- Illustrate the concept of noise.
- Demonstrate use of equipment to measure noise.
- Engage in class projects to curb urban noise.

CONCEPT

URBAN NOISE IS INCREASING AT AN ALARMING RATE.

STUDENT LEARNING OBJECTIVES

- The student will be able to:
- Identify noise sources in community which were not significant ten years ago.
 - Understand the relationship between noise and speech.
 - Cite local ordinances on noise abatement.

TEACHING/LEARNING STRATEGIES

- Prepare a noise scale chart that shows noise levels of various equipment.
- Prepare a bibliography of noise-related material available in the school library.
- Assign reading list and reports to cover noise measurement.
- Assign a hypothetical case study in which current technology discussed in previous lecture can be used to control noise.
- Review literature on airport noise abatement and proposed federal requirements for aircraft.
- Develop a noise survey using a noise meter so that students develop a better understanding of noise levels in various settings.

CONCEPT

NOISE HAS BECOME A PART OF THE AMERICAN LIFE STYLE THAT AFFECTS PURCHASING PATTERNS AND ENTERTAINMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify ways noisy vehicles may have better sales appeal.

Identify appliances in the home that generate noise.

Describe entertainment facilities in which normal communication seems impossible.

Understand noise ordinances of local communities.

TEACHING/LEARNING STRATEGIES

Determine if your local pollution control, Environmental Protection Agency, Health Department or other agency has a noise abatement program and:

- a. how large a staff?
- b. do they have an enforcement program?
- c. are they funded?

Develop a role-playing scheme in which part of the class is designated as home owners opposed to a motorcycle racing park -- the others planning officers, bike riders, and park owners, favoring the project.

Review noise-related ordinance and make comments on how standards are set.

Review literature describing noise standards and make recommendations for urban noise standards.

Have individuals prepare a lecture with audiovisual aids to describe urban noise and control methods.

SCENIC POLLUTIONAlternative #1OVERVIEW

This module attempts to develop an awareness of advertisement scenic pollution, its causes, its harmful effects, and how it may be minimized or eliminated. The social, psychological, economic and political implications of scenic pollution must be better understood.

Industries play a major role in scenic degradation and inefficient use of resources. Concerted efforts should result in alternative techniques of industrial advertising and disposal of liquid and solid wastes. These efforts must include methods of how to change our societal patterns of throwaway packaging, and the frontier ethic of using the land and resources to man's advantage, and move on. Further, in analyzing environmental problems, man must not overlook the conditions of his home and community, and, more important, his own behavior germane to issues of scenic pollution.

CONCEPT

MAN HAS VIRTUALLY IGNORED THE VISUAL RAMIFICATIONS ON THE ENVIRONMENT OF HIS COMMERCIAL ADVERTISING PROGRAMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Discuss the principle of repetitive advertising for benefit of commuter.

Identify products seen daily which are reflected in inflated advertising signs.

Examine political and economic reasons for the proliferation of advertising products.

Analyze sign ordinances for governmental units at the local, state and federal level.

TEACHING/LEARNING STRATEGIES

Record with a camera the number of occurrences of the same advertising image that you see on a commuter route. Make a list of the distance between the occurrences.

Make a list of products that you see daily which are reflected in inflated advertising signs - cite locations.

For one week the student will place the objects he disposes of in a container. Make a list of these objects in categories such as:

- a. packaging materials
- b. worn-out products that he has used.

He may subdivide the lists into biodegradable and non-biodegradable materials.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Stroll through the community (or along nearby state or federal highways) compiling information and/or photographing illegal signs. Cite the specific ordinance or ordinances defied by each illegal sign.

Survey a section of a primary highway, and determine what methods can be utilized to improve the aesthetic value of the right-of-way.

List examples of products which you use that you can discover in advertising on your way to school.

CONCEPT

MAN, FOR THE MOST PART, HAS LOST THE PRIDE AND VALUE OF PRODUCING HAND-MADE PRODUCTS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Outline how new roads can be planned to prevent visual boredom and fatigue.

Explore advertising techniques to better understand consumer practices.

TEACHING/LEARNING STRATEGIES

Conduct a workshop on advertising propaganda techniques.

Examine commercial products and compare on a personal evaluation sheet the following:

- a. Texture
 1. sculpture
 2. rough
 3. smooth
 4. hard
 5. soft
 6. simulated
 7. natural
- b. Size
 1. intense color
 2. faded color
 3. bold lettering
 4. fine print
 5. graphic effort

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Analyze individual perceptions on architecture.

Interview business people who advertise and find out what motivates their advertising techniques.

Analyze cost effectiveness of various advertising.

Conduct a consumer poll on why certain products are bought.

Conduct a study of the Gross National Product to determine why it is necessary to increase per capita income.

Study the philosophical assumption-- "Advertising Creates Demand."

Investigate the degree to which neon signs interfere with reading highway signs.

Determine how much sign painters are paid per hour and compare this to other occupations.

Read Visual Thinking, Anheim.

CONCEPT

PRODUCTS WHICH ARE SIMULATIONS OF NATURAL MATERIALS MIGHT FOSTER A SENSE OF UNREALITY AND CALLOUS INDIFFERENCE TOWARD THE NATURAL VISUAL ENVIRONMENT.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES

The student will be able to:

Compare commercially produced products with natural materials.

Analyze business and industry exterior building quality.

Calculate the ratio of natural to artificial simulations in use in the immediate environment.

Interview leaders in business to determine their commitment to aesthetic quality.

Construct two objects normally bought. Use natural materials in the construction of one and man-made materials in the construction of the other. Evaluate the feelings of a group of individuals concerning the value placed on these objects relative to each other.

SCENIC POLLUTIONAlternative #2OVERVIEW

This module deals with the problems associated with the conversion of land from its natural setting to those settings which man has devised to serve his immediate needs. The scope of visual pollution varies from the gaudy assaults on the eye that are characteristic of most metropolitan areas to the clutter of previously unspoiled vistas with signs, utility poles, junk yards, housing and commercial development.

The competitive need to sell has resulted in the proliferation of outdoor advertising. It may be that such proliferation defeats its intended purpose as people, because of the overabundance, become less aware of the messages offered and are adversely affected as well by the overall visual conditions of a particular locale.

Traditionally, little value has been given to the aesthetics of land use or development of urban areas. The highest values are generally placed on utility and least initial cost. The concept of least initial cost to the individual or to government usually results in a higher social and economic cost in the long run.

Our American cities have become noted for their look-alikeness. This fact becomes obvious as we enter a city or small town. The architecture of suburban areas is look-alike and repetitive to such an extent that neighborhoods frequently have little or no individual character. In addition, the main arteries and business areas in our communities are cluttered with gasoline stations on every corner and a proliferation of advertising signs, directional signs, parking meters and on-site sales signs that are typical of "Anytown" U.S.A. The module emphasizes the need for Americans to begin to take a critical look at their cities appearance, how their neighborhoods are designed, and to work to improve their visual and aesthetic quality.

CONCEPT

ADVERTISING UNIFORMITY AND BUILDING DESIGN USED BY MANY CHAIN RETAIL BUSINESSES HAVE RESULTED IN VISUAL UNPLEASANTNESS AND MONOTONY WHICH ARE CHARACTERISTIC OF MOST URBAN AREAS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify businesses or corporations that have uniformity of signs and architecture.

TEACHING/LEARNING STRATEGIES

Prepare a slide presentation which characterizes typical signs found within a community and typical types of architecture.

STUDENT LEARNING OBJECTIVES (Cont'd)

Understand how advertising has reduced the aesthetic quality of specific areas.

Determine local state and federal regulations concerning advertising and the use of outdoor media.

TEACHING/LEARNING STRATEGIES (Cont'd)

Review local state and federal regulations regarding the use of signs in advertising.

Invite a guest lecturer from the advertising industry to discuss the use of outdoor media and the principles thereof.

Invite a speaker from a local chapter of the American Institute of Architects to discuss how some communities such as Scottsdale, Arizona have a sign ordinance which limits the use of outdoor advertising. Students should further discuss the value of such an ordinance.

In lieu of the above, students should research the Journal of the American Institute of Planning officials for articles pertaining to outdoor advertising.

CONCEPT

UNIMAGINATIVE BUILDING REQUIREMENTS AND LACK OF REGULATIONS HAVE RESULTED IN OUR LANDSCAPE BECOMING CLUTTERED WITH SIGNS AND LOOK-ALIKE STRUCTURES. IN ADDITION, THE LACK OF REGULATIONS HAS PERMITTED LAND USES THAT ARE INCOMPATIBLE AND DETRACT FROM THE BEAUTY OF THE NATURAL ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Develop an understanding of what is considered obvious incompatible land use.

Cite examples of how buildings have been designed without consideration of visual quality.

Determine how building requirements that specify uniform setbacks and side yards have had an impact on the visual quality of residential neighborhoods.

Identify components of the local building and zoning code that relate to visual quality.

TEACHING/LEARNING STRATEGIES

Most communities have some positive visual value that can be taken advantage of such as a river, a lake or wooded area. The students should describe such areas in their communities and what action has been taken in a positive or negative manner regarding them.

Prepare letters to local state and federal government officials expressing concerns for natural settings, and describe suggestions for use and/or preservation of these areas which have aesthetic value.

Invite a speaker from a local or state planning department to discuss specifically how the government evaluates these natural areas and their relationship to the city's master plan.

CONCEPT

FEW OF OUR CITIES HAVE ARCHITECTURAL CHARACTER OF THEIR OWN.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine if various communities have an architectural design review process.

Describe various communities visited or neighborhoods within a community that have a positive aesthetic character of their own.

Discuss how specific government buildings have contributed or detracted from the character of a community.

Explain how public projects such as highways and bridges have enhanced or detracted from the visual quality of a community.

TEACHING/LEARNING STRATEGIES

Invite a guest speaker from the local planning agency to discuss innovative concepts in land use such as:

- a. Cluster housing
- b. Planned unit development
- c. Others

Research literature on methods which can be used to preserve natural beauty such as scenic easements, buffer zones and landscaping requirements.

Investigate to determine the purpose and accomplishments of various architectural review boards around the country.

CONCEPT

PLANNING AND ZONING ARE TOOLS USED BY VARIOUS GOVERNMENTAL AGENCIES TO BRING ABOUT ORDERLY DEVELOPMENT AND COMPATIBLE LAND USE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine if his city or county has a master plan for:

- a. Open space
- b. Land use
- c. Other

Describe the process of zoning used in particular communities.

TEACHING/LEARNING STRATEGIES

Invite a guest speaker from the local planning agency to discuss the planning and zoning procedures used in the local community and describe plans that have been prepared for the community.

Obtain copies of various plans available from a planning agency and conduct a class seminar using these as base documents. The seminar should concentrate on the comprehensiveness of the documents and their general desirability.

CONCEPT

COMMUNITY DECISIONS CAN BE INFLUENCED BY INDIVIDUALS WORKING THROUGH THE EXISTING POLITICAL STRUCTURE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize formal community political structure.

Describe opportunities for citizen input to community decision.

Describe political or governmental decisions that were influenced by individual citizens and groups providing input to the process.

TEACHING/LEARNING STRATEGIES

Acquire or prepare an organizational chart of a city or county government.

- a. Conduct a class visit to a city or county commission meeting.
- b. Assign individuals to interview the chairman or members of various environmental advisory boards and prepare a brief overview and flow chart of their functions.

Attend a public hearing on an environmental issue.

Prepare testimony to be presented to a public hearing:

- a. For oral presentation by representatives of the class.
- b. Written with class approval and endorsement.
- c. Have individuals write a letter to their congressman on an issue he is expected to vote on. Letters should be discussed to determine their impact.

Assign political roles to individuals in the class and have them prepare campaign speeches on the feasibility of a new pulp mill being built in their town.

Lecture on the American political process.

- a. Film
- b. Guest lecturer
- c. Assigned reading

Discuss a case history on a political decision that was environmentally relevant.

Discuss the National Environmental Policy Act.

Develop a small scale environmental input statement to show the process of citizen input to the political process.

CONCEPT

OPEN SPACE, AESTHETICS AND VISUAL AMENITIES CONTRIBUTE TO A MORE PLEASANT AND HEALTHY ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand how beautification projects can have an impact on the visual quality of our nation.

Cite specific regulations, guidelines and enforcements which are necessary for long-term public benefits.

TEACHING/LEARNING STRATEGIES

Prepare short papers on how man's habitat need not be in conflict with nature.

Prepare a slide presentation, along with narratives, which will discuss how advertising, informational signs, utility poles, and parking meters detract from the visual quality of the community.

List the visual positives of a community with the following objectives in mind:

- a. Has the community made the best use of its visual amenities?
- b. What can be done to improve existing situations?

Write individual reports on specific subdivisions, industrial parks, public buildings and expressways, with the objectives of determining if the projects have made the best use of the natural settings available. Further, cover inverse impact on visual quality, and provide recommendations for the improvement of the visual quality of these projects.

Discuss what specific steps can be taken to improve the visual quality of publicly owned facilities such as schools, libraries and expressways. Students should determine if the community has an open space plan and if so, how is it to be implemented.

Prepare a letter to the editor concerning an eyesore in the community and follow up with copies to the city or county manager.

List beautification groups active in the community, and further, attend one of their meetings.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Arrange a campus or community beautification project such as starting a tree planting program.

SCENIC POLLUTIONAlternative #3OVERVIEW

This module deals with scenic pollution or that which is visually offensive and harmful to man. Scenic pollution is often the result of man's failure to recognize the intimate relationship between himself and his environment. Much scenic pollution consists of wasted resources (trash or oil spills) or the failure of an individual or an industry to deal effectively with the use of natural areas in the environment. Solutions to the problem involve sensible planning, efficient resource utilization and modification of man's attitudes and life styles.

CONCEPT

MAN'S PERCEPTION OF HIMSELF, HIS ATTITUDES TOWARD NATURE, AND HIS VALUES, INFLUENCE THE WAY HE TREATS HIS ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the importance of the self-concept as this dictates human action.

Determine the process of attitude formation.

Identify specific occurrences of value based actions of man impinging on the environment.

TEACHING/LEARNING STRATEGIES

Write a brief essay on individual "place" as a member of humankind.

Role play to identify actions which are a direct result of the self-concept.

Identify and discuss at least three changes of attitude regarding a specific value (i.e., church going, abortion, criminal record) which has occurred in the last five years in students' perceptions.

Research and discuss legislative acts which have altered use of immediate environment.

Invite a guest speaker to present attitudinal changes identifiable in a certain area.

CONCEPT

SCENIC POLLUTION IS A BY-PRODUCT OF INEFFICIENT UTILIZATION OF RESOURCES AS WELL AS AN APPARENT INSENSITIVITY TO THE VALUE OF AN ATTRACTIVE ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define "Scenic Pollution."

Differentiate between "value judgments related to beauty" and "scenic pollution."

Understand the relationship between the rates of utilization of resources (iron, timber, aluminum, fossil fuels, etc.) and the estimated tonnage of solid waste in the U. S.

Identify quantities of resources that are recycled in the U. S.

Discuss examples of "scenic pollution" that result from inefficient utilization of resources. Each example is to include:

- a. The type of "scenic pollution" (oil spill, etc.).
- b. The resource that is being wasted or utilized inefficiently.
- c. Whether or not a recycling reclamation process is available, the name of the process, whether the process is currently being utilized in the U. S.

TEACHING/LEARNING STRATEGIES

Develop a slide presentation that compares "scenic pollution" to differences in value judgments as they relate to "beauty." The slides are to cover a range of "environments"--both natural, man-made, things such as visible evidence of solid waste problems, visible evidence of inefficient resource utilization, urban planning for an aesthetic environment, urban non-planning, parks, sculptures, manufacturing or factory sites, etc., are to be included. The narrative for the presentation is to include causive factors, differences in beauty "value judgments," and descriptions of the resources being wasted or destroyed (including human resources).

Develop a questionnaire that will be administered to students or to members of the community to determine how well informed the general public is about recycling and reclamation processes. The results may be summarized and used in some form of media presentation (e.g. school paper, local newspapers, television, or an environmental publication, etc.).

CONCEPT

"MAN MUST MODIFY HIS ENVIRONMENT, BUT THESE ALTERATIONS SHOULD BE CARRIED OUT WITH MINIMAL ENVIRONMENTAL DISRUPTION."

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define "scenic modification."

Distinguish between "scenic modification" and "scenic pollution."

Recognize reasons why scenic modification is necessary.

TEACHING/LEARNING STRATEGIES

In groups, students should examine local land-use planning, as well as several "new towns." What factors were considered in planning the "new towns?"

Design a simple land development project that would be sensible scenic modification without being scenic pollution. (Give the description of an undeveloped area and other necessary information.)

Groups or individual students should be assigned responsibility in planning for social, aesthetic and economic factors as well as water supply, treatment, transportation, and food sources for the land development project.

CONCEPT

LEGISLATION, EDUCATION, MODIFICATION OF ATTITUDES, AS WELL AS COST ACCOUNTING SYSTEMS THAT INCLUDE COSTS OF ENVIRONMENTAL MAINTENANCE, ARE TECHNIQUES FOR AMELIORATING SCENIC POLLUTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Propose properly constructed municipal ordinance that would help ameliorate a local "scenic pollution" problem.

Design an educational activity aimed at informing citizens about strategies for ameliorating scenic pollution.

Define "cost accounting system."

TEACHING/LEARNING STRATEGIES

Identify a local scenic pollution problem that is at least partially attributable to improper cost accounting. In regard to this problem, the student should:

- a. describe the problem
- b. determine who is bearing the cost of the problem
- c. suggest at least three ways a proper cost accounting system would ameliorate the problem.

Design a self-guided "scenic pollution

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

tour" of a city. Students should identify sites of major scenic pollution and prepare a written tour guide. The guide should include:

- a. questions that call attention to specific problems
- b. some background information on causive factors--what industrial by-products are involved, what municipal ordinances are being violated, etc.
- c. processes and/or procedures available to alleviate the problems
- d. name and phone number of the appropriate agency and/or business to call and register a complaint
- e. students should publicize the tour, and consider taking a TV newsman on the tour. This can get citizens, as well as students, involved.

INDIVIDUAL INVOLVEMENTAlternative #1OVERVIEW

This module attempts to foster a desire in individuals to convert their knowledge and concern about the problems of the environment into meaningful action. The direction, goals and concerns of the society are the result of actions and reactions of individuals acting alone, or groups of individuals acting in concert. Each individual makes a contribution to the aggregate behavior of the society. However, the degree to which an individual's activity influences the course taken by a society varies greatly. The willingness of the individual to become "involved" is a function of many variables. Contemporary society has seen a disengagement of the individual from many levels of participation.

To achieve the goal of improvement and maintaining a quality environment requires a reawakening of the individual's perception of his need for personal involvement. To increase individual involvement in solving problems of the society, the individual must be able to recognize clearly the rewards of such involvement. Most individuals weigh the costs, risks, and potential gains that might result from involvement. To the extent that the gains outweigh the risks and/or costs, or that failure to act will pose a severe threat to existence, an individual will act and become involved.

CONCEPT

THE WAY IN WHICH INDIVIDUAL INVOLVEMENT TAKES PLACE DEPENDS ON THE PARTICULAR SITUATION OR CONDITION CONFRONTING THE INDIVIDUAL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the factors influencing an individual's involvement in a situation.

TEACHING/LEARNING STRATEGIES

List situations which tend to: increase chances of individual involvement; decrease chances of individual involvement.

Predict the type of individual involvement that might occur in the following situations: witnessing a violent crime; observing a motorist in trouble; failure to enact adequate zoning ordinances; improper action of elected officials; case of corporate misrepresentation.

Conduct a survey to determine the probability that an individual might become involved in stated situations.

List at least five different kinds or levels of personal involvement.

CONCEPT

TO INCREASE INDIVIDUAL INVOLVEMENT IN SOLVING SOCIETAL PROBLEMS, IT WILL BE NECESSARY TO MAKE EXPLICIT THE RELATION BETWEEN THAT INVOLVEMENT AND RESULTANT CHANGE. MANY INDIVIDUALS REJECT INVOLVEMENT BECAUSE THEY BELIEVE THEIR INVOLVEMENT WILL NOT HAVE ANY IMPACT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine how individuals view their involvement as producing change.

Recognize the variety of positive and negative factors influencing individual involvement.

TEACHING/LEARNING STRATEGIES

Describe three situations in which there can be an immediately observed and desired change.

List ways in which the relation between individual involvement and desired change can be made explicit.

Interview at least three of the following to determine how they see individual involvement producing change: city or county commissioners; school board member; city or county manager; member of public service commission; manager or owner of a business; service club officer; officer of professional society such as bar association, retailers, etc.

Conduct a poll in a particular neighborhood on the question "Individual involvement has little impact on policy makers." Yes or no. As part of the poll, try to determine why people say "no". What would be needed to get these people to feel individual involvement will have an impact.

CONCEPT

INDIVIDUAL INVOLVEMENT WILL OCCUR WHEN CONDITIONS IN THE ENVIRONMENT ARE PERCEIVED AS POSING A DIRECT THREAT TO THE FUTURE EXISTENCE OF THE INDIVIDUAL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the concept of threat as a motive for individual involvement.

TEACHING/LEARNING STRATEGIES

List five environmental or societal situations that can be considered as posing a direct and immediate threat to the individual or his group.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

List five environmental or societal situations that cannot be considered as posing a direct and immediate threat to the individual or his group.

Develop and test two scales to rate issues that might produce individual involvement. The scales should enable the user to evaluate how threatening a situation might have to be before an individual will become involved.

CONCEPT

BEFORE BECOMING INVOLVED, THE INDIVIDUAL MUST PERCEIVE THAT THE INVOLVEMENT WILL NOT INCUR TOO GREAT A RISK AND WILL HAVE SOME OBSERVABLE BENEFICIAL RESULT.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES

The student will be able to:

Understand the relationship of risk in individual involvement.

Understand the function of gain as a motive in producing individual involvement.

Define risk in terms of increasing or decreasing individual involvement.

List those risks which would be most likely to prevent individual involvement.

Describe the observable gains that if seen or understood by the individual would increase involvement in the following areas: water pollution; school integration; consumer protection; taxation; health care; housing.

Conduct a survey to determine the amount of agreement among respondents on the gains described above.

Develop a risk/gain factor to attempt to predict the conditions for individual involvement.

CONCEPT

LARGE NUMBERS OF PEOPLE BELIEVE THAT INDIVIDUAL INVOLVEMENT IN MOST CASES IS IRRELEVANT AND INEFFECTUAL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine the individual's perception of the relevance and effectiveness of individual involvement

TEACHING/LEARNING STRATEGIES

Interview people from the following groups to determine if they believe that individual involvement is irrelevant and/or ineffectual: housewives; high school students; low-income heads of households; politicians; businessmen; Blacks; Latins; factory workers; senior citizens.

On the basis of the interviews, determine the most often given reasons people believe individual involvement is irrelevant and/or ineffectual.

Determine, if possible, the perception that individual involvement is irrelevant and/or ineffectual is more prevalent in some groups interviewed than others.

CONCEPT

PEOPLE MUST BECOME AWARE OF THE POTENTIAL POWER OF THE CUMULATIVE EFFECT OF MANY INDIVIDUALS ACTING TOGETHER.

STUDENT LEARNING OBJECTIVE

The student will be able to:

Understand the need for education for individual involvement and group participation.

TEACHING/LEARNING STRATEGIES

List five ways to make people aware of the power inherent in individual involvement,

Select some issue and organize an educational module to illustrate how individual involvement could influence a decision on that issue.

Determine how various action-oriented groups attempt to get individuals involved.

Describe the range of behaviors that would be classed as showing individual involvement. Show how a certain type of behavior is related to a particular situation.

INDIVIDUAL INVOLVEMENTAlternative #2OVERVIEW

This module deals with the fact that if we are to survive with a desirable way of life, individual commitment and action are required in behalf of environmental quality.

Individual action must involve more than talk, letters to the editor, and meetings. Meaningful involvement dictates that the individual make conscious, personal goals for better environmental management. These goals can include such items as reducing energy consumption, selective buying, voting for political candidates with expressed environmental ethics are becoming involved with organizations that consider their special interests creating a more livable environment not only for today's citizens but for generations yet to come.

Effective individual involvement must follow procedures that will provide the most benefit per time unit of involvement. Individuals must become informed on the issues so as to better recognize the problems and equally important, be in a better position to evaluate proposed solutions. Frequently, action is best accomplished through using the normal processes and channels available. This is especially true today because of the environmental awareness of political candidates and requirements set forth by government requiring environmental considerations in governmental action.

Individuals must strive to become part of the community planning process to avoid excessive special interest influence on community decisions. Individuals, by becoming involved through organizations, can frequently exert significantly more political pressure and accomplish tasks that are far beyond the ability of individuals working alone. Environmentally oriented groups can develop a great degree of credibility with the press, community leaders and government agencies. The group process can lead to a more balanced approach to community issues with fewer conflicting goals and a broader base of support. Individual commitment through organizations has proven to be successful in bringing about a better quality of life and therefore should be maximized to insure environmental visibility.

CONCEPT

INDIVIDUAL ACTION TO ENHANCE THE ENVIRONMENT AND CONSERVE RESOURCES MUST INCLUDE AN EDUCATION PROCESS IN ORDER TO BE EFFECTIVE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify major environmental concerns that require individual involvement.

TEACHING/LEARNING STRATEGIES

Invite a trial lawyer or judge to class to discuss effective case presentation and talk about how this applies to presenting environmental issues.

STUDENT LEARNING OBJECTIVES (Cont'd)

Understand effective methods of individual and group involvement on an environmental issue.

TEACHING/LEARNING STRATEGIES (Cont'd)

Prepare as a class project an environmental reading list and state why each item is placed on the list.

Prepare individual reports on selected environmental issues first without researching. Secondly, research the subject and issue to determine as many facts as possible and prepare a second report.

- a. Select initial reports to be presented to the class.
- b. Follow-up with researched report.
- c. Record and discuss the disparities in the reports to demonstrate how knowledge of the facts may dictate appropriate actions.

Develop a list of reading material on specific environmental issues. Denote:

- a. Where available.
- b. If it includes suggestions for action.
- c. To whom is the suggested action directed.

Invite a speaker to discuss the art of communicating to the public.

- a. Use these techniques to prepare a class presentation.
- b. List and discuss techniques of good communication.

Conduct a panel discussion on one environmental issue.

- a. Assign roles.
- b. Vote or judge which issue won out and discuss why.

CONCEPT

ENVIRONMENTAL MANAGEMENT IS A COOPERATIVE VENTURE INVOLVING A PARTNERSHIP BETWEEN CITIZENS AND GOVERNMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify decision-making bodies in the local community and state

TEACHING/LEARNING STRATEGIES

Do a chronological study of events concerning the initiation of a project that has environmental significance; e.g., a Corps of Engineers' dam:

Individual Involvement

Alternative #2

STUDENT LEARNING OBJECTIVES (Cont'd)

that have citizen advisory boards.

Identify individuals and groups in the county that are noted for their environmental involvement.

Understand how ordinances on air pollution, for example, require the cooperation of citizens in order to be effective.

Cite community action that has mobilized citizens to protect the environment.

Project components of effective community action.

TEACHING/LEARNING STRATEGIES (Cont'd)

- a. Did the public have ample opportunity to contribute?
- b. How was citizen input assessed?

Invite a local conservation or environmental leader to discuss what he considers effective citizen action.

Interview environmental management officials for tips on how citizens can support various programs.

Obtain copies of the county or state pollution control ordinance and use these as a basis for class lectures.

Determine procedure for passage of local environmental control ordinances.

Discuss air quality control implementation plans for certain areas. List steps taken to approve the various plans.

Lecture on methods used by groups to protect the environment.

Develop a reading list for environmental action.

Review the Planning and Conservation League story in the March 17, 1968 New York Times by William Evers.

Lecture or review literature on how local citizens enlisted the help of Cornell University, National Audubon Society, the American Museum of Natural History and others to get the U.S. to protect the Okefenokee Swamp--noting that the local paper, the Waycross Chamber of Commerce and citizens raised \$100,000.

Give examples of how business and industry have reoriented their approaches to environmental quality and how they have supported environmental issues.

CONCEPT

APPROPRIATE INDIVIDUAL LIFE STYLES CAN AFFECT BETTER ENVIRONMENTAL MANAGEMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand how consumer demands influence products available.

Determine aspects of our life style that have influenced:

- a. air quality
- b. water quality
- c. solid waste practices

Identify examples of political decisions that affect environmental quality.

TEACHING/LEARNING STRATEGIES

Lecture on changing purchasing patterns on:

- a. plastics
- b. returnable containers
- c. single service items

Prepare a list of individual actions having a direct effect on stopping a project threatening the environment; e.g., Everglade jetport, Cross Florida Barge Canal.

Conduct a panel discussion on:

- a. consumer practices and solid waste
- b. electric power use patterns

Review county or city commission agenda for items of environmental impact and discuss how decisions were reached.

CONCEPT

INDIVIDUALS CAN HAVE EFFECTIVE ENVIRONMENTAL IMPACT BY WORKING THROUGH ORGANIZED GROUPS

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify aims and goals of environmentally active groups and boundaries of their activities.

- a. city or county
- b. state
- c. national

Identify professional organizations that are active for a better environment.

TEACHING/LEARNING STRATEGIES

Attend local environmental group's meeting and prepare report on what took place.

Compare the goals of various environmental groups, and cite their accomplishments and failures.

Lecture on the roles organizations can play in the legislative arena.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Review news clippings on local environmental groups and determine their effectiveness.

CONCEPT

GROUPS ACTIVELY INVOLVED IN THE COMMUNITY HAVE GREAT POTENTIAL TO BRING ABOUT CHANGE AND INFLUENCE THE DIRECTION OF GOVERNMENTAL PROGRAMS TO IMPROVE THE ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify active environmental groups on the local, state and federal level and describe their roles.

Cite environmental or conservation groups and discuss their impact on the environment.

TEACHING/LEARNING STRATEGIES

Lecture on group dynamics.

Review printed material prepared by various conservation groups.

Invite a guest lecturer to discuss the goals of his organization and its accomplishments.

Lecture on the approaches taken by different groups, e.g., Audubon Society, Sierra Club, League of Women Voters, others.

CONCEPT

INDIVIDUALS WORKING THROUGH GROUPS CAN INFLUENCE THE DIRECTION AND GOALS OF THE GROUP WHICH IN TURN PROVIDE A BROADER BASE OF SUPPORT FOR ISSUES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify organizations which have environmental committees.

Cite the direction these groups have taken on:

- a. ordinance or laws
- b. bond issues
- c. significant local environmental issues

TEACHING/LEARNING STRATEGIES

Lecture on public speaking rules and parliamentary procedures.

Review action projects by various organizations.

- a. Are they goal oriented?
- b. Do activities reflect total organization involvement?

The class should form an environmental activist group, writing bylaws, scope,

Individual Involvement

Alternative #2

STUDENT LEARNING OBJECTIVES (Cont'd)

Identify groups whose origin was not oriented toward issues considered environmental but who have now modified or changed their direction.

TEACHING/LEARNING STRATEGIES (Cont'd)

goals, how committees will be formed, etc.

CONCEPT

GROUP ACTIONS FREQUENTLY MERIT NEWS COVERAGE AND SUBSEQUENTLY COMMAND MORE ATTENTION BY POLITICAL LEADERS AND GOVERNMENTAL AGENCIES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify actions by environmental groups that have received extensive news coverage.

Determine community action that has been brought about by the active involvement of individuals working through a group.

Identify local groups that are conducting information or exploring programs for the purpose of improving the environment.

Identify candidates that have been described as being for ecological issues.

- a. Were these issues significant?
- b. Was the individual endorsed by environmental groups?
- c. Did environmental groups oppose the candidate or others?

TEACHING/LEARNING STRATEGIES

Research court action that has been taken by an environmental group to bring about change in community direction.

Lecture on environmental impact statements.

Review recent court action initiated by an environmental group.

Show movies made by environmental groups.

WILDLIFE AND MANAlternative #1OVERVIEW

This module seeks to determine wildlife's place in the environment with respect to man. It is intended to show that wildlife is an integral part of man's environment, and that man's activities affect the wildlife around him either negatively or positively. This module attempts to point out some of the errors that man has made in the past, and some of the losses and disasters that have occurred as a result of man's ignorance, greed, or thoughtlessness.

An attempt is made to show how man can profit from his past mistakes and strive to protect endangered species, regional and local wildlife populations, and the natural wildlife balances. It should be noted that man occupies center stage in this module not because of any belief that the varieties of wildlife species are here to serve man. Rather, man is the central focus of this module out of recognition of his power to destroy or conserve the world's wildlife.

CONCEPT

WILDLIFE IS AN INTEGRAL PART OF MAN'S ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the ecosystem in which man and wildlife interact.

Identify ways that individual wildlife species affect man as well as how man affects wildlife.

TEACHING/LEARNING STRATEGIES

Describe ways man intervenes in the wildlife of animals and the long-range results of this intervention.

Have students take photographs of the wildlife closest to their homes and illustrate through this the different kinds of relationships between wildlife and man.

Outline an ecosystem in which man and wildlife interact.

List ways man affects the wildlife and vice versa.

Determine what life would be like if wildlife were to be destroyed through a conventional war.

Debate the pros and cons of becoming an environmental activist.

CONCEPT

WILDLIFE IS AN INDICATOR OF MAN'S SURVIVAL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Acquire an awareness of the fact that the destruction or the protection of wildlife has an important relationship to the destruction or the protection of man himself.

TEACHING/LEARNING STRATEGIES

Visit the local zoo or park and observe peoples' conversations about and their reactions to animals. Classify the words used in the conversation into two categories (a) hostility, and (b) sympathy. Show how hostility is the sign of destruction (of both man and nature) and sympathy is the sign of respect and protection of life in general.

Research examples in human history to illustrate how the senseless destruction of wildlife brings with it the destruction of the quality of human life.

Provided with five pictures of different environments, the student will select the one with maximum survival value and defend his selection.

Develop an example of wildlife depletion through a case study.

CONCEPT

MAN, AS THE DOMINANT SPECIES, HAS A RESPONSIBILITY TO PROTECT WILDLIFE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Delineate man's responsibility in the future and survival of wildlife.

Cite the historical basis for the belief of man's dominance over nature.

TEACHING/LEARNING STRATEGIES

Discuss effective political action which could be taken to protect wildlife species.

Given a series of wildlife crises, select the appropriate choices in favor of wildlife preservation.

TEACHING/LEARNING STRATEGIES (Cont'd)

Form an investigative group to determine local wildlife environmental problems.

Survey the endangered species in specific areas.

Demonstrate a number of techniques for documenting environmental pollution case studies.

Investigate local organizations concerned with wildlife preservation.

CONCEPT

MAN AND WILDLIFE ARE BIOLOGICALLY INTERDEPENDENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand that a balanced respect of wildlife is an integral part of man's basic harmony with nature.

Demonstrate that man is not a despotic master, but a responsible guardian of nature.

TEACHING/LEARNING STRATEGIES

In small groups, the students will spend a recreational and educational afternoon and evening in the local forest. Their activities will include games, singing, reading poetry, walking, eating, and ten minutes of silent meditation. At the end of the day they will describe their experiences and their attitudes toward nature and list the benefits of the evening.

Interview a hunter, a businessman, a farmer, a college professor and a college student on their attitudes toward wildlife and nature and give an oral report on the evaluation of the interviews; the entire class will discuss the interviewed person's view of wildlife and nature.

CONCEPT

WILDLIFE PROVIDES RECREATIONAL, PRACTICAL AND AESTHETIC BENEFITS FOR MAN.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify some of man's attitudes toward wildlife in the areas of recreation, aesthetics, and economical benefits.

TEACHING/LEARNING STRATEGIES

Outline a number of uses of wildlife for recreational purposes.

Survey the number of wildlife used for economic purposes.

Research and illustrate the place of wildlife in man's art, food consumption, etc.

WILDLIFE AND MANAlternative #2OVERVIEW

This module stresses that wildlife populations must be viewed in the context of the ecosystem of which they are an integral part. An ecological system is a network of energy and mineral pathways interconnecting populations of animals and plants, specialized to live in a different way, doing a different job for the system itself. The seemingly eccentric individual behavior of wildlife, and of populations and communities, is the expression of evolutionary-programmed units that regulate the timing, and perform other necessary functions for the entire ecological system. Within the ecosystem, all entities have functional, spatial, and temporal dimensions that define their roles.

Man has been preoccupied with wildlife since his earliest origins. His economic, social, and cultural relationships with wildlife are interwoven in all facets of life. Man's use and misuse of land and water and his mis-application of technology endanger many wildlife species whose plight should serve as warning to man. All too few people recognize the biological interdependence of man and wildlife, yet most share an aesthetic appreciation for wild animals that makes this module one of the most vital in terms of human interest.

CONCEPT

WILDLIFE IS REGULATED AND SHAPED BY FUNDAMENTAL ECOSYSTEM DYNAMICS AND ENVIRONMENTAL COMPONENTS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify wildlife communities of several ecosystems.

Understand the inter-relatedness and interaction of wildlife within an ecosystem to the other components in the same ecosystem.

Understand ways ecosystem dynamics and environmental factors influence wildlife.

TEACHING/LEARNING STRATEGIES

Select and show motion pictures depicting wildlife from sharply different ecosystems (e.g., tundra, Everglades, African, Savannah, seashore estuary, or lake).

Discuss in seminar groups the similarities and differences in various wildlife communities.

Visit a nearby ecosystem and in about 1/2 day of observation and sampling, inventory and describe the wildlife component.

Diagram the species found in terms of their interactions and interrelatedness. This should involve extensive library

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

research on life history and community ecology data. The research group approach is viable here, whereby each individual could accept an assignment based on taxonomy, habitat, or niche.

Prepare one or two lectures and discussions on ecosystem concepts and dynamics, stressing application to wildlife as a part of the system. Students need strong feed-back mechanisms to insure understanding at this level.

Invite guest ecologists to discuss evolving ecological theories to apply concepts of cybernetics and systems analysis to energy pathways, mineral cycles and pathways, work circuits, sinks, etc.

Lecture and demonstrate basic energy flow.

Have students diagram a theoretical ecosystem containing components, pathways, and basic processes.

CONCEPT

ANIMALS OF THE SAME SPECIES TEND TO AGGREGATE AS POPULATIONS WHICH EVOLVE, INTERACT AND GROW AS A BIOLOGICAL ENTITY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the dynamics of population growth.

Document changes in various wildlife populations (e.g., size, distribution, movements, spacing and behavior.)

Acquire appreciation of types of wildlife interaction such as competition, co-existence, predation, parasitism, mutualism, and commensalism.

TEACHING/LEARNING STRATEGIES

Lecture-discussion on logistic growth, formula growth curves, natality, mortality, density relationships, age and sex structure of species populations.

Research the ecology and life history of a single species, such as the timber wolf or a native predator.

Lecture-discussion of "biotic potential" and "environmental resistance" and their implications in terms of the logistic growth curve.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Develop a "life table," selecting a wildlife species with adequate data available.

Pursue the species population for a selected "life table" and through a literature search identify the parameters.

Seminar discussions of the biotic characteristics of species populations.

Invite an ecologist to present the diverse ways in which species populations interact, results of interaction, the Gaussian Rule, and niche selection.

Class discussion drawing examples from nearby ecosystems familiar to the student and from the literature.

Use same species studied for "life table" and population characteristics and do a life-history (autoecology) research paper.

Develop a mechanism for presentation to the class of the best autoecological monographs generated.

Encourage students to submit papers for publication to appropriate media sources or to make a public presentation of their single species life history work.

CONCEPT

POPULATIONS OF ANIMALS, ASSOCIATED AND ORGANIZED WITH PLANTS INTO COMMUNITIES, INTERACT WITH EACH OTHER AND THE ENVIRONMENT, PARTICULARLY IN THE ORGANIZATION OF ENERGY FLOW, MINERAL CYCLING, AND SHARING OF TIME AND SPACE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify and understand major ecosystem pathways with special emphasis on energy.

TEACHING/LEARNING STRATEGIES

Select a community in macroscale, such as the wolves and moose on Isle Royale. The class would then form work groups with each group assigned the task of generating a specific food chain-energy

STUDENT LEARNING OBJECTIVES (Cont'd)

Recognize ecosystem mechanisms for maintenance, work storage, waste, growth, transport, cycling, feedbacks, and replications.

Understand food chains and food webs as indicators of energy dynamics and community structure.

Appreciate the concept of ecological dominance.

TEACHING/LEARNING STRATEGIES (Cont'd)

budget, an ecological pyramid stressing trophic levels, and the various biogeochemical cycles, etc. A selected student from each group should form a team to construct a community food web combining the food chain diagrams.

Through class discussion, present the ideas of dominance, co-dominance, and the implications to the community. Explore the ways in which community dominants exercise influence over the community.

CONCEPT

THROUGHOUT HIS EVOLUTIONARY HISTORY, MAN HAS BEEN PREOCCUPIED WITH WILDLIFE AS A PREY, PREDATOR, PET, SERVANT, GOD, AND FELLOW BEING.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Conceptualize the diversity of historical knowledge of man-wildlife inter-relationships.

Analyze hunting as a human activity and contrast it to domestic meat production and consumption.

Assess the extent to which modern man has fundamentally departed from the behavior of his ancestors.

Determine if man should be considered the "dominant" animal species in the ecosphere.

TEACHING/LEARNING STRATEGIES

Invite an expert in history, anthropology, and the cultural and social aspects of wildlife to provide an historical overview.

Students should create a sound-light program on the historical and cultural aspects of man-wildlife inter-relationships and publicly present it.

Arrange a panel composed of a sportsman, wildlife officer, Audubon Society member, individual morally committed to non-hunting, and a rural landowner to discuss the pros and cons of modern hunting.

Have students prepare research papers on the historical, cultural, and social aspects of hunting; man as a predator; relationship to being meat eaters; domestic meat production, etc.

A student panel could review the class papers on hunting and enter into a debate on this topic and even extend it to gun control laws and national violence, the future of hunting in the U. S., etc.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Have a sociologist head a discussion on hunting. Has culture participated in the evolution of modern man? Is "The Naked Ape" a viable concept? How do we differ from our ancestors in the way we conceptualize and relate to wildlife?

Conduct a class discussion on the following:

Does man fit the ecological concept of a dominant species? Is man a magic animal? Does the Judeo-Christian concept of man's dominance jibe with ecological fact and theory? Distinguish between dominance, independence, and interdependence.

Develop a community education plan for creating a public awareness of man's place and role in the ecosystem, drawing on our knowledge gained from the study of other animal populations and communities.

CONCEPT

MODERN MAN EXERTS GREAT ENERGY TO PROTECT, DESTROY, STUDY, USE, AND MANIPULATE WILDLIFE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Review the mechanisms used by man to manipulate wildlife populations.

Identify man's major uses of wildlife.

Assess the economic importance of wildlife.

Identify a variety of endangered species and generate a rationale for their protection.

Perceive wildlife as an outgrowth of land use and niche maintenance, and therefore, biotic indicators of ecosystem change and health.

TEACHING/LEARNING STRATEGIES

If available, an experienced wildlife biologist-manager should be asked to give two or three lecture-discussion presentations on wildlife habitat, habitat preservation and management, carrying capacity, regulating of hunters and harvest, refuges, exotic introductions, release of game-farm animals, reintroductions of native wildlife, control of "pest" wildlife, bounties, research interactions with management. Encourage use of 35mm slides, and brief motion pictures to develop these concepts.

If possible, take a class field trip to a wildlife refuge, forest or park where habitat is being managed extensively for wildlife.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Identify and list the various ways in which man uses wildlife. Indicate which uses are consumptive and non-consumptive. Include aesthetic, cultural, and social considerations.

Review the list developed above and indicate the effect of man's use on wildlife populations. What uses are detrimental enough to endanger the species?

Review literature on natural resource economics, especially measures of fish and wildlife values, and the economics of fishing, hunting, and birdwatching as part of the outdoor recreation industry.

Prepare an annotated bibliography of the North American literature on wildlife economics.

Invite an economist specializing in the natural resources area to discuss the economic theory dealing with goods, services, and resources that lack conventional market place values. How are policy decisions made on such resources?

Have a wildlife biologist lecture on the species of wildlife currently considered endangered, the reasons for their pending extinction, and what can be done to ensure their survival.

Selected students should prepare class discussion - presentation on the species and selected sub-species of North American wildlife that have become extinct since 1850 and the current thinking on what led to these extinctions.

Students should make presentations as to what species have been saved from extinction since 1850 and how this was done.

The class should develop a logical biological, social and cultural justification for an expanded endangered species program.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Students should write legislative delegations and urge greater monetary support for the federal endangered species program.

Conduct a class research project on the degradation "death" of a prominent lake (e.g. Lake Apopka, Florida, etc.), breaking up into groups to handle the various components in that ecosystem. Each should report its findings to the entire class.

A professional wildlife manager should discuss with the students the changes in land and water use, pollution, fertilization, chemical pesticides and the way these technological changes have impact on wildlife.

The class collectively should develop a logical argument for the conservation of wildlife based on it being an indicator of ecosystem decay.

A panel of the most articulate students should attempt to be part of a telephone talk-a-thon with audience phonecall participation (on local radio or television) dealing with the topic of wildlife and man.

WILDLIFE AND MANAlternative #3OVERVIEW

This module depicts the place of wildlife in the environment. It is intended to show that wildlife is an integral part of man's environment and that his activities affect the wildlife around him. This module attempts to point out some of the benefits derived from effective planning by pioneers in the wildlife field as well as some of the errors that man has made, and some of the losses and disasters that have occurred as a result of man's ignorance, greed and thoughtlessness.

Man must profit from his past mistakes and strive to protect endangered species, regional and local wildlife populations, and the natural wildlife balances. The preservation of wildlife depends almost entirely on man.

CONCEPT

WILDLIFE CONSERVATION IS DIRECTLY RELATED TO ENVIRONMENTAL QUALITY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the relationships in the community among the producers, consumers, and the decomposers.

Relate the reproductive potential of wildlife.

Cite the various environmental factors that affect wildlife populations.

TEACHING/LEARNING STRATEGIES

Have a class discussion on the reproductive potential of wildlife.

Hold a panel discussion on the various environmental factors that affect wildlife populations.

Outline the life cycle of various species and delineate their interaction with environment.

Show a movie of wildlife's place in the environment.

Conduct a panel discussion of wildlife activities which are beneficial to man.

Observe at least one local wildlife habitat.

Invite a speaker from a wildlife conservation group to talk to the class.

CONCEPT

WILDLIFE AND MAN CO-EXIST IN THE ENVIRONMENT, NECESSITATING BENEFICIAL WILDLIFE MANAGEMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine wildlife activities economically and recreationally beneficial to man.

Understand the various ways wildlife may affect man's environment.

Determine pest or predator control which has been of significant benefit to man.

Explain how the preservation of a predator may be beneficial to man.

TEACHING/LEARNING STRATEGIES

Conduct a field trip to a wildlife refuge and have students record their observations.

Invite a state or federal legislator to speak to the class on federal and state legislation directly related to wildlife management.

Present a demonstration showing effects of certain activities on wildlife; e.g., white mice sprayed with DDT.

CONCEPT

IT IS MAN'S RESPONSIBILITY TO CONSERVE AND PROTECT WILDLIFE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify species which have become extinct in the present century.

Determine species which are endangered today and learn the activities of man which have endangered these species.

Recognize wildlife industries that have led to the depletion of certain wildlife species.

TEACHING/LEARNING STRATEGIES

Conduct research projects on local species which have disappeared.

Conduct interviews with spokesmen from wildlife industries to determine activities that are taking place to deplete or conserve wildlife.

Conduct studies to find reasons for the following regulations:

- a. hunting licenses
- b. fishing licenses
- c. bag or catch limits
- d. seasons
- e. length of time of seasons

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES (Cont.'d)

- f. sanctuaries
- g. regulation of pesticides and other pollutants.

Have students prepare abstracts from selective reading of wildlife journals.

FORESTS AND MANAlternative #1OVERVIEW

This module deals with the interdependency of man and forests. The history of man has always been closely related to the history of the forests. Each has strongly influenced the other over time, but never has man's impact on forests been greater than now. The forest is an assemblage of co-adapted populations of plants and animals living in an environment largely modified and maintained over time by the living organisms themselves. The green plants capture from the environment solar energy and matter which are consequently transferred from one organism to another, to form the structure of the forest and its living components. The living components themselves form a distinctive living system with its own composition, development, structure, environmental relations, and function. Climate, rainfall patterns, and soil affect the forest, and in turn the forest exerts strong influence on its own internal microclimate, the soil, rainfall patterns and macroclimate.

Forests are very dynamic, stable, diverse, and resilient ecosystems providing many products for man. They are absolutely essential buffer and absorption systems for man's high energy, high pollution technology.

Forest ecosystems also act as self-replicating, self-maintaining genetic information channels into the future. They act as great storehouses of plant, animal, and chemical diversity that provide essential insurance for the survival of life, including man.

CONCEPT

FORESTS ARE DYNAMIC COMMUNITIES DOMINANT OVER A QUARTER OF THE EARTH'S LAND SURFACE, WITH A GREAT DIVERSITY OF ECOLOGICAL CHARACTERISTICS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the ecological components of the forest.

Characterize the major forest ecosystems of the world by area, environment, and dominant plants.

Identify the ecological characteristics by which forests differ.

TEACHING/LEARNING STRATEGIES

Spend 1-2 hours in a forest community, half of that time quietly sitting and observing the components of the forest environment in a highly personalized and private encounter. Immediately thereafter, the students should make notes of the ecological entities observed.

Develop through several reading assignments a generalized descriptive understanding of forest ecosystems.

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES (Cont'd)

Invite a plant ecologist or professional forester to conduct a seminar-discussion on the components that collectively constitute a forest ecosystem.

Diagram on large tagboard charts the forest ecosystem, showing the various living and non-living components and their pathways and inter-connections. This might best be achieved by teams of 3-5 students. Charts could be displayed and used to achieve subsequent objectives.

Show movies and film strips on forest ecology to set the stage for remainder of module.

Research the historical relationships between man and forests, placing man in the perspective of his being an ecological component of the forest.

Lecture on the world-wide nature and distribution of forest ecosystems, using large maps. Distinguish between forest types on the basis of site ecology (desert, alpine, temperate tropical, flood-plain or swamp, etc.), and on tree species dominants (spruce-fir, oak-hickory, redwood, etc.).

Lecture on specific forest communities including urban tree plantings and important exotic introductions. Employ kodachromes of forest communities, and of the dominant characteristic trees that identify that community.

Arrange a self-guided field trip to public parks, forests, nature centers, botanical gardens, etc., that have labeled nature trails, resident naturalists, etc.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Have students research characteristic differences in soils, organic matter, vertebrates, invertebrates, plants, solar radiation, temperature, altitude, latitude, rainfall, wind, fire, evaporation, transpiration, water budgets, human use and manipulation, pollution, etc. that help to distinguish forest ecosystems, one from another. Examples from local forest communities are most helpful. This is an exercise to make the student aware of the complexity of the forest ecosystem.

CONCEPT

FOREST ECOSYSTEM STRUCTURE, PROCESSES, AND FUNCTIONS ARE DETERMINED BY CLIMATE, SOIL, CHEMICAL AND OTHER ENVIRONMENTAL FACTORS AND THE INTERACTION OF THE FOREST LIVING COMPONENTS WITH THESE FACTORS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Encounter and relate aspects of the physical environment at the forest site to forest ecosystem structure, process, and function.

Describe how forest plants and animals influence the forest's physical environment.

TEACHING/LEARNING STRATEGIES

Present lectures comparing boreal and tropical forest ecosystems by structure process and function, revealing how the extreme differences in physical environment influence each.

Invite a speaker from a soil conservation group to discuss forest soil and soil chemistry, root masses, mineral cycles, water movement, and the total complex of edaphic factors as they relate to forest structure, process, and function.

Invite a climatologist and/or meteorologist to speak on climate-vegetation interactions. Consider the possibility of having the class operate a weather station for one month in a nearby forest community.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Have students visit the forest during extremes of weather (heavy rain, drought, frost), and compare field observations with those made during "normal" weather.

Have the students discover differences in microclimate of forest and surrounding microclimates by measuring and experiencing temperature, light intensity, humidity, etc., inside forest and in cleared space adjacent.

Have students do library research and write papers on the kinds, biomass, and roles of the plants and animals that live in forest soils.

Discuss what part organic litter plays in terms of forest water retention capabilities, root dynamics, and effect on plants and microclimate. The lecture should identify as many other examples of forest life - forest environment interactions - as possible, and discuss in a seminar context each example in an attempt to trigger further examples from students.

CONCEPT

AMONG TERRESTRIAL ECOSYSTEMS, FORESTS CONTAIN THE GREATEST BIOMASS OF LIVING PLANT MATERIAL, AND IN THEIR MOST PRODUCTIVE GROWTH THEY APPROACH MAXIMUM PHOTOSYNTHETIC ACTIVITY, INCLUDING ENERGY CAPTURE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Cite methods for determining quantity, nature, and accretion of living plant biomass in forest ecosystems.

TEACHING/LEARNING STRATEGIES

Deliver a lecture on plant biomass formation, storage compartments, research methodology, concepts of primary productivity, maintenance, relevant aspects of plant anatomy and physiology, organic balance sheets, nutrient budgets, energy flow, accumulation, etc.

STUDENT LEARNING OBJECTIVES (Cont'd)

Make comparisons of living plant biomass in different forest types; different successional stages of the same forest type; and between non-forested terrestrial ecosystems, both natural and man-planted.

Evaluate the various living and environmental factors that, in concert, determine the photosynthetic activity of terrestrial plants.

TEACHING/LEARNING STRATEGIES (Cont'd)

Form research teams (3-5 students each) to carry out the following activities:

- a. library research in plant ecology and siliculture, and forest ecology literature for methods of floramass measurements.
- b. develop a research plan for measuring a total plant biomass per hectare of a local forest ecosystem. (assign so that all local forest communities are covered)

Have a literature search by entire class with non-overlapping assignments to obtain primary productivity and living plant biomass data whenever possible for the many diverse forest types, successional series, various crop-land types, and other than forested terrestrial ecosystems.

The results of the above should be synthesized into a summary table, and distributed to the class. Each student should prepare an explanatory critique of the extremes in data and any other extraordinary results implicit in the summary table. Students should deal with the resource management implications of the data in terms of acres allocated to grassland, corn, pine fiber, saw timber, etc.

Arrange for a lecture on the photosynthetic process, its fundamental importance to all life as a primary ecosystem function, energy conversion and storage, food chains, mineral storage and cycling, etc.

Prepare a lecture on the following:

- a. the physical and chemical aspects of the environment as to their influence on photosynthesis
- b. the mechanisms held by green plants to optimize photosynthetic activity
- c. the ways in which other plants and animals in the forest influence photosynthesis

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Visit a forest over a time and note the changes in specific plants as they attempt to capture the sun's energies. Also, look at the forest's structure and form and the place of different plant species relative to their photosynthetic adaptations.

CONCEPT

THE FOREST ECOSYSTEM IS EXTREMELY DIVERSE IN SPECIES COMPOSITION, COMPLEX IN FUNCTION, HIGHLY INTERWOVEN AND INTERDEPENDENT, DYNAMIC OVER TIME AND SPACE, AND NEARLY IMPOSSIBLE TO INVENTORY AND COMPREHEND IN TOTALITY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify by biomass and function the major living components of a forest ecosystem.

Understand changes in forest community structure over time.

Understand the web of interconnections between forest organisms.

Understand the concepts of diversity, stability, resiliency, self-replication, and maintenance as applied to forest communities.

TEACHING/LEARNING STRATEGIES

Spend 1/2 day in a local forest system identifying as many types of plants and animals by common name as possible, sampling as many habitats as the student can recognize. The ecological niche should be identified for each, wherever possible.

The data collected for the above exercise should be compiled and analyzed as a class project to identify:

- a. mass and number of different tree species
- b. mass and number of different mammal species
- c. mass and number of different insect species
- d. mass and number of different reptile species, etc.

Conduct library research on the taxonomy and life history of the organisms encountered in the above exercise so the function, niche, habitat, and relationship to other life forms can be elucidated.

Arrange for lectures by a forest ecologist on succession in the forest community (e.g. old-field to "climax" forest, etc.)

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

The lecture should also include discussion of forces, man-made and natural.

Excellent motion pictures are available. The class could be asked to illustrate forest succession by producing a class movie or 35mm slide sound program in their immediate environments.

Study teams should be assigned to work out relationships involving food chains, predators and prey, parasites and hosts, mutualism symbiosis, for a nearby forest community. Student interest in animal and plant groups should provide a basis for team assignments. Assemble the team reports into a graphical collage of interactions.

Have an ecologist lecture on the theme "Everything is connected to everything else."

Conduct a debate on the topic of man being a "super-species" with dominion over all other life.

Have an ecologist lecture on species diversity and the species diversity index applied to above. Lecturer should place systems stability into juxtaposition with diversity. The mature, "climax" forest as a self-replicating community should be included, as should the high maintenance costs of mature communities. High diversity in mature forests may also be related to genetic reserves and chemical storage.

CONCEPT

FORESTS PROVIDE A RICH HARVEST OF GOODS TO MEET MAN'S NEEDS; BUT, EVEN MORE IMPORTANTLY, THEY PROVIDE SERVICES TO MAN AND THE HUMAN ECOSPHERE ESSENTIAL TO SURVIVAL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

During the course of a week the student

STUDENT LEARNING OBJECTIVES (Cont'd)

Identify daily consumer products from the forest.

Recognize the services the forest provides directly to man and to the quality of human life.

Recognize the primary functions and services the forest renders directly to all life.

TEACHING/LEARNING STRATEGIES (Cont'd)

should list all the goods from the forest personally observed being used or consumed.

Review consumer uses of forest products and classify them in terms of value to the user and to the economy. Are any wasteful, unnecessary adjunct to affluence? Where is waste minimized through recycling and reuse?

Prepare a plan for:

- a. modifying individual life styles to minimize wasteful use of forest products
- b. consider broader changes that must be instituted at the societal level to reduce unnecessary consumption of forest products.

Seek a route for citizen action to implement and institutionalize the plan in the above. Attempt to communicate to a member of the "established power structure" or "decision maker" the class document and plan generated above.

Arrange for a speaker to discuss forest values from a cultural, aesthetic, health restorative, recreational, and poetic overview. The focus should be on the non-market place values and services.

Evolve a value concept of what the forest does for man and the quality of human life.

Through creative writing (poetry or prose) or photography, capture the cultural value of the forest community. Do your "creating" in a forest environment.

Secure an ecologist to speak on the role and function of forests in the ecosphere. Close out the module with a broad review

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

of the essential life support functions of forests in the grand design of nature. It is these functions that man most often overlooks in his commercial and immediate utilitarian approach to forest use.

Each student should make a presentation in the community to a public audience (scouting, church, school, garden club, etc.), developed around the concepts outlined above. Guiding a group on a nature walk through a forest would be an acceptable alternative.

GRASSLANDS AND MANAlternative #1OVERVIEW

This module considers grasslands in relationship to the broader context of range ecosystem. In addition to grasslands, range includes deserts, the tundra, grassy parts of forests, fresh and salt water marshes, and brush areas. Rangeland includes all the uncultivated areas that have a herbaceous or shrubby vegetative cover.

Understanding must be developed regarding the important role of rangeland management as it relates to environmental concerns. Many actions of man regarding use of such lands should be the result of sound political decisions. Man's value systems are an integral part of the process of political decision making. Thus, a body of knowledge, based on the concepts of sound rangeland management, must be communicated to the political institution.

Environmental problems and solutions are receiving increasing attention. This is especially true in land use planning. Because grasslands are found not only in areas of livestock grazing, but also in urban areas where public parks are included in city boundaries, environmentalists expert in rangeland management must be a part of concentrated efforts to improve the quality of life.

CONCEPT

MANY GRASSLAND (RANGELAND) PROBLEMS HAVE RESULTED FROM THE CARELESS ACTIONS OF MAN.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the political dimension of environmental problems.

Discuss the implication of political/societal programs of environmental preservation and conservation.

Understand the function of land tax as this relates to use and/or abuse of the environment.

TEACHING/LEARNING STRATEGIES

Collect newspaper articles relating to pro and con of a particular upcoming environmental issue.

Research the history of "Smokey the Bear."

Write a skit, based on Smokey the Bear, to support prescription fire for land use management.

Investigate the political implication of three recent government (local, state or federal) environmental decisions.

Write a paper proposing governmental revenue to be acquired by means other than tax on land.

CONCEPT

DECISIONS REGARDING GRASSLANDS (RANGELANDS) USE MUST BE FORMULATED OUT OF THE MOST RECENT SCIENTIFIC MANAGEMENT PRACTICES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the "holistic theory" as it relates in its broadest sense to man and nature.

Cite antagonistic, aggressive and/or regulatory conditions associated with crowded urban areas.

Understand the practice of "clear-cutting" used by the U. S. Forestry Service as this relates to construction/preservation values.

Project rational plans for choosing recreational areas.

Understand the process which determines how land will be used (e.g., for consumer products, for leisure-time activities, or for maintenance of balanced ecosystem.)

TEACHING/LEARNING STRATEGIES

Survey individuals living in the neighborhood to determine attitude toward police and fire departments who assist as well as enforce regulations.

Review historical attitudes that "trees are beautiful." Groups could debate the pros and cons of forests encroaching on grasslands and vice versa.

Take an inventory of the local land area projecting ways it may be used for recreational purposes.

Research and discuss changing usage of specific regions in the U.S.

Identify an occurrence wherein man expended much effort and energy to correct the symptom of an ecological problem rather than its source.

CONCEPT

RANGELAND MANAGEMENT, OF WHICH THE GRASSLANDS IS A PART, IS A YOUNG SCIENCE CONCERNED WITH PLANNED LAND USE TO MAINTAIN A BALANCED SYSTEM FOR MAN AND NATURE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Discuss the concept of diversity and stability for land use planning on a regional basis.

Define the specific uses of rangeland.

TEACHING/LEARNING STRATEGIES

Research and project what sequence of ecological changes would occur if a salt marsh were drained.

Lecture and discuss the complex subject of environmental climax communities.

STUDENT LEARNING OBJECTIVES (Cont'd)

Understand progressive steps leading to an environmental climax community.

Project the optimal level of diversity, stability, and productivity within a known ecosystem.

Discuss prescribed fire as this relates to rangeland management.

Analyze the management concept of combining improved species with native communities.

Project the value of waste water recycling as a technique of rangeland management.

Understand man's relative position in ecosystems.

TEACHING/LEARNING STRATEGIES (Cont'd)

Choose a local area in the community and illustrate graphically the position of at least five species within a scale projected toward climax.

Research and lecture on the significance of fire as a natural phenomenon to maintain environmental balance.

List those species dependent upon fire for maintenance in the ecosystem.

Cultivate sample plots of multiple types of vegetation, charting the growth results periodically.

Survey present practices utilized in the local community for waste water disposal and/or recycling.

Use a panel of student experts to present the various positions of man in environmental communities.

CONCEPT

GRASSLAND (RANGELAND) MANAGEMENT MUST TAKE PLACE WITHIN THE CONFINES OF POLITICAL FORCES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand historical antecedents to present grassland (rangeland) concerns.

Understand that many past land use practices were tied to "old world" cultural and/or economic values.

Recognize changes that have evolved within the body of knowledge of rangeland management.

TEACHING/LEARNING STRATEGIES

Chart the various theories of rangeland/grassland conditions since the discovery of the American continent.

Research the significance of the "dust bowl."

Write a skit to portray the various values brought by immigrants which have disrupted original condition of land in the U.S.

Research the position of man as an impact on ecosystems.

Illustrate (graphically) the development of rangeland management ideas and practices.

CONCEPT

MAN AND THE ENVIRONMENT MUST BE VIEWED AS A TOTAL ECOSYSTEM WHEREIN NEITHER TOTAL EXPLOITATION NOR TOTAL PRESERVATION MAY BE TOLERATED. COEXISTENCE AT AN OPTIMAL LEVEL FOR BALANCE MUST BE ACCOMPLISHED.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand that there is an optimal level at which man and nature co-exist.

Explain what is meant by the balance of man and nature.

Understand the essential elements of rangeland management.

Recognize that there are diversities of habitats for all living species (biological and vegetative) to encourage a balance between nature and man.

Understand that the concept of space must be considered in relative terms for an optimal level of co-existence.

TEACHING/LEARNING STRATEGIES

Organize and take part in a field trip to identify the examples of man and nature coexisting (e.g., city parks, high rise apartments, wildlife refuges, livestock grazing land).

Identify the ways the balance of a species may be shifted within an ecosystem or community.

Compare, through research, the various species (biological and vegetative) co-existing in various locations.

Set up a classroom display to study two species which are dependent upon one another (e.g., flowering plants and bees).

List examples of excessive exploitation and preservation by man.

SOIL AND MANAlternative #1OVERVIEW

This module emphasizes that by recognizing that soils are a unique arrangement of varying textures and chemical compositions, man is better equipped to help prevent poor soil management. Man must realize that erosion can be prevented and that the soil can be conserved for future generations.

Lack of good soil conservation practices in the past has led to soil depletion and hardships. There were dust storms in the thirties. There were many floods in large and small rivers alike. Reservoirs became silted and useless. Massive mudflows in certain parts of the country left a bleak message. These and other disasters could have been avoided or at least minimized by good soil management.

In a democracy man can help soil conservation by conducting educational programs for landowners. Man can engage in good soil management with financial and technical assistance. In areas where this fails, laws are needed to assure a good soil for generations to come.

CONCEPT

LACK OF SOIL CONSERVATION HAS LED TO DISASTROUS EFFECTS IN THE UNITED STATES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand how the dust storms in the thirties affected the people and the farmlands in the midwest.

Explore examples of reservoirs in this country that have been filled with silt due to poor soil management and explain why this happened.

Identify adverse conditions that have resulted from poor soil management.

Identify floods that were the result of poor soil conservation practices and the results of the flooding.

Understand how past indiscriminate removal of forest has led to disastrous effects.

TEACHING/LEARNING STRATEGIES

Construct posters showing the dust storms in the thirties, silt filling a reservoir, two floods, a mudflow, and a barren area where a forest has been revived. These posters should be displayed in the classroom through the topic of soil and man.

Show slides of similar disasters. Save these slides until the end of soil and man and see at that time if the students can find ways that the disasters on the slides and on the posters could have been avoided.

CONCEPT

SOIL CONSERVATION MUST BE PRACTICED TO PROTECT USABLE LAND FOR CROPS FOR TODAY AND ALSO FOR FUTURE GENERATIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand reasons for protecting the soil for present and future generations.

Comprehend the advantages of a long-range conservation plan over the shortsighted economic gain.

Explore special uses (transportation, recreation, etc.) of the land which is decreasing the amount of cropland.

Analyze the inverse relationship of the increasing population and the decreasing amount of cropland.

TEACHING/LEARNING STRATEGIES

Show slides on two different screens of a growing city 20-40 years ago and the same city today. A class discussion of the differences.

Compare a road map of 20-40 years ago with one of the same area today. Have a class discussion of the differences.

Discuss in a group the moral obligation of protecting the soil for future generations.

Show slides of starving people and discuss what implications this has for the students.

Ask the students to research in the library and find out how many persons in the world starve to death each year in this modern day and age.

Find out how much surplus food there is in this country today and compare this with 20 years ago.

Collect soil samples for analysis.

CONCEPT

SOIL HAS A UNIQUE TEXTURE AND A SPECIFIC CHEMICAL COMPOSITION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define soil.

Understand residual soil concept.

TEACHING/LEARNING STRATEGIES

Examine gravel, sand, and clay in a stream table or flat pans. Demonstrate the difference between permeability and porosity. Let water run on the gravel, sand, and clay. Discuss with the students

STUDENT LEARNING OBJECTIVES (Cont'd)

Distinguish between gravel, sand, and clay, and identify them as to their relative porosities and permeabilities.

Determine porosity and permeability.

Recognize the difference between a soil in a moist temperate climate from a soil in a dry temperate climate.

CONCEPT

LACK OF PROPER NUTRIENTS IS A SOIL CONSERVATION PROBLEM WHICH MUST BE CONTROLLED.

TEACHING/LEARNING STRATEGIES (Cont'd)

the relative permeabilities. Place the gravel, sand, and clay in three pans of water and let the students observe how much water each soaks up.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Discuss gravel, sand, and clay as to their relative susceptibility to erosion.

Understand how vegetation cover such as trees, grass, and shrubs affect erosion.

Identify ways to retard erosion for each of the following:

- a. gully erosion
- b. river bank erosion
- c. wind erosion

Understand how contour plowing and strip cropping help prevent erosion and also enable more water to soak into the ground.

Cite the ways of putting nutrients back in the soil.

Project a good crop rotation for a particular farm field and explain how this helps to maintain the nutrients in the soil.

TEACHING/LEARNING STRATEGIES

Place gravel, sand and clay in a stream table or three large pans. Let water run across each and let the students decide the relative susceptibility to erosion.

Discuss how vegetation cover can affect erosion.

Demonstrate gully erosion, river bank erosion, and wind erosion. Discuss and try ways of preventing each.

On a stream table or large pan, place a mixed sediment. Show different ways of plowing a hill each time running water on the hill. Discuss what method of plowing is best and why.

CONCEPT

MAN CAN HELP PROMOTE GOOD SOIL CONSERVATION BY RESEARCH, EDUCATION, TECHNICAL AND FINANCIAL ASSISTANCE, AND BY PASSING LAWS TO PROTECT THE SOIL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine restraints or awards which can be employed for better soil management.

Understand how technical and financial assistance can help conserve the soil.

Identify laws which are designed to help conserve soil.

Discuss the pros and cons of organic fertilizer to chemical fertilizer.

Describe ways that soil could be improved somewhere in the local community.

TEACHING/LEARNING STRATEGIES

Invite a guest lecturer to talk about soil management.

Prepare two wood boxes with the same composition of soil. Plant each box with flowers or some other appropriate plant. Put organic fertilizer in the one and chemical fertilizer in the other. Save the runoff water from each box. After a week, start some algae in each container with the runoff water. In one month or so, have the students describe in writing the differences, if any, in the plants in the two boxes and also the differences in the algae growth in the two containers with runoff water.

Locate a place in the local community where the soil could be improved. Write a report, with pictures if possible, describing the condition and how it might be improved.

ROCK AND MINERAL RESOURCE MANAGEMENTAlternative #1OVERVIEW

The thrust of this module is on the multiple effects minerals and energy have on man. The module also deals with rocks and minerals in relationship to their location, political and economic importance, and their pollution potential--both actual and projected.

The far-reaching effects of the use and abuse of rock and mineral resources necessitate the formation of a value system which will lead to responsible decision making regarding their future use of these. An informed citizenry must base actions on present needs and future expectations to ensure environmental quality. Mineral resources belong to the people, not only present but future generations.

CONCEPT

MINERAL RESOURCES ARE FINITE IN VOLUME AND HAVE NO SATISFACTORY SUBSTITUTES. ONCE EXHAUSTED, THEY WILL NOT RENEW THEMSELVES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand why mineral resources from the earth are vital to the operation of an industrial society.

Cite resources vital to man's existence, including energy resources.

TEACHING/LEARNING STRATEGIES

Have students examine and analyze specimens of ores of metals, non-metals and fuels in one or more of the following areas:

- a. Mineralogy hall of a nearby museum.
- b. Collections in the geology department of a nearby college or university, or in a state geological survey office.
- c. Collections of a mineral dealer.

CONCEPT

MINERAL RESOURCES ARE VITAL SOURCES OF METALS, NON-METALS, AND ENERGY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Cite mineral resources which are found in natural concentrations

TEACHING/LEARNING STRATEGIES

Map in outline form the world's geographic distribution of important minerals and energy resources. Note particularly those which have especially

STUDENT LEARNING OBJECTIVES (Cont'd)

sporadically distributed within a small fraction of the earth's crust.

Identify mineral resources that are finite. Once exhausted, minerals will not renew themselves.

Cite critical minerals (e.g., petroleum) that are imported from political "hot spots" (Rhodesia, North Africa, the Middle East, etc.) and discuss economic, military, and political pressures relating to the future use of the resources.

TEACHING/LEARNING STRATEGIES (Cont'd)

limited ores of occurrence (e.g., molybdenum).

Construct a map representing the student's own state; county, or city mineral and fuel resources.

Visit a nearby mine, quarry, oil or gas well, or an industrial plant which uses mineral resources in its operation. Do not overlook power plants; learn their fuel source. Interview company representatives and list their product, supply problems, and possible pollution problems.

CONCEPT

USE OF MINERAL AND FUEL RESOURCES IS INCREASING EXPONENTIALLY IN INDUSTRIAL COUNTRIES, LEADING TO MASSIVE POLLUTION OF AIR, WATER, AND SOIL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Cite mineral resources that have been needed by man from his earliest days.

Explain why pollution of air, land, and water has accompanied the extraction, processing, and use of minerals and fuels in fostering economic growth and higher standards of living.

TEACHING/LEARNING STRATEGIES

Examine specified archeological and anthropological collections of non-industrial cultures to determine the mineral resources used in their daily lives.

Visit a museum of science and technology to ascertain the increasing role of minerals and fuels in the student's daily life.

List minerals, such as mercury, which have no substitute for some or all applications.

Construct graphs and charts to depict increasing demands for minerals and mineral fuels.

Research and list the major pollutants of air and water resulting from the refining processes of minerals and fuels. Cite what has been done . . . what will be done to reduce these pollutants in the future.

CONCEPT

MASSIVE POPULATION GROWTH CAN BE ACCOMMODATED ONLY BY GREATER USE OF RESOURCES LEADING TO A POTENTIALLY INCREASING SPIRAL OF POLLUTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Enlarge upon the concept that compounding the problems of mineral resource extraction and use is the fact that improved medicine has stimulated an explosive growth in population, which is expected to double by the year 2000. Much of this growth is concentrated in non-industrial countries with low standards of living.

Project the problems resulting from the millions who seek a better life by using automobiles, tractors, artificial fertilizers, electricity, which will further strain mineral and energy resources of the world.

TEACHING/LEARNING STRATEGIES

Have students research and report on population changes in non-industrial parts of the world.

Identify the major problems which arise in a heavily populated nation.

Debate or discuss the topic: Will industrialization lead to a better life for non-industrial people? What are the gains? Pitfalls? Is the price of progress too high to pay in pollution and in cultural losses?

CONCEPT

MANAGEMENT OF MINERAL RESOURCES REQUIRES OPTIMUM USE OF DWINDLING MATERIALS, WHILE REDUCING THE DELETERIOUS AFFECTS THAT ACCOMPANY EXTRACTION AND PROCESSING.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Acquire an understanding that dwindling mineral and energy resources can be stretched and pollution reduced by applying improved and new technology such as:

- a. recycling metal, glass, or paper.
- b. substitution for scarce materials where possible.

TEACHING/LEARNING STRATEGIES

Visit recycling centers for newspapers, aluminum and steel cans, and glass bottles. Discuss the success or failure of the operation with those in charge.

Interview local police and sanitation units concerning problems of abandoned automobiles. Determine why so many are found rusting away on roadsides.

List substitutions of everyday products used by residents in local areas.

STUDENT LEARNING OBJECTIVES (Cont'd)

- c. smaller, more efficient automobiles, trucks, and trains.
- d. improved insulation in houses and offices.

These improvements would require, however, a distinct change in both the present wasteful economic system and in the popular "throwaway" attitudes of people.

Recognize and understand the political and economic hurdles associated with adequate resource management.

CONCEPT

SOLUTIONS TO THE PROBLEMS OF THE PRESENT AND FUTURE USE OF RESOURCES MUST BE FOUND IN A MULTI-DISCIPLINARY CONTEXT.

TEACHING/LEARNING STRATEGIES (Cont'd)

Discuss, debate, or write on the topics:

- a. popular values: how to change them without coercion.
- b. economic system: how to change it without revolution.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand why economic growth may be dependent upon restructuring such values as quality of life for everyone, international policies, and population controls.

Determine if it will be necessary to limit economic growth in the U.S. in order to extend shrinking resources and reduce pollution levels.

Identify the impact of limiting economic growth in the U.S. on unemployment, poverty, crime, etc.

Determine why increasing dependence on imported petroleum products and minerals may necessitate a change in foreign policy matters.

Determine a system of population control--both voluntary and enforced

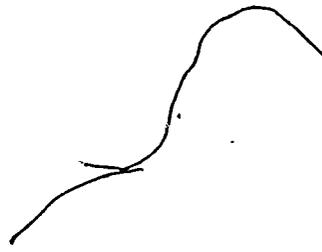
Identify the possible hazards and probable benefits of population control.

TEACHING/LEARNING STRATEGIES

Construct a chart to plot demands on shrinking resources to support continued economic growth.

Graph the probable reduction of employment if the population of a specific area were lowered by a decreasing birth rate of one-half the rate over the past decade.

List the ten most populous nations of the world. Plot their gross national product in dollars against their population.



ROCK AND MINERAL RESOURCE MANAGEMENT

Alternative #2

OVERVIEW

This module stresses that an understanding of the properties, occurrences and origins of rocks and minerals is vital in helping the implementation of better resource management. This understanding leads to better mining practices which have left the land bleak and desolate in certain areas. Man must realize that this desolate land can be restored to even greater beauty than it was before mining. Industrial processing of minerals leads to many air and water pollutants. Many of these pollutants, such as sulfur in stack gases in steel mills can be collected and used to make other compounds used by man. Processing techniques can also be improved to extract more out of the ore itself.

Recycling is a big word today, but it is not widespread enough. There are still millions of dollars of waste along highways and in incinerator wastes. The use and conservation of our natural resources must be extended fully. Without this, the United States will not only become a very dependent country for the resources to fuel its industry, but it will also become a very depleted country financially.

CONCEPT

AN EFFECTIVE ENVIRONMENTAL ACTION MUST BE BASED ON AN UNDERSTANDING OF THE NEED FOR MINERALS, THEIR COMPOSITION AND MINERAL AVAILABILITY.

STUDENT LEARNING OBJECTIVES

- The student will be able to:
- Understand physical properties of minerals, including proper definitions.
 - Identify common ore minerals.
 - Determine ore minerals which are metals.
 - Understand that common rock forming minerals have certain properties.
 - Cite the occurrences and the principal mining areas of important ore minerals in the world.
 - Identify the occurrence of oil underground throughout the world.
 - Determine the principal oil producing areas in the United States.

TEACHING/LEARNING STRATEGIES

- Deliver a lecture on various properties of minerals.
- Present a demonstration of various rock forming and ore minerals.
- Have students study in small groups the properties of minerals when given the actual minerals.
- Have the students research in the library the occurrences and mining areas of six common ore minerals.
- Present a lecture with slides explaining the occurrence of oil.
- Have the students research principal oil producing areas in the United States.

CONCEPT

ROCK AND MINERAL MANAGEMENT REQUIRES AN UNDERSTANDING OF SPECIFIC PROPERTIES, ORIGINS AND OCCURRENCES OF COMMON ROCKS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand properties and origins of igneous rocks.

Determine the properties and origins of sedimentary rocks.

Determine properties and origins of metamorphic rocks.

Identify process of rock weathering (chemically and physically).

Determine the rates of weathering of specific rocks in a moist climate and in a dry climate.

Identify rocks which are important building stones, locating each in the United States.

Locate important coal mining areas in the United States.

TEACHING/LEARNING STRATEGIES

Present a lecture describing properties and origins of certain igneous, sedimentary and metamorphic rocks.

Have the student analyze the properties of certain igneous, sedimentary and metamorphic rocks when given the actual rocks.

Conduct a lecture with slides and demonstrations showing various chemical and physical weathering characteristics of minerals and rocks.

Identify on a map the locations of various building stones and coal mining locations in the United States.

CONCEPT

SOME OF THE MINING PRACTICES TODAY LEAVE THE LAND DESOLATE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explain what is meant by strip mining.

Discuss tunnel mining as it is practiced in the United States.

TEACHING/LEARNING STRATEGIES

Present a lecture with slides and films describing various types of mining operations in the United States.

Have students write a paper on off-shore and on-shore oil drilling operations.

STUDENT LEARNING OBJECTIVES (Cont'd)

Explore the process of on-shore oil drilling operations and an off-shore operation.

Identify local mining operations.

TEACHING/LEARNING STRATEGIES (Cont'd)

Invite a guest lecturer from an oil company to discuss his company's environmental program.

Have class discussion of oil drilling operations.

Have the students investigate in depth one local mining operation.

CONCEPT

BETTER MINING TECHNIQUES SHOULD BE EMPLOYED TO PRESERVE THE LAND.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine ways a strip mining area might be restored after use.

Identify safeguards that should be employed when drilling for oil on-shore to prevent pollution.

Understand the ways oil may be pumped from the ground.

Identify the advantages and disadvantages of strip mining relative to economy and pollution.

Project advantages and disadvantages of tunnel mining relative to economy and pollution.

TEACHING/LEARNING STRATEGIES

Present a lecture showing slides of various strip mining areas.

Present a lecture showing slides of strip mining areas after restoration.

Arrange small group discussions on how strip mining areas might be restored after the mining operation is finished.

Conduct a class debate on the desirability of on-shore and off-shore oil drilling.

Have class discussion on oil drilling safeguards.

Present a lecture on ways of pumping more oil from the ground.

Invite a guest lecturer from the Bureau of Mines, or a mining company, to discuss the future of mining in the United States.

CONCEPT

BETTER MINING PROCESSING PRACTICES ARE NECESSARY TO SAVE LAND, ELIMINATE WASTE AND REDUCE POLLUTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

Trace the process of mining and

STUDENT LEARNING OBJECTIVES (Cont'd)

Explain processes that could increase production of various minerals and protect the environment at the same time.

Explain how pollutants can be extracted and sold at a profit.

Cite industrial pollutants and their possible economic use.

TEACHING/LEARNING STRATEGIES (Cont'd)

production of various minerals that, if increased, would have a negative affect on the environment.

CONCEPT

RECYCLING MUST BE EMPLOYED TO PRESERVE VITAL RESOURCES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine the present increase in use of ore minerals in the last twenty years.

Identify scenic pollutants that could be recycled to conserve our mineral reserves.

Develop the ways that recycling could be encouraged.

TEACHING/LEARNING STRATEGIES

Invite a guest lecturer from the U. S. Bureau of Mines to discuss new methods of mining.

Have the students compare the cost of soda per ounce in non-returnable containers with soda in returnable containers.

Have students identify local scenic pollutants that could be recycled.

Collect items for recycling as a class money-making project. Use the money to implement an informational campaign to inform cities about the benefit of recycling.

INDIVIDUAL MALADJUSTMENT

Alternative #1

OVERVIEW

This module deals with the increased complexity of modern society. Technological changes seem to happen overnight, but individuals cannot always adjust rapidly or easily to these advances. This discrepancy between the individual's rate of adjustment and society's pattern of change often leads to maladjustment. Individuals will frequently experience difficulty in adjusting to new and different work or living environments. Tensions associated with work or the work environment can lead to behaviors at home, as well as at work, which are maladaptive. Such behaviors may result in increasing job absenteeism and/or poor work performance. Family life also may suffer. Tension will increase, and normal responses of anger and concern over events at home will become exaggerated. Understanding, tolerance, and willingness to compromise decrease as maladjustment increases.

Among young people, maladjustment can result in antisocial behavior leading to delinquency. When conditions in which the young person must live are threatening or have no meaning, individual maladjustment may occur. With an increase in freedom of movement and advances in communication, young people are exposed to, and are pushed into, a rapidly changing world in which neither they nor their parents are fully prepared. Changes in technology have occurred so recently that adults, too, are not yet able to cope with them. This tends to decrease communication between parents and children and can act as a factor in producing individual maladjustment. Inability to cope with or understand changing mores and morals also is a factor which can result in an adjustment failure.

There is no single cause that produces individual maladjustment. It is the result of many factors--some have their origins in early infancy and childhood. In some cases the precipitating cause of an individual's maladjustment may be related to the immediate environment, be it home or work.

It is important to understand that individual maladjustment, while reflecting an inability to function as well as possible, is not necessarily a sign of mental illness. Maladjustment is not to be classified in terms of neurosis or psychosis. There is always the possibility that when the maladjustment becomes severe or uncontrolled, the maladjusted individual may begin to show true signs of psychological illness. New techniques will have to be developed to help persons who are maladjusted.

CONCEPT

MANY ASPECTS OF THE WORK ENVIRONMENT OF A COMPLEX INDUSTRIAL SOCIETY CAN LEAD TO INDIVIDUAL MALADJUSTMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the concept of maladjustment.

TEACHING/LEARNING STRATEGIES

Define maladjustment in the student's own words.

STUDENT LEARNING OBJECTIVES (Cont'd)

Relate work environments to the occurrence of individual maladjustment.

TEACHING/LEARNING STRATEGIES (Cont'd)

Obtain a definition of individual maladjustment from:

- a. neighbor
- b. teacher
- c. physician
- d. social worker
- e. clergyman
- f. teenager

Give three factors in each of the following work environments or jobs which can lead to individual maladjustment:

- a. nonassembly line heavy factory work.
- b. high pressure sales office
- c. windshield installer on an automobile assembly line
- d. executive officer of a large corporation
- e. a law enforcement officer

Carry out a survey to determine what aspects of the work environment are most likely to produce individual maladjustment. Try to determine whether present work environments are more likely to result in maladjustment than those of 50 years ago.

CONCEPT

INDIVIDUAL MALADJUSTMENT OFTEN COMES ABOUT WHEN INDIVIDUALS ARE UNABLE TO COPE WITH OR CONTROL SATISFACTORILY THE CONDITIONS OR SITUATIONS IN WHICH THEY MUST FUNCTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the environmental and social conditions which can lead to individual maladjustment.

TEACHING/LEARNING STRATEGIES

Describe those conditions which might exist in the following environments and could contribute to individual maladjustment:

- a. neighborhood
- b. school
- c. home
- d. job
- e. socioeconomic status

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Carry out a group discussion with non-professionals to determine those situations or conditions they feel are most likely to produce maladjustment.

Interview or conduct a panel discussion with professionals to determine those situations or conditions which they feel are most likely to produce maladjustment. Try to include at least one of the following in the survey:

- a. social worker
- b. personnel manager
- c. psychologist
- d. guidance counselor
- e. psychiatrist
- f. parole officer

Analyze the differences and similarities between groups with respect to their views on causes of individual maladjustment.

CONCEPT

PATTERNS OF MALADJUSTMENT OBSERVED IN CHILDREN AND TEENAGERS ARE DIFFERENT FROM THOSE SEEN IN ADULTS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify behaviors which could be considered as indicative of individual maladjustment in children, teenagers, and adults.

Understand the relation of socioeconomic status to individual maladjustment.

TEACHING/LEARNING STRATEGIES

List those behaviors you would identify as indicative of individual maladjustment for the following types of young people:

- a. young school children
- b. white middle class teenagers
- c. white lower class teenagers
- d. black middle class teenagers
- e. black lower class teenagers
- f. upper class teenagers

Describe expected differences between male and female patterns of individual maladjustment in teenagers.

List those behaviors you would identify as indicative of individual maladjustment

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

for adults at home and at work, and women and men separately for each of the following groups:

- a. white middle class suburban
- b. white middle class urban (apartment residents)
- c. middle class farm whites
- d. black middle class urban (apartment residents)
- e. migrant farm workers
- f. white lower class urban
- g. black lower class urban
- h. white lower class farmers
- i. black lower class farmers

CONCEPT

MALADJUSTMENT MUST BE DISTINGUISHED FROM MENTAL ILLNESSES SUCH AS NEUROSIS OR PSYCHOSIS. SPECIAL TECHNIQUES ARE NECESSARY TO HELP THE MALADJUSTED INDIVIDUAL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize the distinction between maladjustment and mental illness:

Understand the ways in which problems of individual maladjustment are treated by professional mental health workers.

TEACHING/LEARNING STRATEGIES

Define:

- a. mental illness
- b. neurosis
- c. psychosis

Describe the essential ways in which individual maladjustment and mental illness differ.

Prepare a report on community efforts to work with:

- a. maladjusted juvenile boys
- b. maladjusted juvenile girls
- c. maladjusted minority groups
- d. maladjusted adults

By interviewing some professional mental health workers, try to determine how each of the following might be used to help alleviate individual maladjustment:

- a. crisis intervention
- b. encounter groups
- c. behavior modification
- d. role playing

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

- e. job counseling
- f. family therapy

Develop a plan for community action to reduce the conditions producing individual maladjustment.

INDIVIDUAL MALADJUSTMENTAlternative #2OVERVIEW

This module deals with the individual limits of man's ability to adapt or adjust to changes in the environment. When these limits are exceeded, an individual may suffer either psychological or physiological damage. This module examines some of the origins of individual maladjustment, psychological and physiological mechanisms by which individuals adjust, and criteria used in measuring maladjustment.

CONCEPT

MAN HAS A REMARKABLE ABILITY TO ADAPT TO CHANGES. THERE ARE LIMITS TO THIS CAPABILITY, HOWEVER, AND WHEN THESE LIMITS ARE EXCEEDED, MALADJUSTMENT OR EMOTIONAL ILLNESS MAY RESULT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define maladjustment.

Recognize behavior that is "maladjusted" within the context of a given situation and defend his position.

Define psychological adaptation, physiological adaptation and "group norms."

Describe "norms" for specific groups of people.

Analyze several studies of animal behavior and attempt to determine whether these have any relevance to human behavior.

Distinguish between non-conformity and maladjustment.

Recognize categories of maladjustment (names of neuroses, psychoses, deviant behavior).

Recognize adaptation needs (defense mechanisms).

TEACHING/LEARNING STRATEGIES

In the classroom, attempt to define the group norms. Then interview foreign students on your campus (or in your community) to see how these norms compare.

Utilize resource persons in the community such as psychiatrists, representatives of community mental health agencies, various types of rehabilitation counselors, sociologists, etc. to provide background information on individual maladjustment - its etiology, its behavioral symptoms, modes of adaptation, defense mechanisms, group norms, etc.

Become familiar with the biological and psychological abstracts found in the library. Each student should present a 3 - 5 minute report on some animal behavior study, and describe the relevance (if any) to human behavior and problems of individual maladjustment.

CONCEPT

THE COMPLEXITY OF CONTEMPORARY CIVILIZATION, COUPLED WITH ADVERSE ENVIRONMENTAL CONDITIONS, INCREASES THE POSSIBILITY OF MALADJUSTMENT, MENTAL DISORDER AND PSYCHOLOGICAL DAMAGE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define "stress" from both a physiological and psychological perspective.

Define alienation and apathy.

Identify factors in contemporary U. S. society that contribute to stress and to alienation.

Describe several adverse psychological effects resulting from (1) sensory overstimulation and (2) sensory deprivation.

Identify specific environmental pollutants that adversely affect mental function.

Identify specific environmental factors that have the potential of contributing to individual maladjustment.

TEACHING/LEARNING STRATEGIES

Examine the words of pop songs (such as Simon & Garfunkle's "I Am A Rock"). Relate the words to "stress," "alienation" and "apathy."

Develop a "case study" in which a problem is described and the resolution of the problem is left open. After the case study is developed, each student should "resolve" the problem individually and these "resolutions" should be discussed in class. Then each student should interview one person in the community to see how they would resolve the problem - persons such as psychologists, judges, policemen, truck drivers, college students, elementary teachers, etc. should be interviewed. Then groups of students should "role play" a discussion of the problem, with each student assuming the role of the person interviewed.

Use psychological, sociological or biological abstracts to get research results.

Assume a position on the following statement (either pro or con) and defend that position. "During the next 50 years in the U. S., changes in technology and social mores will take place at such a rapid rate that the proportion of maladjusted individuals will greatly increase."

CONCEPT

INDIVIDUAL MALADJUSTMENT WITHIN A SOCIETY CAN HAVE EITHER A POSITIVE OR NEGATIVE EFFECT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify historical individuals or groups who were (or appeared to be) maladjusted, who had either a positive or negative impact on society, or in the history of the world, and describe the impact. Consider the areas of politics or government, art, music, philosophy, etc.

Identify individuals or groups in contemporary U. S. society that may be described as "maladjusted" but perform some useful function for society. Describe the useful function.

Identify several mechanisms by which society deals with maladjustment, or by which it attempts to enforce conformity to group norms. Identify mechanisms for (1) formal control and (2) informal controls.

TEACHING/LEARNING STRATEGIES

Role play a disciplinary hearing at a hypothetical college. A group of long-haired "grubby" ecology activists have disrupted a meeting of the board to protest the condition of a lake on the campus that has been badly damaged by the effluent from the campus sewage treatment plant. Assign titles or positions, ages and ethnic groups to members of the committee holding the disciplinary hearing, as well as to students who are to be disciplined.

Design an appropriate format and carry out systematic behavior observations at a kindergarten, a scout troop, a football practice, etc. What are the formal controls (rules, rewards, punishments, etc.) used within the group to seek conformity to group norms? What are the informal controls (ridicule, ostracism, etc.) used to seek conformity? Observe closely and record the responses of individuals subjected to either formal or informal control mechanisms.

CONCEPT

ECOLOGY, WITH ITS EMPHASIS ON BALANCE AND UNITY, MAY BE A CONCEPTUAL FRAMEWORK BY WHICH TO RECONCILE MANY OF THE TENSIONS FACING MODERN MAN.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recommend specific changes that could be made that will alleviate the pressures resulting in individual maladjustment.

TEACHING/LEARNING STRATEGIES

Conduct a survey of the community to identify "environmental resources" available that may contribute to the alleviation of individual maladjustment. How widely are they used? Are they located where they are most needed?

STUDENT LEARNING OBJECTIVES (Cont'd)

Identify environmental resources in or near his community that reduce or contribute to the resolution of problems of individual maladjustment (consider community mental health facilities, city parks, and playgrounds, wilderness areas, etc.) and describe the contribution of each resource.

Identify philosophies or ideas contained within environmental studies that might reconcile tensions facing modern man.

TEACHING/LEARNING STRATEGIES (Cont'd)

What are the plans for increasing the number of such facilities? What recommendations would you make to improve the situation. Indicate on a map of your community, (1) areas of greatest population density, (2) areas of highest crime, (3) existing "environmental resources," (4) planned environmental restoration, and (5) recommended environmental resources.

Visit or write appropriate personnel at various institutions (mental hospitals, prisons, alcoholic or drug rehabilitation centers). Then attempt to identify some major idea or philosophy you have learned in this environmental course that has a close correspondence to the successful strategies identified.

INTERGROUP TENSIONSAlternative #1OVERVIEW

This module deals with the growing pressures of a modern day world and the resulting tensions felt to one degree or another by all of us. Intergroup tensions of various types are all about us. The causes and effects of this problem have, in turn, a profound affect on the nation and society. An understanding of these causes and effects is necessary in order for man to reduce and adapt to these tensions. This module attempts to present an orientation to intergroup tensions.

CONCEPT

HIGH DENSITY CONDITIONS IN URBAN AREAS CAN RESULT IN SOCIAL AND PERSONAL FRUSTRATIONS.

STUDENT LEARNING OBJECTIVES.

The student will be able to:

Understand the phenomenon of human density in contemporary urban living.

Explain the manifold consequences of crowding and density on both individual persons and groups.

Identify the social and personal frustrations and tensions brought about by modern urban environment.

Indicate the immediate benefits man derives from living in a high density environment.

TEACHING/LEARNING STRATEGIES

Analyze behavioral characteristics in rats that result from high density. Relate these to human behavioral characteristics.

List kinds of problems that might arise in:

- a. a high population, low income group
- b. a high population, high income group

Survey a ten block area in a high density neighborhood and note recreational facilities such as miniparks and portable swimming pools.

Observe the rush hour of the city and write a five page essay, with illustrative pictures, on the frustrations of the individual in the crowd of "rushing."

CONCEPT

GROUPS OF INDIVIDUALS WITH DIFFERENT VALUES AND BELIEFS ALMOST INEVITABLY EXPERIENCE SOCIAL AND PERSONAL FRUSTRATIONS RESULTING IN ANTISOCIAL AND PERSONALLY DESTRUCTIVE BEHAVIOR.

STUDENT LEARNING OBJECTIVES

The student will be able to:
Understand why many frustrations and antisocial behavior, including indifference and violence, are originated by the daily togetherness of those who differ from their neighbor in values and convictions.
Explain why physical closeness does not, by itself, bring about a human togetherness.

TEACHING/LEARNING STRATEGIES

List problems that might arise in a racially mixed neighborhood. Explain how these problems differ in high income neighborhoods and low income neighborhoods.
Define psychosomatic disease and give a number of examples. Explain how social and personal frustrations can lead to psychosomatic disease (biological mechanisms).
Have the class observe and give oral reports on people's behavior in a crowded bus or streetcar. The class should discuss the reasons for the observed behavior or attitudes displayed.

CONCEPT

THE POLITICAL PROCESS AFFECTS GROUP BEHAVIOR.

STUDENT LEARNING OBJECTIVES

The student will be able to:
Determine the advantages and disadvantages of the political process imposed upon a socially concerned group of individuals.
Understand the way individual goals can be frustrated in a social and/or political organization.

TEACHING/LEARNING STRATEGIES

Have the students explore ways in which the administrative organization of the school has disrupted one or more of their educational or personal plans.
In a class discussion, describe the present tensions in the group. After six months, once again discuss the attitudes and identify the differences in comparison to the first study of the same group.
Discuss how and why there are changes taking place in student attitudes toward each other.

CONCEPT

IN ORDER TO REDUCE INTERGROUP TENSIONS, A MUTUAL RESPECT FOR INDIVIDUAL DIFFERENCES MUST BE FOSTERED.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Acquire an awareness of a positive attitude toward the reality of human differences in values and personal convictions.

Discover that these differences can be the source of both destructive and constructive tensions in human society according to the individual person's attitudes (indifference, tolerance, respect, dialogue).

TEACHING/LEARNING STRATEGIES

Analyze in small group discussions how America is or is not a "melting pot of nations."

Have the students take a census to discover the ethnic composition of a ten block area in their neighborhood.

Discuss in groups the meaning of the saying "e pluribus unum."

Identify intergroup tensions that might lead to continued world conflict.

INTERGROUP TENSIONSAlternative #2OVERVIEW

This module relates some of the world's current environmental problems to tensions present in individuals and groups. The complexity of the modern day world seems to be increasing the volume of frustrations found in humans. This module attempts to outline methods by which these tensions can be recognized and dealt with effectively.

CONCEPT

THE HETEROGENEOUS NATURE OF OUR SOCIETY CONTRIBUTES TO INTERGROUP TENSIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Describe the heterogeneous segments of American society from a cultural, economical, religious, and political perspective.

Understand the way intergroup tensions originate in a heterogeneous society.

Identify the environmental attitudes of different segments of society.

TEACHING/LEARNING STRATEGIES

Identify and describe antagonistic segments in a particular community.

Find the three most aggressive expressions (in word or action) of each segment identified; subsequently, the student will point out the ways these three expressions contribute to the aggravation of tension and thus represent a threat to the community and to the human and natural environment.

Prepare a list of the groups that the students believe contribute to tensions in the environment.

Have the students draw up a proposal for establishing serious communication between conflicting groups identified in the community.

CONCEPT

INTERGROUP TENSIONS CAN PRODUCE POSITIVE AND NEGATIVE RESULTS IN BOTH OUR SOCIAL AND PHYSICAL ENVIRONMENTS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

Using information gathered from the

STUDENT LEARNING OBJECTIVES (Cont'd)

Understand and evaluate the beneficial and the destructive consequences of intergroup tensions on man's social and physical environment.

Evaluate political events from the point of view of intergroup tensions and their environmental consequences.

TEACHING/LEARNING STRATEGIES (Cont'd)

news media (and personal experiences), list three examples in which intergroup tensions have produced:

- a. positive results
 1. social environment
 2. physical environment
- b. negative results
 1. social environment
 2. physical environment

CONCEPT

REMEDIES TO PROBLEMS IN MAN'S SOCIAL AND PHYSICAL ENVIRONMENTS CAUSED BY INTERGROUP TENSIONS MUST BE DEVELOPED THROUGH INTERGROUP ACTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize and appraise the many existing tensions among different segments of our society.

Acquire an understanding of and a responsible attitude toward the many manifestations of such tensions.

Evaluate intergroup tensions with serious concern and with the insight that a comprehensive solution to such tensions cannot be successful without intergroup involvement and action.

TEACHING/LEARNING STRATEGIES

Discuss a situation in which intergroup tensions have been alleviated by communication and/or educational processes.

Using a specific environmental situation, list several procedures which may be used to solve problems caused by intergroup tensions.

CONCEPT

MEANINGFUL DIALOGUE BETWEEN OPPOSING GROUPS WILL ENCOURAGE RESOLUTION OF INTERGROUP TENSIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand why and how the resolution

TEACHING/LEARNING STRATEGIES

Observe on television a live debate of the United Nations. Identify the groups in tension and describe the

Intergroup Tensions

Alternative #2

STUDENT LEARNING OBJECTIVES (Cont'd)

of intergroup tensions can be accomplished or at least initiated not through a confrontation in aggression, but through a mutual effort to establish a genuine dialogue between the forces and the people involved in aggressive tension.

TEACHING/LEARNING STRATEGIES (Cont'd)

ways these groups try to establish communication with each other.

Evaluate the history of establishing communication between groups involved in the conflict; e.g., nations at war.

Relate and evaluate a personal experience of resolution of conflict.

CONCEPT

IT IS THE INDIVIDUAL, AS A PART OF A GROUP, WHO MUST SEEK TO DEVELOP UNDERSTANDING OF RESOLUTION OF INTERGROUP TENSIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Acquire an awareness of the fact that both the production and the resolution of intergroup tensions involve as much the individual as the group.

Understand that intergroup tension can bring out the worst (power of destruction) or challenge the best (the power of creation) in man as a social and individual being.

TEACHING/LEARNING STRATEGIES

Study in small groups Herbert Marcuse's philosophy on violence and alienation. Students should critically evaluate the theory of Marcuse and compare it to their own personal attitudes toward violence in contemporary America.

Analyze and give five examples of dehumanizing relationships between individuals in our daily living. Explain how these dehumanizing relationships can be eliminated and replaced by a humanizing encounter between the same individuals.

Discuss Her-mann Hesse's Siddhartha and examine the author's philosophy of nature, peace, and life contained in this novel. Point out how the insights of this novel can be applied to our society.

Evaluate the manifold presence of violence on television. Observe the number of violent incidents shown each day for one week, and examine how such programs might encourage a violent attitude and mentality.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Identify and describe two intergroup tensions within the educational institution. Propose a solution to reduce these tensions and to establish fruitful communication between the groups involved in destructive tension.

Analyze a twenty-four hour segment of TV and identify quantitatively the time spent in violent or aggressive actions.

INTERGROUP TENSIONS

Alternative #3

OVERVIEW

This module deals with one of the most important areas of concern with respect to the issue of intergroup tension; namely, the development of techniques to resolve or reduce tensions. No one procedure has yet been designed which is wholly successful in eliminating intergroup conflict or tension. However, this module attempts to offer some insight into this complex problem.

Everyone is a member of several groups. People are often unaware of their membership in a group. The groups people belong to are of several types. There are those groups to which one is assigned by society because of race or color, nationality, or religion. In these instances, the individual has little control over his assignment or designation as a member of such a group. There are groups such as professional associations, political parties, unions, etc., where membership is extended to individuals who meet criteria for admission, e.g., education, commonality of interest, or skill. In addition, there are also those groups which have been organized out of concern for special problems or interest. Examples are NAACP, PTA's, Easter Seal Association and others. Because most groups to which people belong do ultimately seek to promote the interest of the group and protect its members, tensions between groups can develop.

In contemporary society, there are many environmental and societal conditions which lead to intergroup tensions. Placement of various groups in neighborhoods or in schools may produce severe intergroup tensions. Conflict between groups having different life styles or societal goals also can result in tensions. In many instances, if the tensions are not resolved and/or reduced, the end result is severe conflict and even violence. There are instances where an individual is a member of more than one group and the goals or aims of the groups may come into conflict. In such cases, the individual may find himself torn between the issues and end up withdrawing completely, or else taking an extreme position of one of the groups.

CONCEPT

MEMBERSHIP IN A GROUP CAN BE BOTH VOLUNTARY AND INVOLUNTARY.

STUDENT LEARNING OBJECTIVES

The student will be able to:

- Understand the idea of a group and an individual's role in a group.
- Explain what is meant by a group.

TEACHING/LEARNING STRATEGIES

- Make a list of groups to which individuals are said to belong by society.
- Give the major criteria for placing people in such groups.
- Make a list of groups to which

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

individuals belong and attempt to join voluntarily. Give at least one reason for joining each group.

Have students list all groups to which they belong and show which groups are in agreement with each other and which might be in conflict.

CONCEPT

INTERGROUP TENSION OFTEN OCCURS WHEN THE GOALS OR ACTIONS OF ONE GROUP ARE PERCEIVED TO BE IN DIRECT OPPOSITION OR IN IDEOLOGICAL COMPETITION WITH THAT OF ANOTHER GROUP.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES

The student will be able to:

- Understand how differing goals and membership characteristics can produce intergroup tensions.

Select the following areas and invent hypothetical groups and show how the goals of one group could be viewed as conflicting with those of another group: a. housing, b. racial, integration, c. schools, d. law enforcement, e. water/air pollution, and f. zoning.

For each of the following, list the ideological conflicts or differences between groups that might lead to intergroup tensions: a. race relations, b. ethnic or cultural values, c. economic status, d. politics, and e. health care.

Describe what groups are most likely to perceive as actions, goals or ideologies which will create intergroup tension.

CONCEPT

INTERGROUP TENSIONS ARE MOST LIKELY TO OCCUR WHEN ONE GROUP IS DOMINANT AND ANOTHER IS CHALLENGING OR DEMANDING A CHANGE IN THE CONTROL EXERCISED BY THE DOMINANT GROUP.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES

The student will be able to:

Analyze an event which produced

STUDENT LEARNING OBJECTIVES (Cont'd)

Understand and be able to describe events which can lead to intergroup tensions.

TEACHING/LEARNING STRATEGIES (Cont'd)

intergroup tension. The following should be included in the analysis: a. groups involved, b. description of major issues, c. goals or objectives of the groups, d. indicate dominant group and why, and e. describe areas producing tension or conflict.

Organize a group meeting where members are randomly divided, and have one group act as dominant and the other as challenger or demander over a controversial issue. After ten minutes have groups reverse roles. Have participants describe their reactions for each group.

CONCEPT

SOCIAL OR ENVIRONMENTAL CONDITIONS CAN OFTEN BRING TO THE SURFACE LATENT INTERGROUP TENSIONS.

STUDENT LEARNING OBJECTIVE

The student will be able to:

Understand environmental factors which can result in intergroup tension.

Become aware of how intergroup tensions can develop over environmental issues.

TEACHING/LEARNING STRATEGIES

List environmental conditions which are likely to bring to the surface latent intergroup tensions.

Discuss what factors in the following situations are likely to cause intergroup tensions to surface: a. low-cost housing, b. proximity of neighborhoods with different ethnic populations, c. public hearings on busing, and d. job recruitment policy.

Select an environmental issue and show how two groups which might not ordinarily be in conflict might become involved in a tension producing situation.

Set up a role-playing situation to illustrate how tensions can arise around environmental issues. Analyze the behavior of the players in terms of: a. factors which precipitate tension, b. factors which reduce

STUDENT LEARNING OBJECTIVETEACHING/LEARNING STRATEGIES (Cont'd)

tension, and c. apparent intensity of participants to determine what they felt to be factors producing tension.

CONCEPT

A DIVERSITY OF TECHNIQUES FOR THE REDUCTION AND RESOLUTION OF INTERGROUP TENSION IS NEEDED IN ORDER TO MAINTAIN A HEALTHY SOCIETY.

STUDENT LEARNING OBJECTIVETEACHING/LEARNING STRATEGIES

The student will be able to:

Understand techniques used for reducing intergroup tension.

Identify groups with diverse interests that can often foil an issue of unanimous support.

List some techniques for reducing intergroup tension. Describe how each might be applied to the following situations: a. racial conflicts, b. ethnic conflicts, and c. tension between teachers and students.

Interview the following to determine how each would go about reducing intergroup tension on the issue of school integration: a. clergyman, b. schoolboard member, c. students, d. social worker, e. psychologist, and f. teacher.

Describe factors that were common in reducing intergroup tension in the persons interviewed. Describe differences between responses of persons interviewed.

Conduct a poll to determine how many people feel that intergroup tension represents a major problem of society. Ask persons polled to suggest a way in which such tensions could be reduced. Analyze the results of the poll.

SOCIAL INSTITUTIONS

Alternative #1

OVERVIEW

The purpose of this module is to provide a preliminary understanding of the basic and universal processes involved in all forms of social groupings and institutions. To the extent that the present environmental crisis is a man-made phenomenon, the resolution of the problem lies in man's sense of mutual awareness and the ability to develop alternative patterns of social interaction in line with ecological imperatives. Mutual awareness of common problems is a result of social interaction. Environmental degradation and constructive programs for restoring the environment can, therefore, be examined in terms of the processes and mechanisms through which individuals relate meaningfully to one another. Ultimately, the origin of our environmental problem lies within particular patterns of social interaction.

CONCEPT

ENVIRONMENTAL PROBLEMS CAN BE MORE FULLY COMPREHENDED AS SOCIAL PROBLEMS
STEMMING FROM THE OBJECTIVES AND ACTIONS OF VARIOUS SOCIAL GROUPINGS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the characteristics of various types of social aggregates, including dyad (two person relationships), triad, small group, family, clan, large organization, mob, mass, bureaucracy, state, empire, international organization, etc.

Understand the various role-complexes associated with particular forms of social groupings; i.e., bureaucratic roles--climber, conservator, zealot, advocate, statesman (Anthony Downs, Inside Bureaucracy).

Identify environmental problems and relate these to various social organizations.

TEACHING/LEARNING STRATEGIES

From a list of basic environmental problems, have students, working in small groups, isolate aspects of the problem which are affected by various types of social groupings. Rank environmental impact of each type of social aggregate on the problem; i.e., water pollution--what is the impact of families, the city government, various civic and service organizations, the Department of Defense, etc.

Interview one physical scientist and one social scientist on the nature of environmental problems and their solutions.

Have students outline a basic curriculum for environmental studies which includes a mix of scientific-technical dimensions as well as social dimensions.

STUDENT LEARNING OBJECTIVES (Cont'd)

Distinguish between a technical problem involving the choice of the most efficient solution and a social problem which involves a reconciliation of conflicting interests.

TEACHING/LEARNING STRATEGIES (Cont'd)

Examine an issue such as the recent Department of Defense contract for the purchase of 250,000 fur-lined parkas made from wolves. What were the technical considerations that led to the decision to use wolf hides? What is the environmental impact of such a purchasing agreement? How is it possible for a large bureaucracy to operate in contradiction to nationally stated policies regarding the preservation of wildlife?

CONCEPT

SOCIAL INTERACTION MAY BE DISTINGUISHED FROM OTHER FORMS OF HUMAN INTERACTION BY SYMBOLS WHICH CONVEY THE SUBJECTIVE MEANINGS OF THE ACTORS AND, THEREBY, CREATE A SENSE OF MUTUAL AWARENESS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Distinguish between social, anti-social, and asocial interaction.

Identify the difficulty in developing a relationship without resorting to the use of symbols.

TEACHING/LEARNING STRATEGIES

Trip to a mental hospital or similar institution.

Small group exercise in developing cooperation without using verbal symbols or sign gestures.

Experiments in communication distortions.

CONCEPT

THE SYMBOLS, WHICH MEDIATE ALL FORMS OF SOCIAL INTERACTION, TAKE ON A VARIETY OF FORMS INCLUDING LANGUAGE, ART, GESTURE, AND MUSIC.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand art, gesture, music, graphics, etc., as forms of social communication.

Determine various environmental problems in differing symbolic forms.

TEACHING/LEARNING STRATEGIES

Group project. Divide class into small groups each with the task of communicating the various facts, values, and feasible alternatives on a particular environmental problem such as water quality or preservation of endangered species. Each group is restricted to communicating in one symbolic mode: art,

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES (Cont'd)

popular culture forms, music, gestures, photography, etc. Compare and contrast biases and potentialities of each mode.

CONCEPT

BASIC MODES OF SYMBOLIC OR SOCIAL INTERACTION (E.G., CONFLICT, COOPERATION, EXCHANGE) ARE COMMON TO ALL FORMS OF SOCIAL GROUPINGS RANGING FROM TWO-PERSON RELATIONSHIPS TO INTERNATIONAL RELATIONSHIPS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Develop the skill of identifying basic forms of interaction in various types of social groupings.

Appreciate the value of concepts which facilitate comparison within cultures and between different cultures.

TEACHING/LEARNING STRATEGIES

Lecture on writing testable empirical propositions--operational concepts, validity, reliability, non-falsification.

Small groups to work on writing of propositions.

Classroom demonstration of hypothesis formulation based upon small group experimental situation.

Familiarization with basic social science computer programs for analyzing and formulating data. Resource person with social science computer experience.

Divide class into three groups. Each group is asked to find a solution to the same environmental crisis (preferably a situation already studied in a previous unit). Each group attempts to arrive at a solution through role playing which maximizes a different type of social interaction.

CONCEPT

THE PRINCIPAL MODES OF SOCIAL INTERACTION MUST INCLUDE (1) EXCHANGE FOR THE EXPRESS PURPOSE OF RECEIVING A REWARD, (2) COOPERATION OR JOINT ACTION TOWARD SOME COMMON GOAL, (3) CONFORMITY TO NORMS OR VALUES PREEXISTENT IN A SITUATION, (4) COERCION, WHICH RESTS UPON THE SENSE OF SUPERORDINATION AND SUBORDINATION, AND (5) CONFLICT OR STRUGGLE OVER SOMETHING, SOME VALUE, OR SOMEONE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Hypothesize environmental problems which derive from each of the five basic modes of social interaction.

Identify skills and attitudes required for successful analysis and resolution of environmental problems.

TEACHING/LEARNING STRATEGIES

Divide students into groups. Have each group work with the identical environmental problem. Each group should be structured so as to maximize each of the basic modes of social interaction. For example, a group should be organized on the premise of cooperation with each participant on an equal footing, operating within the norms of teamwork and consensual solution. Another group should be set up to make decisions on the basis of competition and conflict relations. Participants must bargain in a competitive arena in pursuit of their perceived self-interest.

In seeking solutions to environmental problems, have students develop a criteria for choosing a mode of interaction most appropriate to a particular problem. What problems are most amenable to exchange, cooperation, conformity, coercion, and conflict?

CONCEPT

ROLE PLAYING IS THE MANNER BY WHICH INDIVIDUALS ENGAGE IN SYMBOLIC INTERACTION AND, THEREBY, BECOME MEMBERS OF THE SOCIAL ORDER.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Demonstrate the skills involved in role playing.

TEACHING/LEARNING STRATEGIES

Analyze the role of key people in environmental action. Use interviews.

STUDENT LEARNING OBJECTIVES (Cont'd)

Understand the function of role playing as a basic process of socialization.

Gain an insight into the various roles each individual plays in the normal course of the day.

Appreciate the perspective that role playing does not necessarily involve hypocrisy.

Understand the sociological conception of role playing as a pattern of mutual expectation.

Experience intentional role playing situations.

TEACHING/LEARNING STRATEGIES (Cont'd)

Play any one of the existing role playing simulations dealing with environmental problems.

Create scenario around an environmental crisis situation. Identify the various roles and role conflicts. Have other members of the class play out roles. Critique.

Analyze the following roles in terms of approaches to environmental problems: middle-class homemaker, builder, civil engineer, city manager, city planner, biology professor.

IMPACT OF POLITICAL SYSTEMSAlternative #1OVERVIEW

This module highlights the reality factor associated with making sound environmental decisions. Regardless of the apparent worth of a particular action, unless the appropriate political forces view it as beneficial, little positive response can be expected. The module attempts to demonstrate the fact that not very much in the way of long range environmental impact can be accomplished outside of political considerations. An understanding of political forces should allow individuals to deal more effectively with the process of politics.

CONCEPT

THE BASIC UNITS OF THE U.S. POLITICAL SYSTEM ARE LOCAL, STATE AND NATIONAL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine the roles of the three major levels of the political system--local, state and national.

TEACHING/LEARNING STRATEGIES

Choose an environmental issue facing your community and identify various governmental agencies (local, state, federal, and intergovernmental) participating in the decision process.

Attend a meeting of a local governmental unit to determine the various elements of the "decision-into-action" process.

CONCEPT

A KNOWLEDGE OF THE FUNCTIONS AND OPERATIONS OF THE VARIOUS LEVELS OF GOVERNMENT IS NECESSARY FOR INTELLIGENT POLITICAL ACTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize environmental problems which could be solved at:

- a. local level
- b. state level
- c. national level

TEACHING/LEARNING STRATEGIES

Deliver a lecture comparing traditional concept of federalism as a division of powers with the present reality of federalism as inter-governmental cooperation centering around various types of grants-in-aid.

STUDENT LEARNING OBJECTIVES (Cont'd)

Cite what is being done about major environmental problems at:

- a. local level
- b. state level
- c. national level

TEACHING/LEARNING STRATEGIES (Cont'd)

Have students prepare a case study of federal air pollution legislation as an attempt to prod the states into action.

Discuss aspects of air or water pollution which can best be handled at each level of government.

CONCEPT

POLITICAL SYSTEMS ARE A REALITY IN THE U.S., AND EFFECTIVE POLITICAL ACTION IS A WAY OF ACCOMPLISHING GOALS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Project effective political action on environmental problems at the:

- a. local level
- b. state level
- c. national level

Identify influential (pro and con) groups which bring about political action on environmental problems at the:

- a. local level
- b. state level
- c. national level

TEACHING/LEARNING STRATEGIES

Inventory and list goals and objectives of major environmental interest groups at the local, state, and national levels.

Have a panel discussion, inviting representatives from local, state and national groups, governmental and private sector, to discuss their competing and cooperative roles in bringing about effective environmental action on a specific local issue.

CONCEPT

IN A POLITICAL SYSTEM WHICH IS DEPENDENT UPON DEMOCRATIC PROCESSES, INDIVIDUAL INITIATIVE WHICH CULMINATES IN GROUP EFFORT IS THE MEANS FOR BRINGING ABOUT POLITICAL ACTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify individual initiatives which have resulted in solutions to environmental problems.

TEACHING/LEARNING STRATEGIES

Conduct a research project on how congressmen perceive their constituency. (Political behavior studies of congressmen point to the relative insignificance of the

STUDENT LEARNING OBJECTIVES (Cont'd)

Determine the steps an individual could take in order to begin political action on a given environmental problem.

TEACHING/LEARNING STRATEGIES (Cont'd)

individual constituent in political calculations.)

Interview newspaper editors regarding the myth and reality of individual impact upon the political system.

CONCEPT

THE ENVIRONMENTAL IMPACT OF ALTERNATIVE POLITICAL ACTIONS REQUIRES CAREFUL ANALYSIS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine the alternatives, rationale, and possible environmental impact of a recent political action.

Understand political actions in other countries which affect our environment.

TEACHING/LEARNING STRATEGIES

View films on international conservation produced by the United Nations and the International Union for Conservation.

Discuss issues on international conservation using material from the 1972 Stockholm meeting.

IMPACT OF POLITICAL SYSTEMSAlternative #2OVERVIEW

This module examines the manner in which differing political systems make environmental decisions and the varying ways that these systems respond to environmental problems. The theme of the module evolves around the fact that unless effective political action can be implemented, the soundest environmental strategies can be lost. In essence, even the purest of environmentalists must face the realities of how decisions are made and recognize the forces that have to be dealt with when attempting to change a policy affecting the environment.

CONCEPT

DIFFERING POLITICAL SYSTEMS VARY IN THEIR RESPONSES TO ENVIRONMENTAL PROBLEMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize the essential characteristics of the political systems.

Identify a centralized and decentralized form of government.

Project an environmentally responsive political model.

TEACHING/LEARNING STRATEGIES

Let the class function in a state of "anarchy" for a specified period of time to demonstrate the need for defined procedures.

Develop a stylized flow chart of the political system of several nations.

Look up several formal definitions of a "political system" in sources such as Encyclopedia Britannica, Encyclopedia of Social Sciences, etc.

In small groups, students should design a political system and implement the system in class.

Develop a general model for what a political system achieves - to include the function, the population units, the distribution of goods, etc.

Interview the County Chairmen of the Democratic and Republican Parties to get their operational definitions of what constitutes a political system.

CONCEPT

POLITICAL SYSTEMS CAN EITHER FACILITATE OR OBSTRUCT ENLIGHTENED ENVIRONMENTAL DECISION MAKING.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine strategies available to the concerned citizen for solving environmental problems through existing political systems.

Recognize governmental organization at the various levels of the system in which he lives (local, county, state and federal).

Identify the current decision-making structure in the local government by specific individual and office.

Analyze records of political decision makers at each level of government germane to involvement with environmental issues (e.g. voting record, bills presented, etc.).

Compare the concept of centralization vs. decentralization in the context of environmental decision-making.

TEACHING/LEARNING STRATEGIES

Design an organizational chart of the students' municipal government.

The teacher will provide class sub-groups with decision-making strategies (or rules). Each group is to reach a decision on the same (specified) environmental problem using the assigned rules. Reassemble to analyze the process in each group. Example: each group is to pick the site for a power plant using:

- a. socialist government format
- b. unlimited democracy
- c. representative systems
- d. others

Identify a critical environmental issue in your area. Develop a political map of senators and representatives. Select 5 and write to them. Analyze the responses in terms of answering your questions. Follow up on the correspondence and maintain a portfolio in attempting to get direct answers.

Obtain a copy of the Environmental Protection Act. Analyze it for strengths and weaknesses. Can it provide a basis for environmental responsiveness?

Students should determine if the state or county has an initiatory procedure and what is required to get an issue on the ballot.

Students should interview a judge or official of some sort and apply the rules of debate to determine whether or not questions were answered.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Taking a specific local problem - interview local, state and national representatives or officials to find out where power resides. What are problems of diffuse power? What are advantages and problems of centralized power?

Write a letter on an environmental issue to the editor of a local newspaper.

Identify a local problem and design five strategies to deal with that problem.

Attend some hearings; e.g., building, zoning petitions.

CONCEPT

THE COMPLEXITY OF ENVIRONMENTAL PROBLEMS OFTEN RESULTS IN VARIOUS POLITICAL LEVELS WITHIN A SYSTEM HAVING CONFLICTING INTERESTS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify elements of the environment which should be under federal governmental control.

Project strategies to affect the political structure in the community toward an environmentally responsive government.

Understand the elements of the political power structure of the U. S.

TEACHING/LEARNING STRATEGIES

Students should select an environmental problem and adopt a viewpoint. They should attempt to "walk the problem through" City Hall. Did officials deal with problem or circumvent the issues? How did they respond to differing sets of demands from differing groups?

As a class, develop and put into action a campaign to call attention to a specific local problem. Ascertain public reaction to this effort.

IMPACT OF POLITICAL SYSTEMSAlternative #3OVERVIEW

This module deals with the validity of the political powers for accomplishing sound environmental action programs. The impediments to effective environmental progress are also, many times, the result of the political structure. Regardless of what conclusions men arrive at through scientific or technological information, implementation of intelligent environmental decision-making requires the addition of political consideration. Therefore, it is necessary to examine the parameters and functions at all levels of political systems and develop skills and know how in working with all three considerations--political, technological, and scientific. Political systems offer both obstacles and opportunities in environmental decision-making, and environmental action requires citizen organization and participation.

CONCEPT

INTELLIGENT ENVIRONMENTAL DECISION MAKING REQUIRES A MIX OF TECHNOLOGICAL, SCIENTIFIC, AND POLITICAL CONSIDERATIONS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine the role of scientists, technologists and politicians in decision making.

Understand decisions based on:

- a. only political considerations
- b. only scientific or technical considerations
- c. both political and scientific considerations

TEACHING/LEARNING STRATEGIES

Present a lecture on Don K.:Price's Four Estates: scientific, technological, administrative, and political. Illustrate, using case study material.

Divide the class into four groups. Each group will attempt to solve a particular problem from a different perspective: basic science, technology (applied science), administration (efficient and effective management), and politics (reaching agreements which satisfy divergent community interests).

CONCEPT

THE POLITICAL SYSTEM OFFERS BOTH OBSTACLES AND OPPORTUNITIES IN ENVIRONMENTAL DECISION MAKING.

STUDENT LEARNING OBJECTIVES

The student will be able to:

TEACHING/LEARNING STRATEGIES

Role-play a crisis situation. Using

STUDENT LEARNING OBJECTIVES (Cont'd)

Determine an instance whereby environmental abuse resulted from a purely political decision.

Understand constraints the political system imposes on environmental decisions.

Identify advantages of political decisions on environmental decisions.

TEACHING/LEARNING STRATEGIES (Cont'd)

current information from air and water pollution studies, the teacher should construct a brief crisis scenario; e.g., emergency smog alert or pollution of urban water supply. Have students act out roles of various governmental and non-governmental groups in responding to the crisis. Students should attempt to maximize self-interest of their group.

Given a situation where science can retard the aging process, project the political costs and benefits in dealing with this development.

Play one of the existing simulation games dealing with environmental issues.

CONCEPT

THE ENVIRONMENTAL IMPACT OF POLITICAL ACTIONS CAN HAVE LONG-RANGE CONSEQUENCES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand that more than one level of government may be involved in the same environmental problem.

Determine the needs for the inter-governmental involvement in specific environmental decisions.

Select a local environmental problem and identify which political units have jurisdiction over it; e.g., administrative, legislative, or judicial.

Understand limitations upon individual action.

Analyze a particular environmental organization with regard to:

- a. membership
- b. organization
- c. strategies
- d. beliefs

TEACHING/LEARNING STRATEGIES

Conduct a field research project dealing with a local problem which has not received much political attention. Research should aim at revealing the facts of the situation and the values of various governmental agencies and private interest groups toward policy change. Identify participants, salience of the issue, friendship-hostility relations between participants, and relative power. Report should include recommendations for change and political/administrative implementation.

Pick a local environmental problem and have students interview various experts with the purpose of understanding the interdisciplinary nature of environmental policy making.

Request a representative from the Environmental Protection Agency to speak on the

STUDENT LEARNING OBJECTIVES

Investigate where group action has succeeded in making a change in a political decision.

TEACHING/LEARNING STRATEGIES (Cont'd)

problem of generating policy alternatives which are technically sound and politically feasible.

IMPACT OF ECONOMICSAlternative #1OVERVIEW

This module deals with the economic considerations that influence the way men think about environmental problems. These economic realities explain why different cultures, nations, and economic systems allocate resources to satisfy their needs and desires. However, resources are limited and the rape of the environment is an inefficient method of allocating resources, thus avoiding an attempt to confront survival problems. The economic policies of different nations will affect the world ecosystems. International bodies are developing an awareness of eco-problems. All of this environmental activity, however, does not take place in isolation of economic restraints.

CONCEPT

ECONOMIC CONSIDERATIONS EXERT A MAJOR INFLUENCE IN SHAPING MAN'S RESPONSE TO SOLVING ENVIRONMENTAL PROBLEMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the four factors which make up the essentials of an economic system.

Determine the difference between a need and a want.

TEACHING/LEARNING STRATEGIES

Seek price information on various pollution control equipment.

List recent bond issues and determine what portion was for pollution control.

Determine the cost of a local sewage facility:

- a. construction
- b. operating costs

Invite a sanitary engineer or consulting engineer to speak on the cost of sewage treatment showing graphs as to the increased cost with the degree of treatment.

Prepare a chart from a literature survey on the cost of pollution control based on:

- a. no control
- b. 50% control
- c. 90% control
- d. total control

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Have students review "Economics and Ecology" by Kenneth E. Boulding found in a book entitled Future Environments of North America.

Have students read Robert S. Diamond's article in Fortune Magazine of February, 1970 - pages 118, 119, 171, 172 - entitled "What Business Thinks."

Ask a guest speaker from the local power company to discuss how the added cost of pollution control will be reflected in consumers' bills.

Conduct a poll asking students and others if they would be willing to pay higher taxes and higher costs for consumer products in order to preserve the environment.

Conduct a brainstorming session on the following ideas: There is concern that the public may not fully comprehend the extent of its responsibility or the kinds of sacrifices required in the cause of the natural environmental commitment. The American public may not realize the full impact on individual economics of pollution control. American business has put productivity increases into higher wages, fringe benefits, expansion and corporate profits. However, in the future a large portion of business capital will go into the "hidden cost" of pollution control. Discuss what this will mean for the consumer.

CONCEPT

ANY BASIC ECONOMIC SYSTEM HAS A POTENTIAL TO PRESERVE OR DESTROY THE ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:
Determine effects of different

TEACHING/LEARNING STRATEGIES

Cover the topic on the Federal government establishing economic penalties to control the pollution of our physical environment

STUDENT LEARNING OBJECTIVES (Cont'd)

economic systems on similar landscapes.

Project a change of life style in order to effect a lower rate of consumption of natural resources.

Identify differing ways in which various economic systems impact the environment.

TEACHING/LEARNING STRATEGIES (Cont'd)

by the following methods:

- a. lecture.
- b. guest speaker from business
- c. seminar or panel discussion.
- d. individual research papers on one specific topic
- e. literature reviews and discussion.

Review articles in professional journals or technical journals such as Environmental Science and Technology, for specifics on the cost of pollution control.

Seek actual cost information on the control of one aspect of pollution such as air:

- a. seek catalogues on control equipment
- b. ask a consulting engineer or pollution control officer to discuss cost of control equipment.
- c. based on the information gathered above, have the class play roles of business' faced with pollution control from a small town industry.

Assign reading to individual students from the "Economics of Clean Air" and the "Economics of Clean Water" published by the Environmental Protection Agency.

Assign students to read the report by the Council of Environmental Quality "Cost and Economic impacts of Environmental Improvement" pages 269-309.

Provide examples of how to control the pollution from industrial processes and cause them to alter basic methods that have in turn provided a profit from resource recovery.

Discuss how pollution control increases as the percent of treatment desired goes up, using charts from the second annual report of the Council of Environmental Quality.

Review some of the hidden costs of air pollution control such as the development of a mass transit system.

CONCEPT

INTERNATIONAL COOPERATION IN ECONOMICS-RELATED PROBLEMS IS ESSENTIAL FOR THE SOLUTION OF ENVIRONMENTAL PROBLEMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify examples of international cooperative action in the environmental area which are economically related.

Determine major obstacles to international cooperation in solving environmental problems.

TEACHING/LEARNING STRATEGIES

Review material from the Stockholm Conference on Environment and discuss the concern of the underdeveloped nations, their national goals and potential impact on the world environment. Discuss their request that the developed nations help them in developing technology that will reduce the impact on environment.

Discuss the rights of a nation, an industry, a community, or an individual citizen to use the environment to dispose of waste. Questions to discuss are:

- a. Why should the environment serve for disposal of waste at a cost to another part of the ecosystem, the public or nation and, at the same time, a savings to the polluter?
- b. Should waste control be a responsibility of industry, government, or individual?
- c. Should we allow a certain percent of degradation providing natural systems can recover? Further, how would we assign the rights to pollute?
- d. Would a pollution tax improve the environment or would it be a license to pollute?
- e. How does the community or nation justify the disposal of waste at the expense of the environment because pollution control facilities cannot be afforded?

Describe how economic development can be a conflicting goal with environmental quality.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

What should be the role of the U. S. in helping countries with a much lower living standard and a need for economic development to control the industrial effluent.

CONCEPT

THE ADVANCED INDUSTRIAL ECONOMIC SYSTEMS ARE THE GREATEST CONTRIBUTORS TO WORLD-WIDE POLLUTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Compare the rate of consumption of natural resources as it relates to the standard of living in an undeveloped country with an industrial nation.

Determine the way the standard of living of a society affects the rate of consumption of its natural resources.

TEACHING/LEARNING STRATEGIES

Discuss how recycling can reduce the cost of pollution abatement, using examples like Britain which saves 2.4 million dollars a year in recycling scrap.

Describe the role of the developed nations in aiding the industrial development of the emerging nations.

Describe how the proliferation of one industry and the disposal of its waste may destroy another.

- a. Discuss examples of this.
- b. Should the offender be required to repair the damages and compensate the members of the deposed industry?

Review capital expenditures of various industries noting what percent of total capital investment is for pollution control.

- a. Invite a guest speaker from a local power company to explain pollution control.
- b. Invite a guest speaker from a local industry to discuss the impact of pollution control on his particular company.

Review articles from technical journals on how solid waste is used to generate electricity, or another byproduct of economic value.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Discuss the economic impact to the total community of pollution in terms of health, cleanup costs to the individual, property damage, and depreciation of property values.

Discuss the significance of required increases in the importing of oil to meet our energy needs.

Conduct a seminar on the value of current sewage treatment technology:

- a. Are large treatment plants, pipes in the ground, etc. the best answer to domestic waste?
- b. Is the best use of water to carry away waste?
- c. Would reduced consumption and alternate disposal methods reduce economic impact?

Review the budget of local state and pollution abatement agencies:

- a. Invite a guest speaker from the pollution agency to discuss the various components of his budget.
- b. Ask the city or county budget director to discuss the cost of government and the percentage of his budget that goes toward controlling waste generated in his community.

The speaker should be asked to provide charts or data from which students can prepare charts, that will show the community's commitment to environmental management.

Discuss some of the constraints of recycling:

- a. Have students prepare individual papers on recycling, by doing literature research.
- b. Ask a guest speaker from the local waste management agency or public works director to speak on the quantity and quality of waste generated within the students' community.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Review the notion that pollution control is a cost to society in two ways: 1) the cost of total unabated discharge, and 2) the cost of 100% control of discharge. Have a class seminar discussion and prepare reports on the above statement. Specifically, they should respond to the cost to society for 100% control of effluent.

COMMUNICATION: DISSEMINATION
AND ACQUISITION OF INFORMATION

Alternative #1

OVERVIEW

This module examines strategies that can be used to increase effectiveness of communication in the resolution of environmental problems. Communication can be verbal or nonverbal. In order for information or feelings to be shared or exchanged, participants must receive or attend to the communication. The effectiveness of communication is evaluated in terms of the stated or implied goals and objectives and is not dependent on the accuracy of the information or the value of the objectives.

CONCEPT

COMMUNICATION IS MORE LIKELY TO OCCUR WHEN PARTICIPANTS ATTEND TO OR RECEIVE INFORMATION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Define communication.

Identify strategies that will establish conditions in which information will be received by a specified target audience.

Acquire understanding and factual information about selected environmental problems utilizing strategies that facilitate or open lines of communication.

Identify the factors that block communication before it starts.

TEACHING/LEARNING STRATEGIES

Relate a personal experience in which the target audience was interested in information but did not receive it as presented.

Divide the class into small groups. Assign a discussion topic to each group that is known to be of little or no interest to the group. A group leader is to be charged with responsibility for meeting certain specified objectives. An observer should be assigned to each group to take notes on whether or not the group communicates on the assigned topic, the number of divergent topics that arise, the number of complaints, etc. Students should not be told in advance that the true objective is to identify conditions under which communication is not likely to take place and the strategies used by individuals to circumvent the assigned objectives of the group. After 15 minutes, inform students of the true objectives and have them analyze the communication dynamics within the group.

CONCEPT

COMMUNICATION IS MOST LIKELY TO BE EFFECTIVE WHEN THE INFORMATION IS WELL ORGANIZED, PRESENTED IN AN UNDERSTANDABLE WAY, OR HAS AN EMOTIONAL IMPACT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Recognize factors that influence the effectiveness of communication or have an impact on the interpretation of information resulting from different cultural or experiential backgrounds of participants.

Evaluate the effectiveness of various communication techniques,

TEACHING/LEARNING STRATEGIES

Have three students volunteer and give each of them a news story or a research report to read in a fixed time period. Then let each of them report the event to the class without using notes, but do not let the volunteers hear each other's reports. Classmates are to compare the three versions of the report for consistency. After all reports are completed, volunteers should be questioned to attempt to account for differences in emphasis, choice of words, emotional responses, interpretation of report, etc.

Invite another professor to lecture the class on a topic chosen by the class. Ask the guest to present materials in a haphazard fashion using a vocabulary not familiar to the students, or using words in ways not familiar to the students. If possible, the speaker should do something at the opening of the talk to alienate the students. Have the students react to this experience.

Have the students demonstrate their ability to analyze a written communication provided by the instructor by (1) identifying and stating the implicit or explicit objectives of the communication; (2) evaluating the organization or structuring of the information; (3) evaluating the vocabulary used in terms of the students' own level of understanding; (4) evaluating the clarity of presentation; (5) identifying and stating the emotional approach used (if any); and (6) evaluating the effectiveness of the communication in terms of the objectives identified by the student.

CONCEPT

COMMUNICATION TECHNIQUES CAN BE EFFECTIVELY UTILIZED TO ACHIEVE STATED OBJECTIVES INDEPENDENT OF WHETHER OR NOT THESE OBJECTIVES WORK FOR THE GREATER GOOD OF MAN AND ENVIRONMENT, OR WHETHER THE INFORMATION COMMUNICATED IS ACCURATE OR USEFUL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify various communication techniques that have both positive and negative implications for community environmental concerns.

TEACHING/LEARNING STRATEGIES

Bring to class three examples of effective communications (advertisements, articles, books, tapes of speeches, etc.) used to achieve undesirable results, from the perspective of the student, for the individual or group to whom the communication was directed. Each student should identify (1) the target audience; (2) the implied or apparent objectives of the communication; (3) the students' evaluation of the possible undesirable results (environmental degradation, maintaining a false corporate or personal image, mind control, dissemination of false or questionable information, etc.) and (4) the communication techniques utilized.

Research government use of communication systems in totalitarian nations such as Nazi Germany or Communist China for evidence that communication techniques can be used to control people.

Investigate the technique used for mind control and brainwashing in North Korean prisons: of war camps to determine whether violence or effective communication techniques were most often used.

Look for advertisements aimed at objectives that will, in the long run, result in greater environmental degradation.

Look for examples of press releases aimed at maintaining personal or corporate images that are not necessarily accurate according to evidence the student can cite.

CONCEPT

TECHNIQUES OF EFFECTIVE COMMUNICATION ARE TOOLS THAT SHOULD BE USED TO MAXIMAL ADVANTAGE IN SEEKING RESOLUTION OF ENVIRONMENTAL PROBLEMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Demonstrate ability to utilize and make maximal use of effective communication techniques.

TEACHING/LEARNING STRATEGIES

Have the students evaluate various courses they have taken in terms of what they have learned about effective communication techniques, considering (1) success in creating (in the target audience) a willingness to attend or receive information; (2) success in terms of meeting stated goals and objectives for the target audience; (3) organization or structuring of information and experiences; (4) clarity of presentation; (5) level of difficulty of materials; and (6) effective impact (modification of values or attitudes).

Monitor local media to identify examples of communications aimed at improving the environment and evaluate them in terms of their apparent effectiveness in achieving implied objectives.

In groups, students should prepare a lesson or presentation to be used with another group of students (at any level--elementary, secondary or college students). Students should devise their own evaluation strategies which may include testing for cognitive gain, observations of the willingness of the target audience to receive the lesson, assessment of whether the lesson was presented at the appropriate level of difficulty, etc.

If possible, students should present the lesson a second time (to a different group) incorporating revised strategies and evaluating the revised lesson.

MEDIA AND THE ENVIRONMENTAlternative #1OVERVIEW

This module stresses the fact that the media must be understood and used to its maximum benefit in dealing with environmental issues. The media play a key role in disseminating information as well as shaping attitudes and values. The media can be utilized either in a beneficial or a detrimental fashion in relation to exposing environmental ideas. It is imperative that environmental education use the media to promote environmental literacy in society.

CONCEPT

CULTURES HAVE DEPENDED UPON EFFECTIVE COMMUNICATION--FIRST UTILIZING SIMPLE MEDIA, THEN DEVELOPING HIGHLY COMPLEX COMMUNICATION SYSTEMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explain and compare the ways several cultures use mass communication in order to influence thoughts, values, attitudes, and actions of their contemporaries.

TEACHING/LEARNING STRATEGIES

Describe the ways the following cultures used mass communications to influence the actions of their contemporaries:

- a. Ancient Egyptians
- b. African Bushmen
- c. Ancient Greek Civilization
- d. Ancient Rome
- e. American Indians
- f. Modern Western Civilization

Graph the number of methods used vs. time and identify those points in time when technology has dramatically increased the effectiveness of communication.

CONCEPT

DIFFERENT SEGMENTS OF SOCIETY HAVE DIFFERING ABILITIES TO BE HEARD THROUGH THE MEDIA BECAUSE OF OUR ECO-POLITICAL POWER STRUCTURE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Explain the different uses, techniques, and influences of contemporary mass communications.

TEACHING/LEARNING STRATEGIES

Describe ways each of the following media might affect behavior:

- a. news telecasts
- b. editorials
- c. periodicals

STUDENT LEARNING OBJECTIVES (Cont'd)

Identify the power of mass media on one's own personal life.

TEACHING/LEARNING STRATEGIES (Cont'd)

Illustrate different propaganda techniques used by advertisers to sell their products.

List specific media sources which have affected the student's personal actions within a week's period of time.

Collect examples of those kinds of information described as "media" and have the students indicate on a clock/time basis the amount of time they have spent with each during a 24 hour period.

CONCEPT

ADEQUATE INTERPRETATION OF ENVIRONMENTAL EVENTS REPORTED THROUGH THE MEDIA REQUIRES INCREASED SOPHISTICATION IF HUMAN VALUES AND BEHAVIOR ARE TO BE MODIFIED IN RELATION TO CHANGING ENVIRONMENTAL NEEDS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Acquire an awareness of the different goals and interests involved in the mass media.

Identify the social, cultural, economic, and political implications of the different segments of society that have varying abilities to be heard through the media because of the present eco-political power structure.

Determine the role and the responsibility of an editor in mass communication modes.

TEACHING/LEARNING STRATEGIES

Given a weekly news magazine, classify each article based on the following systems:

- a. Governmental press release
- b. Corporate press release
- c. Publicity on a public figure
- d. Articles dealing with average individuals
- e. Feature material researched on a given topic by the magazine

Qualify the relative proportion of visibility of different segments of the local society by the environmental news which is presented by the local newspaper or a local radio or TV station monitored for a one week period; i.e., that which is generated by industry, commerce, public agencies, private individuals, editorials. Evaluate the implications from any bias in the environmental news coverage revealed in the above survey.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Editorialize on the pollution of Lake Erie from the following points of view:

- a. a citizen of a community bordering on the lake
- b. a Californian
- c. a person who resides in the British Isles
- d. through the eyes of different people such as the individualist, the student, the sportsman.

CONCEPT

THE MEDIA CAN BE A SIGNIFICANT SOURCE OF SENSORY POLLUTION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the ways mass media interprets environmental events.

Grasp the influence of and the need for an adequate and responsible interpretation of environmental events in order to establish a human response through values and behavior toward man's natural and human environment.

TEACHING/LEARNING STRATEGIES

Bring in material from the daily newspaper assessed to have an influence on improving the environment in their community.

Evaluate a given environmental controversy in the community. Have student group choose a problem and develop a position paper based on a community role assigned them by the group; e.g., writing as president of the Chamber of Commerce, etc.

Critique the presentation of a local environmental problem reported in the newspaper, noting:

- a. objectivity of presentation
- b. probable impact
- c. input

Analyze a major advertising campaign, pointing out positive and negative aspects of the campaign on the environment.

CONCEPT

MEDIA SKILLS CAN BE USED TO BRING ABOUT ENVIRONMENTAL CHANGE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Appraise the media as a significant source of sensory pollution (sound and sight).

Explain the role and the responsibility of the media in nourishing, or establishing a healthy sensorial environment.

TEACHING/LEARNING STRATEGIES

List specific events of sensory/pollution from one media source within one week's time.

Listen to one hour of the total radio programming on one station and evaluate the material presented on the basis of attempted behavioral modification.

Survey a local area and identify 25 specific sources of sensory pollution brought about by communication media, classifying into the general categories deemed appropriate, and obtain a copy of the local sign ordinance for discussion.

CONCEPT

ALL FORMS OF COMMUNICATION (MEDIA) SHOULD BE USED IN RAISING AND RESOLVING ENVIRONMENTAL ISSUES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the potentialities of the media in bringing about environmental changes and fostering ecological values and behavior.

TEACHING/LEARNING STRATEGIES

Write a definition of propaganda.

Plan a media campaign on a current environmental issue in the community stressing:

- a. What media shall be used?
- b. How should it be presented?
- c. Who should sponsor this campaign?

Analyze the role of sensationalism in various newspapers.

Participate in an organized campaign to reduce air pollution.

MEDIA AND THE ENVIRONMENTAlternative #2OVERVIEW

This module deals with the impact the media has on our daily lives. It is virtually impossible to spend very few minutes of any day without some contact with the media. The bombardment of information from magazines, newspapers, TV, signs, etc. influence our attitudes, values and directly affect behavior. Understanding the ramifications of the media in contributing or altering environment problems is the central issue in this module.

CONCEPT

HUMAN SURVIVAL HAS HISTORICALLY DEPENDED UPON MEANINGFUL COMMUNICATION FROM SIMPLE MEDIA TO HIGHLY COMPLEX COMMUNICATION SYSTEMS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand methods by which the cultures used mass communication to influence the actions of their contemporaries.

Identify those sources of information collectively described as "media."

Determine ways media can have an effect on behavior.

Identify specific media sources which have affected personal actions.

Learn to draw inferences about the impact of media on behavior.

Analyze advertising campaigns and identify the positive or negative aspects with regard to environmental impact.

Identify specific sources of "sensory pollution" emanating from communication media (e.g., outdoor advertising, neon signs, loud music, etc.)

TEACHING/LEARNING STRATEGIES

Invite an anthropologist to class to discuss communication techniques in various cultures.

Assume some emergency situation (impending storm or flood, fire, etc.) and role play a warning system between people who cannot communicate verbally with each other.

Bring to class research reports on warning signals and warning systems in animal societies.

Keep a record and indicate on a clock/time basis the number of hours spent (in a specified number of days) in contact with different hours of media (e.g. 12 hours TV, 48 hours radio, 3 hours newspapers, 8 hours other periodicals, etc.) The class should calculate the average number of hours per day spent in contact with media.

Monitor one hour of radio programming at specified intervals (or by dividing the work among a group) and record the number of minutes aimed at behavioral modification (e.g. advertising, messages or advice contained in the words

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

of songs or in editorials, public service announcements). Also record the behavior sought for each case.

Collect advertisement copy for as many ads in a campaign as possible. Consider the consequences of the campaign in terms of factors such as (1) consumer practices, (2) rate of resource depletion, (3) solid waste disposal, (4) environmental degradation at the manufacturing site, etc., or other factors that seem more appropriate.

Survey the community and classify sources of sensory pollution into whatever categories are deemed appropriate.

Research propaganda techniques used by advertisers to sell their products, when provided a set of example materials.

Identify specific events of "sensory pollution" from one media source within one week's time.

CONCEPT

DIFFERENT SEGMENTS OF SOCIETY HAVE DIFFERING ABILITIES TO BE HEARD THROUGH THE MEDIA BECAUSE OF POLITICAL-ECONOMIC POWER STRUCTURES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Select criteria for and develop a classification system to be used to tabulate the relative representation of the views of different segments of society in news articles.

Quantify the relative "visibility" of different segments of the local society as represented in local media (newspaper, radio, TV, etc.)

TEACHING/LEARNING STRATEGIES

Given a weekly news magazine, students should classify, tabulate and calculate the percentage of coverage of viewpoints for groups such as:

- a. government agencies
- b. corporate press releases
- c. publicity or coverage of a public figure
- d. articles dealing with average individuals
- e. viewpoints of special interest groups

STUDENT LEARNING OBJECTIVES (Cont'd)

Identify groups that have been very effective in making their position known through the media.

TEACHING/LEARNING STRATEGIES (Cont'd)

f. "feature" material researched on a given topic by the magazine, etc.

Define criteria to identify "visibility" of selected groups such as minority groups, unions and blue-collar workers, athletic groups, higher social economic groups, conservatives, environmentally concerned individuals or groups, etc. Articles may be simply tabulated in newspapers, or TV and/or radio broadcasts can be monitored for a one-week period (perhaps during class time) and tabulated.

CONCEPT

THE MEDIA HAVE THE ABILITY TO SHAPE PUBLIC OPINION, VALUES AND BEHAVIOR, AS WELL AS POTENTIAL TO SERVE AS A SIGNIFICANT SOURCE OF "SENSORY POLLUTION".

STUDENT LEARNING OBJECTIVES

The student will be able to:

Acquire understanding of the long range impact of environmental sensationalism.

Critique the presentation of a local environmental problem reported in the newspaper.

Recognize discrepant evidence contained in local media presentations of specified environmental problems.

TEACHING/LEARNING STRATEGIES

Gather a set of clippings describing a local environmental problem. It is better to gather them from more than one newspaper, if possible. These clippings should be analyzed in terms of:

- a. evidence of sensationalism
- b. objectivity of presentation
- c. identification of bias (if any)
- d. probable impact of the problem
- e. conflicting opinions as to impact,
- f. shifts in positions by key individuals
- g. the probable conclusions that could be drawn by the public based on these clippings alone.

Choose a problem (such as the pollution of Lake Erie) and write from biased points of view, such as:

- a. a resident in a U.S. community bordering on the lake
- b. a Californian

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES (Cont'd)

- c. a resident in a Canadian community bordering on the lake
- d. a resident of the British Isles or through the eyes of different individuals, such as:
 - a. eco freak
 - b. serious student
 - c. sportsman
 - d. industrialist
 - e. conservationist
 - f. president of the chamber of commerce

CONCEPT

MEDIA SKILLS CAN BE EFFECTIVELY USED TO BRING ABOUT ENVIRONMENTAL CHANGE.

STUDENT LEARNING OBJECTIVES

TEACHING/LEARNING STRATEGIES

The student will be able to:

Identify examples in which media influenced or helped bring about a positive environmental change.

Define the term "responsible media utilization."

Bring in all printed materials from the daily newspaper assessed to have an influence on improving the environment in their community.

Plan and implement, if possible, a media campaign on a current environmental issue in the community:

- a. The media to be used
- b. Strategies to capture the public's attention
- c. How it should be presented
- d. Who should sponsor the campaign
- e. The necessary information to be conveyed by the campaign

Research the fight staged to save the Grand Canyon several years ago. This is an excellent example of massive public response to a media campaign that made the issue highly visible.

Investigate the role played by the students' college in using media skills to seek environmental change.

THE ANTECEDENTS OF CONTEMPORARY PROBLEMS
AND SOLUTIONS IN ECOLOGY

Alternative #1

OVERVIEW

To a considerable degree, many of the other modules deal with antecedents of the problems man now has with his environment, although they deal mainly with the development of specific symptoms of environmental stress or damage. Here we wish to consider the development of some of the root causes of whole sets of environmental problems. We will consider whether the environmental deterioration and resource depletion chronicled elsewhere is primarily the result of population pressures; of runaway technology; of exploitative philosophy; or possibly of some combination of these factors.

While this module ostensibly deals with antecedents of both the problems and solutions, emphasis is given to antecedents of the problems. This is true because it would seem necessary to have a rather thorough understanding of the problems and their history before even contemplating solutions. Further, there is very little history of solutions since only recently have they even been suggested, few solutions have been attempted, and still fewer properly evaluated.

CONCEPT

ENVIRONMENTAL DEGRADATION AND RESOURCE DEPLETION HAVE BEEN CUMULATIVE OVER TIME BUT BOTH APPEAR TO HAVE BECOME MUCH WORSE IN THE LAST FEW DECADES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the rate of depletion of resources and the extent of environmental degradation from past to present.

TEACHING/LEARNING STRATEGIES

Either by use of a graph, a copy of some article in a newspaper or magazine, or by your own prose, describe the depletion of some natural resource over time; e.g., passenger pigeons, copper, tin, natural gas, hardwood forests, etc.

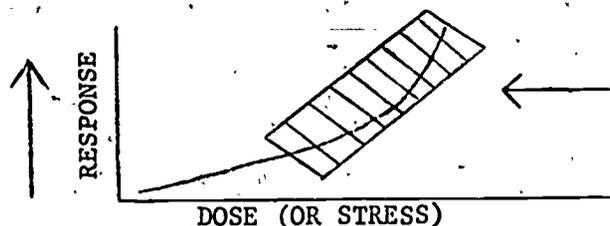
By talking to a native of your area who has lived there 50 years or more, determine what environmental conditions (by his or her value system) have been degraded in his lifetime. Tape-record your interview if possible, or even better, make arrangements to bring him to your class to tell his story in person. You may be surprised at how interesting a person is who has lived in the same area for 50 years or more.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Conduct a class debate on the following topic: Do you think environmental degradation in your area has been cumulative and more serious over the years, or is it just better reported now than heretofore?

CONCEPT

THE EXACERBATION OF ENVIRONMENTAL PROBLEMS MAY BE SIMPLY THE REFLECTION OF A DOSE (OR STRESS) RESPONSE CURVE FAMILIAR TO BIOLOGISTS AND PHYSICIANS. THAT IS, THE ENVIRONMENT MAY HAVE BEEN ABLE TO ABSORB REPEATED STRESSES WITH RELATIVELY LITTLE RESPONSE UNTIL THE CUMULATIVE STRESSES FINALLY BECAME SO LARGE THAT THE ABILITY TO ADJUST TO STRESS BEGAN TO BE OVERWHELMED. SUCH A DOSE-RESPONSE CURVE LOOKS LIKE THIS:



Is this where we are now for many of our environmental problems?

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand classic relationship between dose (or stress) and response.

Discuss some of the factors contributing to stability (resistance to stress) in an ecosystem.

Consider where we may now be on the stress-response curve for certain stressed environments.

TEACHING/LEARNING STRATEGIES

From a biology teacher, textbook, science encyclopedia or other source, obtain a dose-response curve and copy it. (You may need to look under such headings as sigmoid curve, threshold, LD₅₀.) Compare this curve with some environmentally significant phenomena, such as the effect of added nutrients on eutrophication of a body of water.

List factors which contribute to the stability or instability of an ecosystem.

Conduct a group discussion on the following topic: Do you regard a large field of corn as a stable ecosystem? How about a square mile of planted slash pines in a tree farm? Why?

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Look about you and see if you can pick some aspect of the environment that is showing sharply increased signs of stress (such as sharply decreased supply of game fish in a local body of water) in recent times. What stress seems to be causing the stress-symptoms? Have the symptoms increased in proportion or out of proportion to the increase in stress? Approximately where on the stress-response curve does this system appear to be at present? Present any ideas you may have (even "wild blue yonder" ones) for relieving the stress and/or for restoring the stressed environment.

CONCEPT

DEMANDS OF INCREASED POPULATION HAVE BEEN A MAJOR CAUSE OF ENVIRONMENTAL STRESS AND RESOURCE DEPLETION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand the ramifications of population trends from historic times to the present.

Determine the role of population increase in demands for certain resources as well as certain products or services that place added stress on the environment.

Project the increase in demands for resources caused by projected population increases 50 or more years hence.

TEACHING/LEARNING STRATEGIES

What approximate fraction of all people who have lived in the last 10,000 years is represented by those living in the period 1870-1970? Comment on the significance of this to depletion of natural resources.

Ask your local electric company for their data on past trends and future projections for their service area with respect to the following:

- a. population
- b. power production (or demand); calculate "doubling time."
- c. per capita power consumption

With such data in hand, calculate what fraction of the increased power demand (over some time interval such as the last ten years) was due to an increase in population. By difference, you can calculate what fraction of the increase is due to other factors.

The Antecedents of Contemporary
Problems and Solutions in Ecology

Alternative #1

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Using data such as that stated above, project the power consumption that would be required 50 years hence and 10 doubling times hence. Use the current doubling time for such projections.

CONCEPT

TECHNOLOGICAL ADVANCES OF THE LAST FEW DECADES HAVE CAUSED ADDITIONAL DRAINS ON RESOURCES AND ALSO ADDED STRESSES ON THE ENVIRONMENT IN A NUMBER OF CASES.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Evaluate the effects of certain recent technological advances on environmental degradation and on the supply of natural resources. The students should read the opinions of experts on this subject.

TEACHING/LEARNING STRATEGIES

Conduct a debate on the often-repeated statement "While we may have some problems with ecology (or pollution, or the environment, etc.) now, we surely can fix it if we just apply our technology." (This has been dubbed "the technological quick-fix argument" by its detractors.)

CONCEPT

OUR VALUE SYSTEM WHICH EQUATES "MORE" WITH "BETTER," DEPLETES RESOURCES AND ADDS STRESS ON THE ENVIRONMENT.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine value judgments on a number of currently held beliefs with ecological significance such as "more is better"; the "growth ethic"; "development"; etc.

TEACHING/LEARNING STRATEGIES

Have the class discuss one or more of the following from the standpoint of costs, benefits (short and long-term), and ecological effects.

- a. "Growth vs. no growth." This may be with reference to population, Gross National Product, or other factors.
- b. "Development" vs. natural areas.
- c. "More equals better."

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

- d. "What this city needs is more high-ways" vs. "What this city needs is more mass transit."
- e. "A swamp is wasteland" vs. "swamp can perform valuable services to society."

CONCEPT

THE COURSE OF ACTION WHICH OFTEN WILL MAXIMIZE SHORT-RUN PROFITS WILL ALSO LIKELY MAXIMIZE ENVIRONMENTAL DEGRADATION.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Examine the validity of the notion that maximization of short-run profits often also maximizes environmental damage, a notion eloquently developed in the classic essay "The Tragedy of the Commons", in Population, Evaluation, and Birth Control.

TEACHING/LEARNING STRATEGIES

Describe some examples that would support or refute the idea that maximization of short-run profits to individuals or corporations also maximizes environmental damage; i.e., minimizes long-range benefits to society. For example, try strip mining or muck farming practices that give two or three crops a year, but remove the soil to bedrock in less than a century.

CONCEPT

MAN'S ATTITUDE TOWARD THE ENVIRONMENT MUST REFLECT A COMMITMENT TOWARD PRESERVATION AND ENCOMPASS RESPECT FOR NATURAL SURROUNDINGS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Review man's perception of the place of man and animals in the scheme of things important to him.

Examine the evaluation of man's attitudes toward wilderness.

TEACHING/LEARNING STRATEGIES

From your recollection of accounts of pioneer life, compare the attitude then toward wilderness and the creatures in it with those now found in publications of the Audubon Society or Sierra Club.

Quote passages from the Holy writings of your religion which detail a view of

STUDENT LEARNING OBJECTIVES (Cont'd)

Develop an understanding of the emerging view of man's relation to nature covered by the term "stewardship."

TEACHING/LEARNING STRATEGIES (Cont'd)

man's relation to the earth or to animals and plants on it; i.e., a religious view of man's ecological role.

If you were given a piece of land to hold and use as long as you exercised wise stewardship of the land, how might your use of the land differ from your use of a similar piece of land that you owned outright.

CONCEPT

MUCH OF OUR CONSERVATION EFFORT HAS BEEN DIRECTED TOWARD CONSERVING PRIMARILY PARTS OF THE NATURAL WORLD TO WHICH WE HAVE ASSIGNED A HIGH VALUE AT A PARTICULAR TIME, IGNORING ECOLOGICAL ROLES IN NATURE. HOLISTIC CONSERVATION LOOKS AT THE NATURAL WORLD FIRST AS A FUNCTIONING WHOLE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Understand types of conservation efforts.

- a. Resource conservation (sometimes called extractive conservation).
- b. Holistic conservation.
(Excellent discussion of this concept can be found in Conserving Life on Earth by David W. Ehrenfeld, Oxford University Press, N.Y. 1972, pp 8-23.)

Recognize some aspects of current ecological problems and suggested solutions in considerable depth through reading one or more classic works by such "idea people" as: Rachel Carson, Barry Commoner, David Ehrenfeld, Paul Ehrlich, Jay Forrester, Garrett Hardin, Aldo Leopold, Ian McHarg.

TEACHING/LEARNING STRATEGIES

As a class, discuss whether the term "conservation of resources", as you understand it, includes consideration of conservation of ecosystems.

What does the word "holistic" mean? Would holistic conservation include the conservation of functioning ecosystems?

Have the students read one or more classic essays in the field of the history of environmental problems and their proposed solutions.

RESPONSIBILITY TO FUTURE GENERATIONSAlternative #1OVERVIEW

In some ways this module should have been the first rather than the last in the curriculum, since it is intended to encourage a long-range look at man and his environment. Such a perspective may greatly change how we view many current practices and conditions. For example, the present rate of increase of electric power production, if extrapolated for less than a century, becomes an absurdity; the rate of use of non-renewable resources by the U.S. becomes unconscionable; and their use at continually increasing rates in the world may well be catastrophic in the same time period. One's view of such diverse topics as irrigation, muck farming, the ocean as a limitless sink for pollutants, highways, and the personal automobile, may well switch from positive to negative as the time perspective lengthens.

Of course, the ultimate time bomb already ticking and ready to go off is man himself, or more correctly, his numbers. The population explosion, when extrapolated over an extended time and when coupled with the natural resource problems similarly extrapolated, becomes of such transcendent importance that many experts on man and the environment would feel consideration of it should be woven into nearly every module.

CONCEPT

THE PRINCIPLE OF STEWARDSHIP MUST BE EMPHASIZED TO INSURE ENVIRONMENTAL QUALITY FOR THE FUTURE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Examine his own value judgments to consider the following:

- a. What environmental values he would most like to conserve for his grandchildren.
- b. Which one or several of these cherished items he views as most threatened in the future.
- c. What positive action(s) he might take or persuade others to take to show the rate of destruction of areas or features of the environment he cherishes.

TEACHING/LEARNING STRATEGIES

Describe what kinds of environmental values you would most like to conserve for your grandchildren; e.g., clean public beaches, wilderness, free-flowing clean rivers, certain national parks, good fishing, public green spaces in your city, etc.

Which of the types of cherished environmental values or areas described do you feel is most threatened; i.e., which are least likely still to be available by the time your grandchildren need them? Why? What is the threat?

Discuss the positive action(s) you as an individual can take to show the rate

STUDENT LEARNING OBJECTIVES (Cont'd)

- d. Whether the phrase "I am my brother's keeper" has relevance to his life.

TEACHING/LEARNING STRATEGIES (Cont'd)

of destruction of one or more of your cherished environmental values; e.g., become active member of some conservation organization, do some work in the politics of the environment, attend and participate in a public hearing related to some environmental issue, etc.

Do you think the phrase "I am my brother's keeper" has an application to issues discussed in Man and Environment? Explain.

What does the term "stewardship" mean when applied to your use of natural resources or of natural areas?

If you think you are a good steward in some area of the environment, explain how this is so. (Brag a little.)

If you know of some way in which you are being wasteful of natural resources or natural areas, discuss this too. (Confess a little.)

CONCEPT

A FALLACY EXISTS IN THE BELIEF THAT GROWTH IS SYNONYMOUS WITH PROGRESS AND IS AUTOMATICALLY GOOD.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Comprehend the arithmetic of exponential and linear growth with various parameters of the population expansion.

Understand the concept of doubling time.

Extrapolate growth rates and doubling times over long time periods.

TEACHING/LEARNING STRATEGIES

Describe the difference between linear and exponential growth. Which term describes human population growth?

At the current rate of population increase, how long will it take to double the population; i.e., what is the doubling time of:

- a. your state
- b. the USA
- c. the world

STUDENT LEARNING OBJECTIVES (Cont'd)

Investigate the doubling times for some environmentally significant activities.

Comment on the American growth ethic.

TEACHING/LEARNING STRATEGIES (Cont'd)

If the doubling time for electrical power production is eight years, how much more power would have to be produced in 80 years than is now produced?

For certain states, countries, and the world, give the current doubling time for:

- a. population
- b. electric power production
- c. fossil fuel consumption
- d. other resources

Communicate with a large electric utility company in your state, or with the state public service commission (or utilities board) to find out both the doubling time for electric power production in their jurisdictional area and the location of the major generating plants in this area.

On a suitable map, place colored dots to show the location of the generating plants described in the above. Notice whether they seem to be concentrated along some waterway (seacoast, coast of a Great Lake, or along major rivers). Think about how this map would look if you were putting in the dots after 7 or 10 doubling times.

Select one of the waterways now having a concentration of power plants along it, and calculate how long it would take before this waterway would have "wall to wall" power plants; i.e., how long before they will be continuous along the waterway. Use the following more or less arbitrary assumptions on your calculations:

- a. The doubling item for power production is ten years.
- b. The average size of power plant properties (including also fuel storage, security area, roadways, etc.) is 1000 by 1000 feet.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

- c. Make some assumption about the trend in average generating capacity per plant; i.e., it stays the same, or say it will be two times or five times as large as at present.

As an alternate to the calculations in the above, obtain data from an appropriate local government on the present population and growth rate of your metropolitan area. Calculate how long it will take before your metropolitan area will cover your entire state.

CONCEPT

SHARP CHANGES IN LIFE STYLES, VALUE SYSTEMS, ATTITUDES, AND HUMAN NUMBERS MUST OCCUR IN THE FUTURE IF CIVILIZATION IS TO AVOID DISASTER.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Consider life styles now espoused that may be forced to change over long time periods.

Examine evidence of thought about the relation of material possessions, rate of profit return, our current reward system, and some of our rate structures to environmental degradation.

Examine attitudes of his peers on environmental issues, and evaluate the possible need for change.

Review his own attitudes on factors related to the population explosion.

TEACHING/LEARNING STRATEGIES

Obtain literature from a local or state chamber of commerce, and study it in relation to their position on growth.

Compare and contrast the growth ethic that has dominated the U.S. with various population control groups.

CONCEPT

ALTHOUGH MOST EXPERTS BELIEVE WE HAVE A RELATIVELY SHORT TIME TO GET OUR NUMBERS AND OUR ENVIRONMENTAL HOUSE IN ORDER, THERE IS A LACK OF AGREEMENT AS TO HOW SHORT THE TIME IS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Become familiar with:

- a. The views of experts on what seem to be the most critical environmental issues of the future.
- b. The predictions and the basis for the predictions of the rate we are approaching criticalness in certain environmental (or population) problems.
- c. Some of the literature on growth and its consequences.

TEACHING/LEARNING STRATEGIES

Have students read a few landmark articles on what might be called "the time table to disaster"; i.e., articles that discuss how long certain resources can be expected to last, or how long before we are engulfed by our own numbers. Review in some depth the one you find most believable.

Present to the class changes in life styles, etc., that you think might slow the approach to disaster.

RESPONSIBILITY TO FUTURE GENERATIONS

Alternative #2

OVERVIEW

This module is designed to deepen the right meaning of environmental responsibility. The main task of this module, therefore, does not consist in summarizing or reviewing the content of this course in environmental studies but rather in enabling the student to clarify the most crucial implications of the environmental crisis--the threat to man's survival and man's accountability to future generations.

Both the quality of life in general, and the survival of man in particular, are threatened by the destruction of the balance between man and nature. The very survival of man is at stake. Today man has the knowledge and the power to protect or to destroy not just the quality but the very life of mankind as such. It seems that man has gained the knowledge enabling him to make environmental decisions. The problem, however, consists in that man also needs to acquire the wisdom and courage that allow him to make his human and environmental decisions be responsive to the present and the future generations.

The environmental responsibility of man extends not just to the living of today but also to those of tomorrow. A genuine environmental responsibility enlarges our horizons of both space and time; however, the key to the future lies in our concern with the present. We can be responsible to future generations only through becoming responsible to the present generation.

CONCEPT

THE ENVIRONMENTAL CRISIS INVOLVES THE THREAT TO MAN'S SURVIVAL.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Develop an awareness of the seriousness of the environmental crisis.

Describe what will happen if air pollution is not controlled.

Project how the very survival of mankind is being threatened through the lack of serious environmental concern.

TEACHING/LEARNING STRATEGIES

Write an essay (to be submitted for publication in the local newspaper) on the seriousness of the environmental crisis with special emphasis on the real threat to man's survival.

Give examples of the ways the quality of human life has deteriorated in his city during the last six years, using public records, newspapers, etc.

STUDENT LEARNING OBJECTIVES (Cont'd)

Explain what will happen in fifty years if the present growth of noise pollution continues in the inner city and other populated areas.

Promote a universal concern for the quality and the future of life on this earth.

TEACHING/LEARNING STRATEGIES (Cont'd)

List five examples of the deterioration of plant life due to air pollution.

CONCEPT

THE QUALITY OF LIFE AND THE SURVIVAL OF MANKIND ARE THREATENED BY THE DISRUPTION OF THE BALANCE BETWEEN MAN AND NATURE.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the basic causes of the environmental crisis.

Determine the disruption of harmony and how the balance between man and nature can destroy the future of man and the quality of life.

Identify proposals designed to protect and enhance the quality of life of the present generation and of generations to come.

TEACHING/LEARNING STRATEGIES

Prepare a list of basic facts showing the seriousness of the environmental crisis. Explain the consequences of these facts for the future of man.

Research and list four examples of the disruption of the balance between man and nature.

Give examples of water pollution endangering the quality of human and animal life.

Prepare a speech to describe how to protect the ecological balance of specific areas.

Function as a group member to discuss the dilemma of man's survival versus non-survival; each group will prepare a basic proposal to enhance the chances of man's survival.

CONCEPT

MAN'S SURVIVAL CANNOT BE THE RESULT OF ENVIRONMENTAL KNOWLEDGE AND TECHNOLOGY ALONE, BUT RATHER THE FRUIT OF WISDOM AND COURAGE THAT MAKES MAN RESPONSIVE TO THE PRESENT AND FUTURE GENERATIONS OF MAN.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Identify the different dimensions of environmental responsibility.

Understand that a responsible environmental decision affecting the future of man cannot be the result of environmental knowledge alone.

TEACHING/LEARNING STRATEGIES

List examples of the international dimensions of the environmental crisis.

Prepare a short essay on the ways political antagonism between nations endangers the quality of human life and enhances the destruction of mankind.

Compile a list of personal responsibilities to future generations.

Discuss in a group the role of social and political action in protecting the quality of all life and especially man's survival.

List examples of the individual's genetic responsibility to future generations.

Research the role of mass media in promoting environmental responsibility to future generations.

Determine three examples of environmentally unconcerned decisions made by professionals.

CONCEPT

A GENUINE ENVIRONMENTAL RESPONSIBILITY ENLARGES THE HORIZONS OF SPACE AND TIME OF BOTH GROUPS AND INDIVIDUALS.

STUDENT LEARNING OBJECTIVES

The student will be able to:

Determine the ways a genuine environmental concern enlarges the horizons of space and time of both the individual and the group.

TEACHING/LEARNING STRATEGIES

Survey how people litter the streets and project their reasons for littering.

Draw a picture illustrating the effects of smoking one cigarette in a non-smoking group of people.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES (Cont'd)

Discuss and illustrate the ways the smoker needs to enlarge his horizons of space and time if he decides to quit smoking.

List three prejudices which prevent people from taking the environmental crisis seriously.

Describe to the class what the students can do in their own home to promote responsibility to future generations.

CONCEPT

MAN MUST ENLARGE HIS RESPONSIBILITY TO FUTURE GENERATIONS THROUGH FULFILLING HIS RESPONSIBILITY TOWARD HIMSELF AND TOWARD HIS IMMEDIATE CHILDREN.

STUDENT LEARNING OBJECTIVESTEACHING/LEARNING STRATEGIES

The student will be able to:

Understand the responsibility to future generations in the proper perspective.

Determine and project the practical implications of man's responsibility to future generations.

Grasp that man's first obligation and responsibility consist in fulfilling his responsibility to his own children, and through them he can fulfill his responsibility to future generations. Man cannot be responsible for the tomorrow if he is not responsible for the today here and now.

List examples of what man can do within the next two months in order to enhance the quality of life for the future of his children.

Chart and explain three examples of water pollution which endanger man's survival.

Illustrate what he can do in order to prevent scenic pollution in the year 2001.