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ABSTRACT

This guide was written to aid the organization of an adult education course on the environment. Each of the ten sessions in the guide is an independent unit--to be used as such or to be interchanged with other sessions. Topics or units are titled: Environmental Quality--Everyone's Responsibility; Land and Space Resources; Population Stress and Its Implication; Energy Needs of Society; Production--Consumption Patterns; Perspective on Pollution; Food and Fiber; Water Resource Management for All; Cultural and Recreational Needs; and Environmental Quality for You. Each unit is composed of four parts: (1) objectives--behavioral objectives developed to give direction to the session, (2) background information--a brief textual statement designed as a point of departure for classroom presentations and discussions, (3) teaching activity--a different type of teaching technique for each session, designed to involve the class in discussion of environmental areas of concern and to seek possible solutions, and (4) references. In addition, a list of general course objectives and a bibliography related to natural resources and environment are provided. (EL)

ENVIRONMENTAL QUALITY AND THE CITIZEN

A Teaching Guide for Adult Education Courses Related to the Environment

This guide was produced under Public Law 91-516 through a grant to the Soil Conservation Society of America

ENVIRONMENTAL QUALITY AND THE CITIZEN

A Teaching Guide for Adult Education Courses Related to the Environment

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Contents

Preface

This guide was written to aid the organization of an adult education course on environment. We have made no attempt to write a textbook. We believe the course should make use of local information, supplemented by a variety of references.

The guide has been developed under the general direction of the Soil Conservation Society of America, an organization of 15,000 members, with active chapters in all states and members in most countries. Members of the Society hopefully will make themselves available as advisors or instructors for certain lessons.

Each of the 10 sessions in the guide is an independent unit — to be used as such or to be interchanged with other sessions. Additional sessions can be developed for a particular situation wherever the instructor wishes.

Each session has four parts:

1. Behavioral objectives developed to give direction to the session.
2. A brief textual statement designed as a point of departure for classroom presentations and discussions.
3. A different type of teaching technique developed for each session. Instructors may adopt such techniques for any of the sessions, or they may replace them with techniques of their own. The various techniques are designed to involve the class in discussion of environmental areas of concern and to seek possible solutions. If possible, class field trips should be taken to observe local environmental conditions. Individual observations should be encouraged.
4. References are provided for participants who desire additional information. The references are not classic textbooks, but general extensions of the topics. A key reference for the course should be the local newspaper.

As a general reference textbook for the course, we suggest the following: Foster, Phillip W. 1972. *Introduction to Environmental Science.* Learning Systems Company, Homewood, Illinois 60430.

We suggest that an advisory group be established to help the instructor identify local problems and obtain local information. The advisory group should be representative of those in the local area who have special knowledge in one or more of the topics to be included in the course. There is no need for one instructor to handle all teaching responsibilities. In fact, use of local resource people, from federal and state agencies, local government, and the general public is recommended. We visualize beginning each class with a 30-minute presentation to set the stage for informed discussion.

The session moderator or instructor may or may not be an educator, but he or she should be capable of leading group discussion. There is little possibility that the moderator or instructor will be knowledgeable in all subject areas to be covered. However, a certain creditability on the part of this individual in at least one subject area would be useful in promoting the course.

The adult education program administrator, advisory group, and moderators no doubt will want to promote the course by publicizing its content, objectives, and the presentations to be made. These promotional efforts and the invitations to participate must be tailored by the advisory group to fit a community's needs.

The instructor should make participants aware of the continuing education possibilities through membership in organizations and involvement in outdoor hobbies. Participants may well wish to conduct some special projects on their own to increase their learning and experience both during and after the course. A list of possible individual activities might include:

1. Wildflower or wildlife photography.
2. Plant or tree identification.
3. Membership in a civic organization.

4. Hunting and fishing.
5. Vegetable and/or flower gardening.
6. Membership in a garden club.
7. Skiing, hiking, or canoeing.
8. Membership in a conservation organization.
9. Active participation in local government as it affects environmental affairs (city council, parent-teacher organization, etc.).
10. Membership in local historical society.

Persons providing outside assistance will probably find the session objectives and background text useful in preparing their presentation and discussion materials. Users are authorized to reproduce the materials herein.

Bernard L. Clausen and Ross L. Iverson

Course Objectives

Upon completion of the course, participants should:

1. Be aware of their role as citizens in maintaining environmental quality.

2. Exhibit skill in evaluating various proposals relating to management of the environment, thus enabling them to effectively and intelligently assist in making private and public policy decisions.

3. Express increased interest in, and knowledge of, problems in the following areas of environmental concern:
   a. Land resources
   b. Water resources
   c. Population growth
   d. Production of food and fiber
   e. Pollution
   f. Recreation
   g. Energy systems
   h. Quality environment

4. Be able to analyze individual social, economic, political, and cultural values and goals toward the development of a conservation ethic.


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SESSION 1

Introduction: Environmental Quality —Everyone's Responsibility

Objectives

1. To describe general attitudes of the past toward man's effect on the environment and the environment's effect on man and to describe specific changes in America's environment since its discovery in 1492.
2. To list those items generally included under the topic of environmental studies.
3. To identify various attitudes of fellow participants and their role in the environment.
4. To develop an appreciation of, and interest in, the need for, and value of, good conservation and management of renewable natural resources.
5. To interact in group discussion with other participants.

Background Information

Throughout history, man has used the resources of his environment to sustain life and perpetuate his culture. Primitive man was few in numbers, with limited culture and technology. His physical and biological needs were met in competition with other organisms. As he learned to use tools and fire, he began to gain the upper hand over these organisms.

For thousands of years after man learned to use basic tools and fi[illegible]l societies and culture remained primarily agrarian. In 1798 Thomas Malth[illegible]redicted that starvation and disease would limit human population growth. However, Malthus failed to foresee the industrial revolution and the application of technological advances to agriculture and medicine, which brought about longer life spans and a means for a greater portion of the populus to leave the agrarian work-force. As societies became less dependent on agriculture as a way of life, more and more people were free to find jobs in manufacturing or to provide services to the remainder of the population.

The immigrants who established permanent settlements in North America in the early 1600s had to carve a place for themselves in a seemingly unlimited and inhospitable wilderness. What had been a heretofore undisturbed environment was now "invaded," in a sense, by a European culture—and a new system of democracy with individual freedom and private ownership of land. Strikingly different from the existing Indian population, the immigrants were engaged in building a nation. On the basis of their culture, they used the abundant resources found on the North American continent to develop and build a new country.

During the years that followed, the only resource in short supply was the human resource. No one could imagine a day when the continent's abundant natural resources might be in short supply.

Today the frontiers are gone. Each state and each community has a limited amount of land and resources with which to support a given life style and culture for the existing population. Most problems concerning the environment relate to matters of land use. Patterns in nature are built around cycles: the mineral cycle, the water cycle, the oxygen cycle, the carbon cycle, the food production-composition-decomposition cycle, the population cycle, the disease cycle, and so on. Man has entered into the cycle of nature, manipulating each to accomplish a given end. In recent years considerable concern has been expressed for environmental and aesthetic values, a view previously neglected.

We presently have the technology to solve most environmental problems, once defined. The real task is defining so many of the problems.

Teaching Activity

The first session presumably will be introduced by the instructor and the administrative details and course objectives will be presented. The instructor should summarize environmental concerns in the community in which the course is being offered and relate these to state and national responsibilties.

Following this brief presentation, divide the class into discussion groups of 10 to 15 people. Once participants have given their name, occupation, areas of interest in the environment, and reason for enrolling in the class, turn the class's attention to the first question below.

Put this and subsequent questions to the class one at a time. The questions should bring participants, through the three-step sequence of discussion, to an awareness of the complexities of environmental issues that will be taken up in future sessions of the course. Interrupt discussion after 15 minutes and pose the next question. Do not attempt to lead discussion. Allow each group to develop its own leadership and interaction. The discussion will raise more questions than are answered, thus serving as an introductory and stimulator activity.

Question 1. What is your definition of pollution?

Good as an opener, this question can be taken on a nonpersonal basis, as participants are just getting to know each other. The group should try to develop a definition on which all members can agree. The question no doubt will bring out differences of opinion on what constitutes pollution. For example, how much smoke is harmful to what and whom? How polluting is white smoke as opposed to red or black smoke? Or, is perfume a pollutant?

Question 2. What land uses would you find objectionable within a few blocks of your home?

This question brings quality and value judgments to the immediate concern of each participant. It should start the groups toward developing their own concepts of environmental quality in specific terms. Undoubtedly, the question of what to do with land uses they don't want close to home will come up.

Question 3. How should water be divided among competing uses if it is in short supply?

The instructor may change this question to apply to a resource that has been in short supply locally. It could be water, fuel oil, gasoline, land, or any other resource. The question should create an awareness among participants of the need for trade-offs and compromises in establishing priorities for resource use. The discussion will bring out different political and economic arguments.

Remember that each of the three discussions above is to last only 15 minutes. Discussions will likely be just getting interesting when they must stop. Following the last discussion, call the whole class together to remind participants that the remainder of the course will be spent on these and other topics.

REFERENCES

1. Bates, Marston. 1960. *Forest and the sea.* Random House, New York, New York.
2. Brubaker, Sterling. 1972. *To live on earth.* Johns Hopkins Press, Baltimore, Maryland.
3. Commoner, Barry. 1971. *The closing circle.* Alfred A. Knopf, New York, New York.
4. Cooper, Charles F. 1970. *Man's impact on the biosphere.* Journal of Soil and Water Conservation 25(4): 124-127.
5. Pearson, Norman. 1971. *Environmental turning points in time.* Journal of Soil and Water Conservation 26(2): 70-72.
6. Soil Conservation Society of America. 1970. *Resource conservation glossary.* Ankeny, Iowa.
7. Storer, John. 1956. *The web of life.* Signet, New York, New York.
8. Timmons, John F., et al. *National land use policy . . . A special reprint from the Journal of Soil and Water Conservation.* Soil Conservation Society of America, Ankeny, Iowa.

SESSION 2

Land and Space Resources

Objectives

1. To list essential uses of land.
2. To list physical factors that affect land capability for agriculture, urban, and other uses.
3. To tell why land use capabilities should not be exceeded.
4. To determine how nonphysical factors such as (1) adjacent land use, (2) economic considerations, (3) ownership attitudes and philosophy, and (4) other social and political factors affect land use.
5. To relate land capability and land use to soil type, topography, natural hazards, and ecosystem stability.
6. To understand present restrictions on land use as imposed by various levels of government; to consider factors involved when land use changes are proposed; and to relate present land use to possible future policy.
7. To develop an understanding of, and an interest in, the concept of open space and its place in our culture, society, and environment.

Background Information

Man needs space to work, live, and play. Society needs space for food and fiber production, resource extraction, production of goods and services, waste disposal, transportation, and many other uses. An increase in population increases demand for food and fiber, energy, goods and services, and, subsequently, land. As land resources become limited, man must determine use priorities.

Not all land is equally capable of supporting different uses. Land varies in biological productivity, water absorbing capacity, erosion susceptability, and physical ability to support structures. Land capability has been determined by climate, geological conditions, and soil formation processes. Man can increase the capabilities of land if he spends money and energy to develop or maintain the resource.

Nonphysical factors also affect the use of land — esthetic value, political pressure, population concentration, standard of living. A combination of values, based on these factors, will generally be used in obtaining priorities that will determine the use of any given parcel of land. As is the case with any resource, the controls and guidelines regarding its use become more stringent as it decreases in quantity, and availability.

(The instructor should be familiar with the Standard Soil Surveys available for most communities. He should also be familiar with the classification system used by the U.S. Department of Agriculture's Soil Conservation Service to classify land for productive purposes.)

Land ownership generally includes air rights, surface rights, vegetation rights, mineral rights, water rights, and development rights, all of which may be sold or leased separately. Land ownership not only involves rights but responsibilities. The manner in which a specific acre is used and managed may have far reaching effects. Zoning, environmental corridors, tax structure, and building codes are techniques designed to establish priorities for allocating land among competing uses and to protect individual land owners from unexpected changes.

Variety in land use avoids monotony, decreases hazards of ecosystem oversimplification, and increases environmental quality. Aside from recreational values, open space and natural areas are considered important land uses.

Teaching Activity

The following suggested class activity relating to the location of a packing plant is designed to develop interest and participation of the enrollee in a community problem. The map, key, and other material may be reproduced for use by the student. It may be desirable to use an industry different than a packing plant — an industry more local in nature — such as a pulp mill, alfalfa dehydrating plant, food processing, factory, power plant siting, etc.

Where do you put the packing plant?

A major meat processor has indicated he would like to build a plant in your community. Even though it will be a modern plant, there will still be some smells associated with it that you might find unpleasant. The prevailing winds are west-north-westerly. Refer to the map and key herewith and select the ideal location for the plant. Be able to give some reason for putting it where you do.

The following land-capability classes have been established by the U.S. Department of Agriculture and are referred to in the problem. Additional information on land-capability classes can be secured from any office of the Soil Conservation Service.

Land suitable for regular cultivation and other uses

Class I — These soils have few or no conditions that limit their use. They can be safely cultivated without special conservation treatment.

Class II — These soils have some natural condition that limits the kinds of plants they can produce or that calls for some easily applied conservation practice when they are cultivated.

Class III — These soils have more serious or more numerous limitations than those in Class II. The limitations may be natural ones — such as steep slope, sandy or shallow soil, or too little or too much water. Or the limitation may be erosion brought on by the way the land has been used.

Land suitable for occasional cultivation and for other uses

Class IV — These soils have very severe limitations that restrict the kinds of plants they can grow. If cultivated, they require very careful management. In humid areas, they are suitable for occasional but not regular cultivation; in subhumid and semiarid areas, crops fail in low-rainfall years.

Land generally not suitable for cultivation but suitable for other uses

Class V — These soils have little or no erosion hazard but have some condition impractical to remove that limits their use largely to pasture, range, woodland, recreation, water supply, or wildlife food and cover.

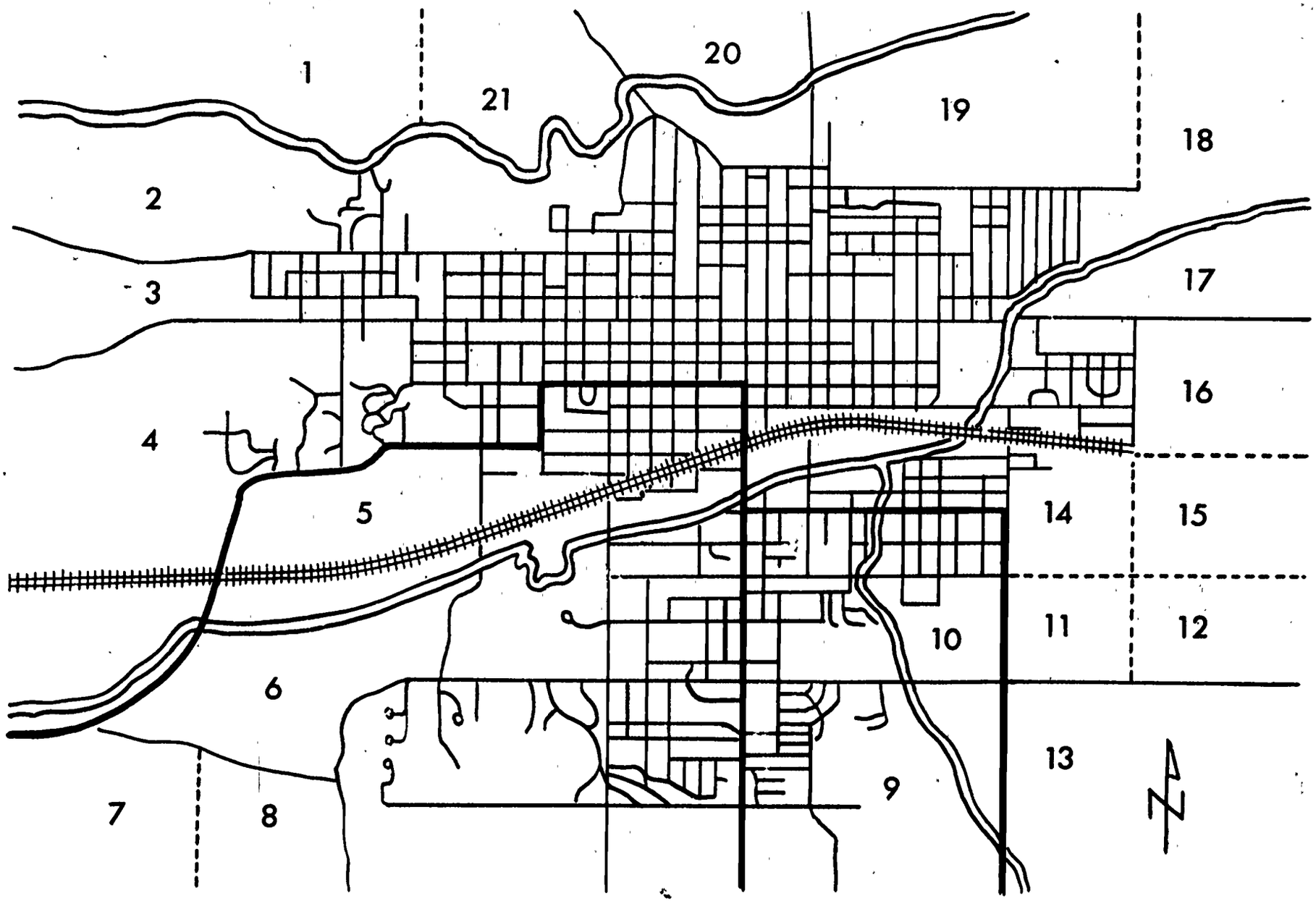
Class VI — These soils have severe limitations that make them generally unsuited for cultivation and restrict their use largely to pasture, range, woodland, recreation, water supply, or wildlife food and cover.

Class VII — These soils have very severe limitations that make them unsuited for cultivation and that restrict their use to pasture, range, woodland, recreation, water supply, or wildlife food and cover with careful management.

Class VIII — These soils and land forms have limitations that prevent their use for commercial plant production and that restrict their use to recreation, water supply, or wildlife food and cover with careful protection.

KEY

1. Agricultural class II & III, not readily accessible, subject to flooding, owned by Mr. A.
2. Agricultural class I & II, easy access, half is low and subject to flooding, owned by Mr. B.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3. Agricultural, well-drained, Construction Company C holds an option.
4. Part agricultural class I, part under development with single-unit dwellings, option held by C.
5. Owned by Mr. D as part of a family estate, highway frontage is developed in large single-unit dwellings.
6. Agricultural, Construction Company E holds option.
7. Agricultural class I, owned by Farmer F.
8. Agricultural, Contractor G holds option.
9. Under development with apartments and single-family units by Contractor G.
10. Agricultural class III, owned by Mr. H.
11. Agricultural class III, owned by Mr. I.
12. Agricultural class I & II, owned by Mr. J.
13. County-owned fairgrounds and some development of small-single unit dwellings.
14. Agricultural class II, owned by Mr. K.
15. Agricultural class I, owned by Mr. K, under option to Company C.
16. Agricultural class III, subject to flooding, owned by Mr. L.
17. Agricultural class II, owned by Mr. L.
18. City owned park and water treatment plant, north of river is a flood zone (floods three to six times a year).
19. Timber, owned by Mr. W.
20. Agricultural portions subject to flooding, owned by Mr. A.

When you have selected a location for the plant, meet with several other class members, as directed by the instructor. Play the role of a city council and come up with a recommendation mutually acceptable. A discussion group size of 5 to 10 is suggested.

To add interest to the activity, the instructor may slip one of the following notes to one or more members of the group. This must be done before the groups meet so appropriate changes can be made. No two notes in the group should be the same. The instructor should feel free to set his own conditions and notes if he wishes. Make the situations as real as possible. No one else in the group needs to be told what anyone else's role is. Some will figure out that something is "up," others may remain quite naive. Depending on the size of the class, the instructor may choose to provide all members with such notes. Following are examples of the types of parameters the instructor may establish:

Note 1: You are Mr. I. You purchased the land at site 12 as a speculation property seven years ago. If the plant was built on your site, it would turn a handsome profit, but single-unit dwellings would make you two or three times as much. (Change your choice if this new information changes anything.)

Note 2: You are Mr. J. Site 13 is part of your farm and you are planning to farm for some time. However, there would be some easy money, and farming profits have not been good over the past two years. (Change your choice if this new information changes anything.)

Note 3: You are Mr. H. You own site 11. You are in deep financial trouble (this is **not** generally known) and this deal would bail you out. (Change your choice if this new information changes anything.)

Note 4: You are Mr. K. You own site 15. You are a farmer and about ready to retire. You have already moved to town and your son is living on the farm. The rest of the farm is to the east and this one field sticks out to the west. Retirement costs money and this would certainly help. (Change your choice if this new information changes anything.)

REFERENCES

1. McHarg, Ian L. 1971. *Design with nature.* Doubleday, Garden City, New York.
2. Shomon, Joseph James. 1971. *Open land for urban America.* John Hopkins Press, Baltimore, Maryland.
3. Soil Conservation Society of America. 1968. *Making rural and urban land use decisions.* Ankeny, Iowa.

4. Soil Conservation Society of America. 1971. *Planning and zoning for better resource use.* Ankeny, Iowa
5. Soil Conservation Society of America. 1972. *National Land Use Policy: Objectives, components, implementation.* Ankeny, Iowa.
6. Soil Conservation Society of America is cooperation with WOI-TV, Ames, Iowa. 1972. *"30 Minutes," an interview on land use policy and planning by Ed Weiss, featuring Marion Clawson and Minott Silliman, Jr.* 28-minute, 50-second videotape, available for rent or purchase. Ankeny, Iowa.
7. U. S. Department of Agriculture. 1963. *A place to live, the Yearbook of Agriculture.* Washington, D. C.
8. Wohletz, L. R., and W. E. Wildman. 1971. *Land use planning by foresight or hindsight.* Journal of Soil and Water Conservation 26(4): 135-137.

SESSION 3

Population Stress and Its Implication

Objectives

1. To develop an understanding and knowledge of population stresses.
2. To develop an understanding of population control factors and carrying capacity indicators for plant and animal species.
3. To analyze and develop an understanding of trends exerted by animal and human populations with regard to (a) territorial instinct, (b) population control, (c) removal of predators and disease, (d) introduction to new habitats.
4. To develop interest in, and knowledge of, the changes in population growth rates and the problems created throughout the world by excessive population.
5. To develop an understanding of the reasons for population distribution and the problems created by unequal distribution.
6. To develop an understanding of man's attempts to control populations of various species.

Background Information

Any species' potential for reproduction far exceeds what that species' environment can support. But nature maintains a system of checks and balances as a means of manipulating population. Populations are kept within the environmental carrying capacity by such resistances as disease, predators, starvation, storms, fire, and immigration. Disruption of a particular segment of any population chain can cause severe stresses among related populations.

Technological changes have allowed man to move his population above and beyond the environmental resistances that control other species. Because of these changes, the number of people in the world has increased rapidly, so fast in fact there is much talk about a "population explosion." Some scientists view the rapidly increasing number of humans as a grave threat to the future of mankind. They claim we are close to entering a new dark age. Other scientists do not consider the problem so threatening. But almost everyone who has studied the matter agrees it is serious.

The world's population reached 1 billion by the year 1850. In 1930, 80 years later, the population reached 2 billion. Thirty years later, in 1960, there were 3 billion people in the world. This population growth represents an average rate of about two percent each year. Unless something happens to change the present growth rate, the number of people in the world will continue to double every 35 to 40 years.

If people were spread evenly over the earth, the problem of excess numbers perhaps would be easier to solve. But population is very unevenly distributed. More and more people are living in cities. About 2 percent of the people in the world lived in cities with 20,000 or more people in 1800. In the United States, at the time of the first census in 1790, 95 percent of the population lived on farms or in communities of less than 2,500 people. By 1850, about 20 percent or 1 person in 5 lived in cities. In 1920, 51 percent were living in urban areas. It seems clear, according to the experts, that most, perhaps 70 to 80 percent of our new Americans, will be born in or migrate to urban places.

The shear number of people in the world now, the fact that number is rapidly increasing, and the concentration of people in cities present a series of difficult problems for mankind.

Only two things seem certain: (1) There are going to be more people in the future, and (2) they will live in denser aggregates. The number of people to be accommodated by the end of the century, moreover, adds a new dimension to current crises. To accommodate these populations, the developed world will require, by the year 2000, additional urban facilities equivalent to those already in existence; the underdeveloped world will require correspondingly more. This calls for an entirely different view of our cities and their resource requirements than if we think only of ameliorating specific crises, step by step, as they arise. Complete urban renovation, creation of new and better living clusters throughout the country, and better and more diversified use of suburban and rural space are big orders. There is no simple "best solution." A variety of solutions must be tried, and for all of them the resource component (including clean air and water) will be central in nature.

—A prime conclusion among ecologists is that species whose populations exceed or approach too closely a carrying capacity of resources in the space occupied undergo reduction. Such reductions are often severe and may lead to extinction because of disease, pestilence, predation, or aggressive competitors. Although it is true that man has repeatedly succeeded increasing both the space he occupies and its carrying capacity, and that he will continue to do so, it is also clear that both the occupiable space and its carrying capacity have finite limits that he can approach only at great peril.

The environmental pressure of the human population is a function of numbers, population density, and culture. It has been estimated that a citizen of the United States has 25 times the environmental impact of a citizen of India. Human populations have grown rapidly as technology has removed environmental resistance factors. All aspects of culture have combined to permit an increased carrying capacity. Further increases in population stress will require adequate planning and development if the quality of environment, culture, and mental and physical health of mankind is to be maintained in the face of change.

Teaching Activity

The following multiple choice questions may be put to the class, with the hypothetical case study used to stimulate class discussion. The instructor, if he desires, may adapt this technique to a more practical situation involving growth activity in his community — problems relating to traffic congestion, ghettos, urban renewal, schools needs, etc.

Have the participants answer the following questions without discussion. Present the case study for discussion and debate.

1. The main reason for a population explosion is that too many babies are born each year.
   (a) strongly agree ____
   (b) agree ____
   (c) disagree ____
   (d) strongly disagree ____

2. Good health and sanitation practices should be one of the first things to be developed in an "emerging nation."
   (a) strongly agree ____
   (b) agree ____
   (c) disagree ____
   (d) strongly disagree ____

3. Population growth usually results from a lower death rate among senior citizens.
   (a) strongly agree ____
   (b) agree ____
   (c) disagree ____
   (d) strongly disagree

4. A country is always better off when its people are free from diseases (malaria, etc.).
   (a) strongly agree ____
   (b) agree ____
   (c) disagree ____
   (d) strongly disagree ____

5. By exporting agricultural technology, western societies could eliminate starvation throughout the world.
   (a) strongly agree ____
   (b) agree ____
   (c) disagree ____
   (d) strongly disagree ____

Case Study

A young, newly-elected president of a small underdeveloped, yet emerging island nation in the Pacific Ocean (a former British colony) is faced with a tough decision. He must decide whether or not to ask western technicians to come in and spray for malaria and to allow western doctors to vaccinate the entire population for contagious and infectious diseases that cause most of the deaths on the island.

This seems like no problem at all. In fact, many would call it a blessing. But this president has seen from example that it is not a blessing. Other nearby islands accepted similar "help" from other countries to improve health and sanitation, and it literally cut the death rate in half almost overnight. The result was that twice as many babies lived (for here is where cuts in death rate have the greatest affect). Per person food supplies drop sharply on the already near-starving islands.

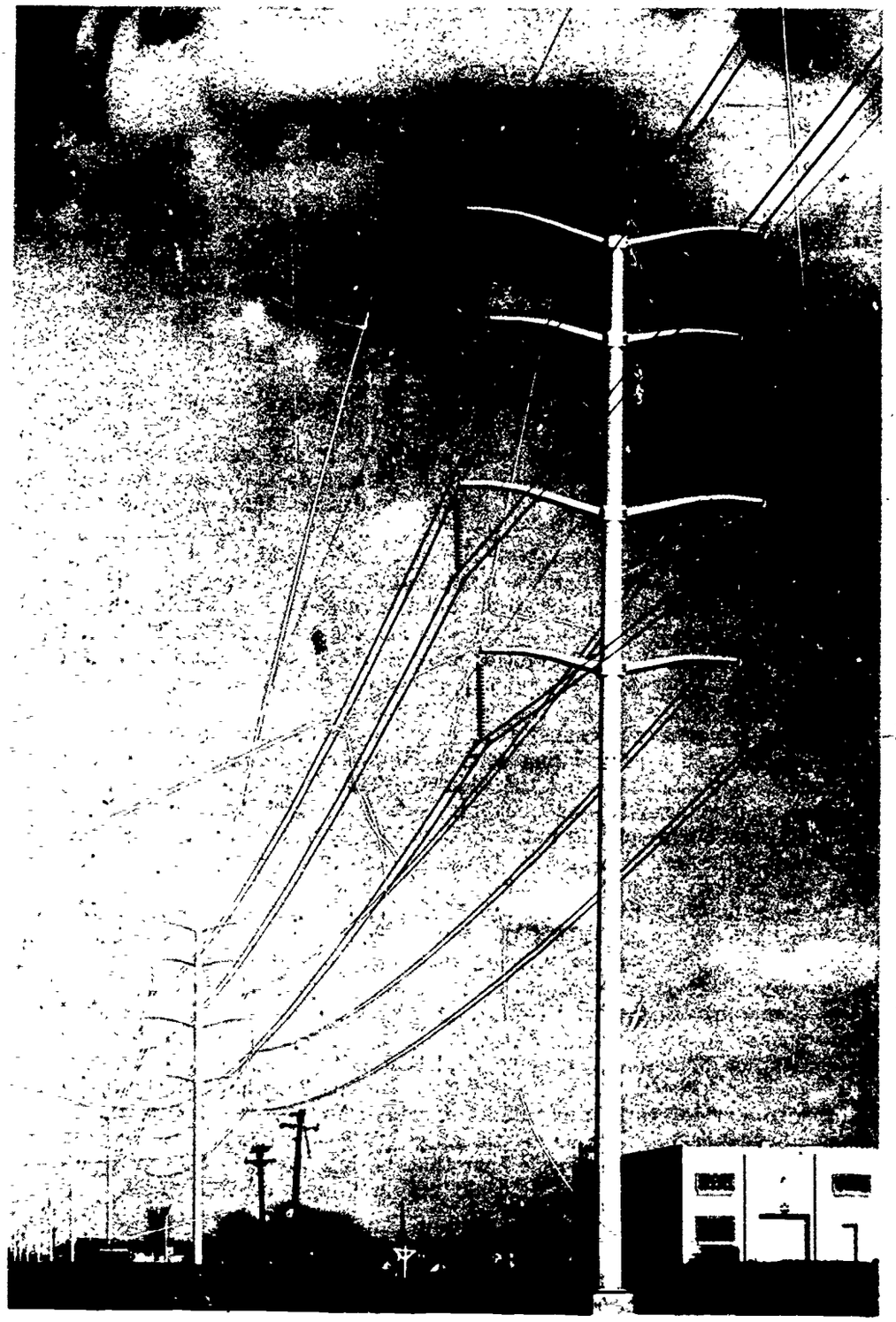
The young president realizes that health and sanitation can be spread widely in a country with overwhelming results. However, there may be no corresponding increases in education and the economy. This is generally the case, as he has seen. In fact, the economy may fall to a lower level than before. He knows also that starving people do not starve quietly, particularly those people who have "seen it better." He guesses that if he accepts help from the western nation, this is likely all he will receive.

The possibility of having a much higher percentage of nonworkers (dependents less than 15 years old and the elderly) among his people is a frustrating prospect. The land, even now, has an over abundance of workers — working at the subsistence level of agriculture. The main occupation is farming, and there is relatively little industry. The farmable land (and even the unfarmable) has been strained to its capacity. Workers no longer can produce high yields without mechanization. The soil is nearing depletion as the result of constant growing over the years. The president feels it is quite possible that his young country will not be able to bear the population increase. But he also knows that, when given a choice between life or death, all people — throughout history — choose life over death. If his own people hear that he has decided to keep health and sanitation from their country, it could very well mean death for him.

REFERENCES

1. Anderson, G. C. 1972. *An agricultural view of the world population—food crisis.* Journal of Soil and Water Conservation 27(2): 52-56.
2. Hinrichs, Noel. 1971. *Population, environment and people.* McGraw-Hill Book Company, New

York, New York.
3. Population Reference Bureau, Inc. 1972. *The world population dilemma.* Washington, D. C.
4. Resources for the Future, Inc. 1972. *Population, resources, and the environment.* Volume 3 of Research Reports of the Commission on Population Growth and the American Future. U. S. Government Printing Office, Washington, D. C.



SESSION 4

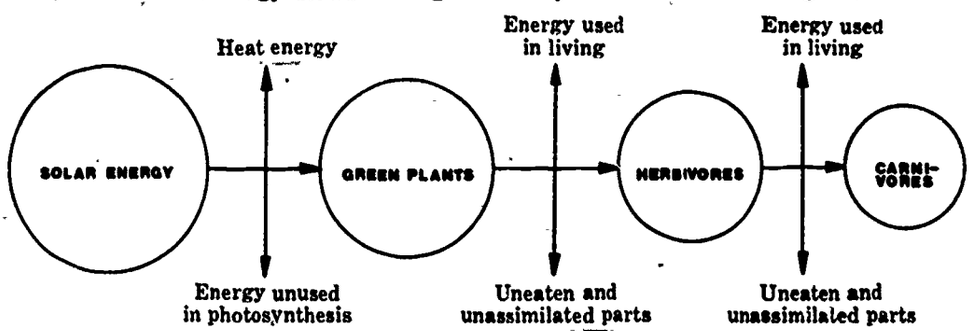
Energy Needs of Society

Objectives

1. To develop an interest in, and understanding of, energy flows and methods of producing energy in terms of resources consumed, techniques of production and distribution, efficiency, quantity of energy, and economic costs and ecological considerations involved.
2. To analyze energy needs in relation to increasing usage, determine patterns of energy use, and suggest action for possible change.
3. To develop an understanding of the trade-offs associated with the various types of energy production and consumption.
4. To develop an understanding and knowledge of local energy needs and future requirements.
5. To study individual energy use trends during the past decade and the various future alternatives involved.

Background Information

The ultimate source of energy for all living things, including man and his culture, is the sun. Energy flows through an ecosystem in the following manner:



The amount of energy reaching each successive level in the food chain is reduced by an approximate factor of 10.

Every time man tries to overcome or manipulate a natural force, it takes energy. It takes energy to climb a hill against the force of gravity, to keep an agricultural field or forest at the desired stage of ecological succession, to heat homes in cold winters, and to cool them in hot summers. It takes energy to change raw materials into finished products. Our energy demands have increased rapidly.

In our nation's early years, energy needs were met by water power from the sun-driven water cycle, muscle power derived from the food chain and combustion of plant and animal materials (wood for fires, whale oil for lamps, wax for candles). Unused plant and animal parts stored over billions of years in the form of coal, oil, and natural gas are now being used in increasing quantities to meet growing energy demands. At the present time we are in no danger of running out of energy sources. However, we are rapidly depleting sources of cheap fuel. Other factors, such as the high sulphur content of some coal, make the use of certain energy supplies unfeasible.

Man has made more food energy available through modern agricultural prac-

tices. At times the intensity of modern agriculture had been at the expense of other values related to natural resources—timber, wildlife habitat, aesthetic and scenic values.

The atomic age, with its nuclear power plants, has yielded a great potential for energy production from nonbiological sources. Problems of nuclear power production remain in the form of safety from radiation, disposal of radioactive wastes, thermal pollution, and size of uranium reserves. Perhaps the new generation of breeder reactors now on the drawing boards will resolve some of these problems. Research continues into harnessing the power of the sun directly, but solar batteries and solar heating have yet to replace green plants and fossil fuels.

The current nationwide concern for energy sources arises from an extraordinary coincidence of events involving each source of commercial energy—factors as diverse as Middle Eastern politics, the quest for a cleaner environment, the health and safety of workers producing energy resources, legal restrictions due to environmental considerations, the federal government's policies toward natural gas prices and oil imports, and unanticipated increases in demand. In recent years the total demand for energy of all types in the United States has been rising four percent a year. This rate exceeds the growth of population and gross national product.

Teaching Activity

The following questions should be answered in groups of four or five participants. Answers should be written down and then compiled for the entire class.

1. What single activity do we engage in that takes the greatest amount of energy from the environment?
2. What is the second greatest use of energy?
3. Do we want to stop or reduce the positive results of these expenditures of energy?
4. Can we retain the positive benefits and reduce or eliminate the negative products?
5. Would you be willing to change your life style and reduce your energy consumption as a means of improving the environment?

REFERENCES

1. Barrow, T. D. 1972. *Industry looks at land use.* In *National Land Use Policy: Objectives, Components, Implementation,* the proceedings of a national conference. Soil Conservation Society of America, Ankeny, Iowa.
2. Brown, Theodore. 1972. *Energy and the environment.* Charles Merrill Publishing Company, Columbus, Ohio.
3. Curtis, Richard, and Elizabeth Hogan. 1970. *Perils of the peaceful atom.* Ballantine Books, New York, New York.
4. Hattel, H. C., and J. B. Howard. 1971. *New energy technology: Some facts and assessments.* MIT Press, Cambridge, Massachusetts.
5. Office of Emergency Preparedness, Executive Office of the President. 1972. *The Potential for energy conservation: A staff study.* Washington, D. C.
6. Schurr, Sam H. 1972. *Energy, economic growth and the environment.* Johns Hopkins Press, Baltimore, Maryland.
7. *Scientific American.* 1970. A special issue on the biosphere (September). New York, New York.

SESSION 5

Production-Consumption Patterns

Objectives

1. To develop an understanding of the natural resources involved in maintaining current consumption patterns in the United States.
2. To develop an understanding of the advantages and disadvantages of alternative production—consumption processes and uses.
3. To relate production—consumption patterns to solid waste management, including consideration of uses and potential uses of waste materials.
4. To understand the need for research and continued mineral exploration and substitution to meet production demands.
5. To develop an understanding of the demands and competing uses for natural resources.

Background Information

The United States now has more than 78 million people employed, with only about 6 million engaged directly in food production. The remaining 72 million people in the work force are employed in manufacturing, sales, and services.

Advances in technology have significantly increased the productivity of producers. Equally important to the United States has been the expanded use of natural resources from foreign countries. Much of the foreign policy of any nation is dictated by natural resource needs. As developing nations acquire capital and technology, and create internal demands for goods and services, they have fewer resources for export.

To meet the demands of consumers, the United States will need to:

1. Find new domestic and foreign supplies of resources.
2. Recover and recycle present waste materials.
3. Substitute more plentiful resources and synthetic materials for scarce items.
4. Restrict the use of scarce resources to those uses for which they are uniquely suited.
5. Continue increasing efficiencies of resource extraction and utilization.
6. Extend the useful life of manufactured goods.

The quality of life now enjoyed by Americans is based on the production of raw materials, the application of technology in manufacturing and in producing services, and the consumption or use of goods and services. A problem has developed in that waste occurs at each step. The disposal of wastes, from cars and refrigerators, to bottles and paper, has created massive problems of air, water, and aesthetic pollution. Locating sites for sanitary landfills creates a land use decision. The capacity of the ecosystem to disperse and assimilate wastes is limited, and mankind must find new methods of waste disposal in future years. The expenses of waste management were not previously included in production costs. Current concern involves the payment of such costs by the producer or consumer. Unless a waste product is biodegradable or recyclable, it poses a serious solid waste problem.

Teaching Activity

Have each participant list the renewable and nonrenewable resources he or she has consumed in the past 24 hours and identify each as essential to survival, necessary for maintenance of life style, or convenience and luxury. Have each enrolle list alternatives that would eliminate wastes.

REFERENCES

1. Brubaker, Sterling. 1972. *To live on earth.* Johns Hopkins Press, Baltimore, Maryland.
2. Carlson, Jack W. 1949. *What price a quality environment.* Journal of Soil and Water Conservation (24(3): 84-88.
3. Kneese, Allen V., Robert U. Ayres, and Ralph C. D'Arge. 1970. *Economics and the environment.* Resources for the Future, Washington, D. C.
4. Maddox, John. 1972. *The doomsday syndrome.* McGraw-Hill Book Company, New York, New York.
5. Meadows, Donald H., Dennis L. Meadows, Jorgen Randers, and William W. Behrens. 1972. *The limits to growth.* Universe Books, New York, New York.

SESSION 6

Perspective on Pollution

Objectives

1. To understand the effects of pollution and relate the efforts to the capability of the environment to absorb, disperse, and recycle solids, liquids, and gases.
2. To understand the relation of increased production, the abundant life, and a larger population to the need for more intensive pollution control measures.
3. To understand how pollution affects the daily life of each citizen and define the citizen's responsibility in pollution abatement.
4. To analyze techniques used in the local community to dispose of pollutants.
5. To study the economics of pollution control and understand how some efforts have created new problems.
6. To examine existing legislation and legislative needs with regard to pollution abatement.

Background Information

The addition of materials to the environment is not in itself pollution. Air, water, and land have a limited capacity to absorb, disperse, and recycle materials. Pollution exists when the addition of materials to the environment exceeds a given level of environmental quality.

Pollution control is an additional cost of production and consumption. Land, air, and water are the primary vehicles for dispersing pollutants. An increasing per capita demands, has made it essential to use resources over and over in shorter time periods. In some instances the public, through legislation, has placed responsibility and cost directly on the producer of the pollutant. In other instances the public has accepted at least part of the cost and responsibility.

Environmental additives that are considered pollutants in certain concentrations are of six basic types:

1. Organic solids and liquids
2. Inorganic solids
3. Chemicals and toxins
4. Noise
5. Visual
6. Heat and radiation

Many so-called solutions to pollution have been aimed at treating symptoms rather than the specific problem. In ameliorating one symptom a greater pollution problem may be created. Increasing combustion ratios in internal combustion engines would produce less carbon monoxide and lower hydrocarbon emissions but would significantly increase the production of nitrous oxides and total fuel consumption. The foaming nonbiodegradable detergents were replaced by biodegradable detergents containing phosphate that contribute to eutrophication. At least one suggested substitute for the phosphate in detergents is known to cause other pollution problems. Electrically heating buildings may solve a pollution problem in the home, but the increased demand for electricity may result in increased pollution from power plants.

Teaching Activity

The following activities are intended to stimulate classroom discussion. The exercises are generally self-explanatory.

Air Pollution*

Current Sources — *Sources in the Year 2000*

Have participant list sources of pollution:

(a) Motor vehicles (a)_____

(b) Generation of electricity (b)_____

(c) Industry (c)_____

(d) Heating of home and public places (d)_____

(e) Refuse disposal (e)_____

(f) Blowing soil (f)_____

Do you believe that total air pollution in the year 2000 will be (a) greater than, (b) less than, (c) equal to the total for 1970?

Sources of the Gross Increase or Decrease

The participant should then explain his response by designating items 1 through 10 by code at right:

1. Motor vehicles _____
2. Generation of electricity _____
3. Industry _____
4. Heating _____
5. Refuse disposal _____

Code

+ = increase

0 = no change

— = decrease

Pollution Abatement Measures and Methods

6. Improved technology for abatement _____
7. Federal laws to control pollution at its source _____
8. Sanctions on automobiles and home heating _____
9. State laws to control air pollution _____
10. Local ordinances to control air pollution _____
11. Economic sanctions and charges and incentives _____

Land Pollution*

Sources Current — *Sources in the Year 2000*

	Quantity	*Toxicity*
(a) Refuse disposal	(a)_____	(a)_____
(b) Chemicals	(b)_____	(b)_____
(c) Radiation	(c)_____	(c)_____

Currently, refuse disposed in the the soil is increasing by four percent a year, radiation is not increasing; pesticides are an unknown. Total land pollution will, in the year 2000, be (a) greater than, (b) less than, (c) equal to the total for 1970?

Sources of Gross Increase or Decrease

The participant should explain his answer by designating items 1 through 10 by code at right:

1. Refuse disposal	_____	+ = increase
2. Chemicals	_____	— = decrease
3. Radiation	_____	0 = no change

Pollution Abatement Measures and Methods

4. Use of current technology for abatement _____
5. New technology for abatement _____
6. Reuse or recycling of materials _____
7. Federal laws _____
8. State laws _____
9. Local laws _____
10. Economic charges, sanctions, incentives _____

Water Pollution*

Current Water Pollution Sources Ranked by Volume of Water Returned to Rivers, Lakes, and Streams

(a) Power plant cooling (thermal)	An increase in all but irrigation is expected for the year 2000
(b) Irrigation	
(c) Manufacturing uses	Expected discharge 733 billion gallons/day
(d) Municipal uses	Average flow of U. S. Rivers 1,100 billion gallons/day
(e) Mining	

Have the participants discuss the effects of each aforementioned pollution type and the stress they place on the water resources.

Pollution Abatement Measures and Methods

Following the discussion, have the participants designate items 1 through 11 as they will see changes by the year 2000. + = increase 0 = remain same — = decrease

1. Cooling water before it is returned _____
2. Reduction of nutrient content of irrigation returns _____
3. Manufacturing treatment _____
4. Municipal treatment _____
5. Mining treatment _____
6. Reuse and recycling _____
7. Federal standards _____
8. Federal law _____
9. State law _____
10. Economic incentives _____
11. Economic charges and sanctions _____

Total Pollution

Have participant give his opinion regarding status of pollution for year 2000 for resources named compared to present day.

	More	*Same*	*Less*
Air	_____	_____	_____
Land	_____	_____	_____
Water	_____	_____	_____
Total	_____	_____	_____

How Will Quantity of Pollution Affect:

(a) Rural people

(b) Farmers

(c) City people

(d) Cost of products purchased by typical family

(e) Cost of products purchased by poor family

(f) Cost of products purchased by wealthy family

(g) Population distribution

(h) Plants, animals, and organisms in nature

(i) Others

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*Prepared by Charles P. Gratto, Extension Economist, Iowa State University

REFERENCES

1. National Tuberculosis and Respiratory Disease Association. 1969. *Air pollution primer.* New York, New York.
2. Conservation Foundation. 1970. *Your right to clean air—a manual for citizen action.* Washington, D. C.
3. Soil Conservation Society of America. 1971. *Primer on agricultural pollution.* Ankeny, Iowa.
4. Marx, Wesley. 1971. *Man and his environment: Waste.* Harper and Row, New York, New York.
5. Odell, F. Glen. *Agriculture and air pollution.* In *The Earth Around Us,* the proceedings of the 27th annual meeting. Soil Conservation Society of America, Ankeny, Iowa.
6. Strobbe, Maurice A. 1971. *Understanding environmental pollution.* C. V. Mosby Company, St. Louis, Missouri.

SESSION 7

Food and Fiber

Objectives

1. To develop an interest in, and knowledge of, technological advances of the 20th century that have resulted in increasing and improving the production and conservation of food and fiber.
2. To develop an understanding of the limiting factors affecting food and fiber production.
3. To develop an understanding of the positive and negative effects associated with increased farm size in relation to food and fiber production.
4. To analyze conservation management needs with regard to food and fiber production in local areas.
5. To develop an understanding of costs and overhead associated with production of wood products, textiles, meats, vegetables, and feed grains.
6. To develop an understanding of, and interest in, the energy requirements and nutrients required to produce, for example, meats versus plant materials.

Background Information

Both primitive man and modern man have had to depend on the plants and animals produced from the land. Domestication of animals, fire, and tools were used to obtain food and fiber more easily. Human populations grew. Societies and cultures developed. The techniques for increasing yields advanced, and the amount of space used by man increased.

Societies have collapsed because their demands for food and fiber exceeded the capacity of the land to produce. Land can be worn out.

The trends of this century show native landscape changing to agricultural land and agricultural land changing to urban land. The land best for growing crops is usually most desirable for buildings and roads. Farmers and timber producers have had to find technological means of increasing production on a given supply of land.

The productive capacity of the land has been increased by:

1. Improved plant breeding and cultural practices.
2. Increased mechanization.
3. Fertilizers to replace mineral nutrients removed by leaching, surface runoff, and crop harvest.
4. Herbicides and insecticides to reduce competition from insects, weeds, and disease.
5. Irrigation to supplement available precipitation or to provide water in arid regions.
6. Soil erosion controls to reduce topsoil loss and management of surface crop residues to conserve soil moisture.
7. Reforestation to accelerate re-establishment of tree crops and to protect watersheds from excessive soil erosion.
8. Use of formerly wasted plant and animal parts.

Farmers in the United States have produced an abundance of food in an efficient and economical manner. Today, one farm worker produces food for 47 people. Grain is probably the world's most important food. In 1970, 51 percent of man's energy came from grain; 13 percent from beans, lentils, peas, and soybeans; 22 percent from meat, milk, eggs, fish, fats, and oils; 14 percent from potatoes, fruits,

vegetables, cassava, sugar, nuts, etc. These are, directly or indirectly, products of the land.

Man's ability to produce synthetic fibers and to preserve and distribute food have increased food and fiber supplies without directly increasing pressures on the land. Nylon, rayon, and polyester fibers, manufactured from coal, substitute for cotton and wool. Plastics have substituted for paper and wood. Food additives and refrigeration make it possible to store food longer without spoiling. Improved transportation systems have made it possible to distribute food and fiber products from areas of production to areas of consumption, from farm to city, and from the United States to countries throughout the world.

While striving to keep up with increasing demands, modern agriculture has had some undesirable effects on the environment. Man has not always recognized his responsibility to maintain the productivity of the land. Public supported programs of conservation have been developed to assist the management of land, water, forest, and wildlife resources.

The increased use of open space and rural lands for uses other than agriculture has created certain conflicts with regard to agricultural practices. Heretofore only concerned with production, agricultural producers now must concern themselves not only with maximizing production, but attempt to do so while minimizing the effects of agriculture on environmental quality. Items to consider in this regard are:

1. Conservation practices involving floodplain management, soil erosion, water pollution (both point and nonpoint).
2. Economic and social problems associated with rural development.
3. Problems associated with the monoculture of corn in the midwest and timber in the South and Pacific Northwest.
4. The fact that agricultural land, including timber land, historically has had a lower priority in our society than land used for other purposes.
5. Particular problems associated with certain agricultural practices, such as the use of pesticides, clearcutting as a timber harvesting practice, and so on.

Teaching Activity

Copies of the following material might be reproduced and the class participants asked to classify a list of items into four categories. (The instructor should make certain the class understands there may be no right or wrong answer).

Categories into which items may be classified:

A. Advancement through technology.
B. Problems caused by technology.
C. Socioeconomic advance.
D. Socioeconomic problems.

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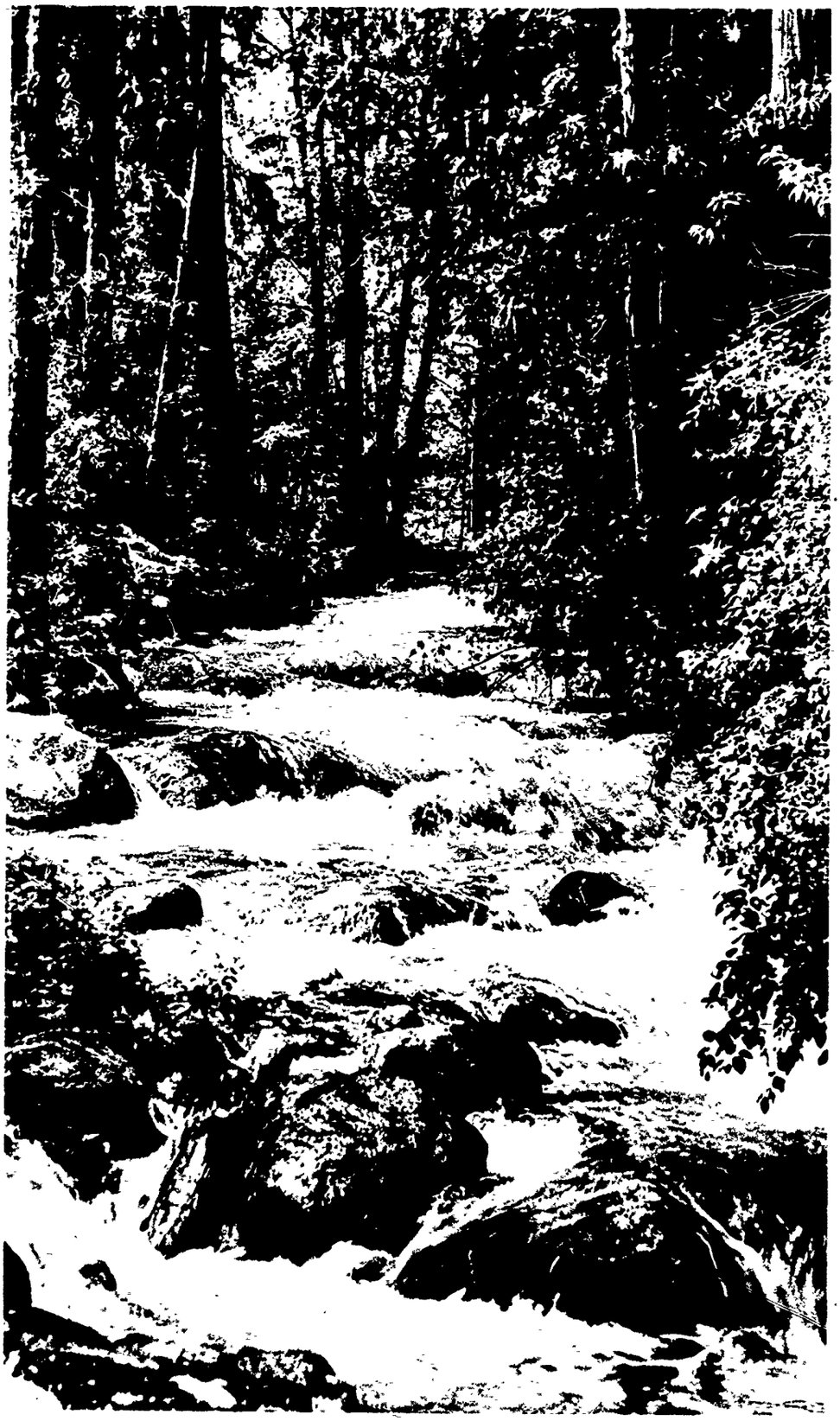
1. More production from one acre.
2. High cost of farm operations.
3. New plant and animal species.
4. Farm equipment too large to give attention to special cultivation needs.
5. Agricultural chemicals (fertilizers, pesticides).
6. Food storage facilities.
7. Genetic quality of existing species.
8. Escape of agricultural chemicals.
9. U.S. government feed grain policies.
10. Improvement of farm efficiency.
11. Transportation of food.
12. Bigger and better farm equipment.
13. Soil erosion prevention practices (contouring, terracing, etc.).
14. Elimination of family farm unit.
15. U.S. grain exports.

16. Better educated farmers.
17. Mass media communications.
18. U.S. meat imports.
19. Row-cropping marginal land.
20. Idling agricultural land.

As an optional activity, discussion of public-supported programs related to food and fiber production could be introduced. Such programs, as those fostered by the Extension Service, Soil Conservation Service, vocational agriculture, and other federal, state, and local agencies, would provide an interesting and enlightening session for most participants.

REFERENCES

1. Anderson, G. C. 1972. *An agricultural view of the world population—food crisis.* Journal of Soil and Water Conservation 27(2): 52-56.
2. Brown, Lester R. 1970. *Seeds of change, the green revolution and development in the 1970s.* Praeger Publishers, New York, New York.
3. Hardin, Clifford M. 1969. *Overcoming world hunger.* Prentice Hall, New York, New York.
4. McHale, John. 1972. *World facts and trends.* MacMillan Company, New York, New York.
5. National Advisory Commission on Food and Fiber. 1967. *Food and fiber for the future.* U S. Government Printing Office, Washington, D. C.
6. Thompson, Louis M. 1969. *The world food situation.* Journal of Soil and Water Conservation 27(1): 4-7.



SESSION 8

Water Resource Management For All

Objectives

1. To develop an understanding of, and interest in, the uses of water, distinguishing between consumptive and nonconsumptive uses.
2. To identify the specific source of water that is used in the individual's home and the processing that water undergoes before it is used.
3. To identify the impact of local, state, and regional water management on society.
4. To describe and understand the legal system in the state for water allocation and water ownership.
5. To develop an understanding of the economics (benefits and costs) of water management.
6. To develop an understanding of the importance of upland conservation practices and control measures in watershed and river basin programs.
7. To identify local, state, regional, and national agencies and programs in water management.

Background Information

Although the total water quantity of the world is constant, the amount of water available in any one place at a particular time may vary greatly. In the economic sense, water is considered a free good. Water itself does not cost anything, but man's manipulation of available water resources and the water cycle is costly, requiring inputs of energy, other resources, and technology. Water is stored, purified, and transported. Weather modification, irrigation, flood control, drainage, conservation practices, vegetation management, land management, etc., are attempts to put water where man wants it when he wants it there. The flow characteristics of a particular stream are a function of precipitation patterns, topography, soil type, and land use. A stream is the product of its watershed.

Water provides a medium for the life of many economically and ecologically important organisms. Periodic flooding of natural floodplains is responsible for maintenance of a vital ecosystem, without which the flora and fauna of a river would be greatly different. Since water is almost the universal solvent, it is easily contaminated. The ability of water and aquatic organisms to disperse, dilute, and decompose wastes is limited.

Per capita use of water is increasing, but, in general, supplies have been sufficient. In some areas, groundwater reserves are not capable of meetng demands, and recycling of surface water is required. As demands continue to rise, it will become necessary to reuse water many times on its way to the sea. The technology of water purification is already well developed.

Teaching Activity

Water management is important to every community. Most towns and cities in early America were located on streams or bodies of water. A teaching activity can easily be developed to fit a local community. One such activity relating primarily to flood control (an important problem in some communities) follows. In arid areas or areas where flooding is not a problem, water development can be substituted.

The purpose of this activity is to portray to participants the range of alterna-

tives available to satisfy water quantity problems. The selection of alternatives must be based on consideration of all economic, social, and environmental advantages and disadvantages.

Divide the class into groups of five or six participants to discuss the combinations of alternatives they favor for flood control. If possible, the discussions should focus on a particular watershed with which the participants are familiar.

Alternative 1: Status quo

This alternative could be considered when conflicting interests in the water and land resource areas cannot agree on compatible solutions, or when the alternatives are not socially acceptable. No additional flood control structures would be constructed under existing zoning. The average annual flood damages would increase with continued development in the floodplain. Pollution and sedimentation would continue.

Alternative 2: Floodplain management

Floodplain management does not reduce or eliminate the flood hazard. Floodplain management provides guidelines for future floodplain development to lessen the damaging effects of floods. Floodplain regulations imply the adoption and use of legal tools with which to control the extent and type of future development that will be permitted in the floodplain. For these controls to be effective, it is necessary that the public understand the general flood problem, the degree of risk, and the methods that can be used to control the use of land. The following are means of effecting floodplain management:

a. Designated floodways and encroachment lines
b. Zoning
c. Subdivision regulations
d. Building codes
e. Taxation rates based on demand for public services or expenditures

Alternative 3: Flood-proofing

Flood-proofing is a combination of structural changes and adjustments to properties subject to flooding, primarily for reduction or elimination of flood damage. Although it is more simply and economically applied to new construction, flood-proofing is also applicable to existing facilities. It has promise in one or more of the following situations:.

a. Where moderate flooding with low stage, low velocity, and short duration is expected.
b. Where traditional types of flood protection are not feasible.
c. Where individuals desire to solve their flood problems without collective action, or where collective action is not possible.
d. Where activities depend on riverbank or floodplain locations, but need some degree of protection.

Alternative 4: Floodplain evacuation

Floodplain evacuation is of two types: immediate evacuation and evacuation over a period of time. In highly developed areas, immediate evacuation is usually conducted in conjunction with urban renewal. In sparsely developed areas, immediate evacuation can often be accomplished in conjunction with open space, outdoor recreation, or other logical floodplain uses. Floodplain evacuation studies indicate that, in most instances, the most economical plan would be one that is gradually executed over a period of time in conjunction with good floodplain management.

Alternative 5: Levees and floodwalls

Levees and floodwalls are used to reduce the flood hazard by confining the river to a definite course. They will eliminate the flood hazard only up to the size or frequency flood for which they are designed. This solution is usually considered

only for developed areas that suffer frequent flooding. Development behind the line of protection is unrestricted.

Alternative 6: Channel improvements

Channel improvements are used to reduce the flood hazard by reducing the flood stage in a particular area. This is accomplished by straightening and/or increasing the size of the channel. This will eliminate the flood hazard only up to the size or frequency flood for which a channel is designed (and will reduce flooding at higher stages). This solution is usually considered only in developed areas subject to frequent flooding and in rural areas having a large floodplain. Future development in the vicinity of the improvement may, in some cases, be unrestricted.

Alternative 7: Construction of dams and lakes on main tributaries

This solution is used to reduce the flood hazard by providing an area for the storage of floodwaters in reservoirs for gradual release after the flood threat has passed. Reservoirs will eliminate the flood hazard only up to the size or frequency for which they are designed (and reduce flooding at higher stages). Dams and lakes are usually considered only upstream from developed areas subject to frequent flooding and may contain additional storage for such uses as municipal water supply and/or recreation. Future development in the floodplain downstream of the dam would be controlled.

Alternative 8: Tributary watershed soil and water conservation programs

This solution considered such possibilities as soil conservation practices, floodwater-retarding structures, channel-stabilization structures, and channel modifications to reduce the flood hazard, sedimentation, and pollution.

REFERENCES

1. Odum, Eugene P. *Air-land-water—an ecological whole.* Journal of Soil and Water Conservation 24(1): 4-7. Ankeny, Iowa.
2. Overman, Michael. 1968. *Water: Solutions to a problem of supply and demand.* Doubleday, Garden City, New York.
3. Tinney, E. Roy, and J. O'Riordan. 1971. *Water as a consumer commodity.* Journal of Soil and Water Conservation 26(3): 102-106.
4. U.S. Senate, Select Committee on National Water Resources. 1960. *A series of U.S. Government Printing offices reports.* Washington, D. C.
5. U.S. Water Resources Council. 1968. *The nation's water resources.* U.S. Government Printing Office, Washington, D. C.

SESSION 9

Cultural and Recreational Needs

Objectives

1. To develop an understanding of the increased use of natural resources for recreational purposes as a result of increased population and leisure time.
2. To develop an awareness of how outdoor recreational needs are being met in the community, state, and nation.
3. To understand society's need to conserve, protect, develop, and restore its cultural and social history (natural parks, battlefields, wilderness areas, scenic rivers, coastal waterways, and estuaries).
4. To understand the value of compatible multiple uses of land for recreational and other purposes.
5. To determine ways and means the individual may improve his recreational and cultural opportunities through the wise use, management, and conservation of renewable natural resources.
6. To develop an understanding of the need for historical, cultural, and social considerations in land use that will affect the quality of the environment.

Background Information

A significant advantage of the increase in technology has been the use of machines to do our work in less hours, thus allowing more time for leisure. Increased demand for recreational and leisure activities stems from increased population, increased leisure hours, and improved transportation.

At the same time, Americans have expressed an increased interest in, and concern for, their cultural and historical background. Since these values are related to certain geographical areas and the outdoors, they are then influenced by the quality of the environment and vice versa.

Social and cultural expression as well as recreational activity are essential for good physical and mental health. Although they exist in many forms, those that use natural resources as a basis for the experience are directly related to the quality of the environment. These cultural, social, aesthetic, and recreational expressions, which utilize natural resources, may be grouped together in what is termed "outdoor recreation."

What then is outdoor recreation? It is the use of soil, water, and other natural resources, along with their aesthetic values and productivity, for outdoor leisure-time activities. This definition may initially suggest camping, hunting, hiking, or mountain climbing. But it also includes a short walk, a scenic drive, the view from an office window, the drive to work, or any outdoor experience that is aesthetically appealing and enlightening to the individual. It is in these not so obvious forms of recreation that recent findings and studies have revealed the importance of an aesthetically appealing, well-planned environment.

The removal of monotonous patterns and unaesthetic qualities in our rural and urban communities adds to the quality of our environment. Not measurable in monetary terms, aesthetic appeal and environmental quality lend vitality and vigor to a society's life style. Painting, gardening, scenic visits, city planning, woodworking, and architecture are all aesthetic expressions that someone creates and which are enjoyed by others. Planning studies have included such considerations in formulating overall environmental decisions and recommendations.

Specialists in this field of environmental resources often refer to the value of the "recreational experience." Unmeasurable in dollars, the experience may last for hours, a few moments, or an instant.

Where appropriate, outdoor recreation should be encouraged as an integral part of wise land and water use plans and programs of conservation, farming, watersheds, and rural and urban resource development. Outdoor recreation areas are usually thought of as public areas (parks, etc.). However, such areas may be income-producing alternatives for land use by private enterprise. Outdoor recreation is a distinct and important part of American life representing a major land and water use. It should be given full consideration in determining multiple-use management priorities by public and private groups.

An outdoor recreational experience should offer those seeking it an opportunity to experience nature. A great deal of American history lies in the grassroots of the great outdoors. We have set aside prairies, natural areas and forests, parks, monuments, and other historic sites, so that each year millions of Americans can recreate experiences otherwise known only to the pioneers. These experiences are an important and integral part of our national and natural history. It is important that these historical areas remain undisturbed.

The perpetuation of plant and animal species through their maintenance in wilderness and natural areas is important as a genetic pool for future generations.

It is perhaps easiest to consider the need for, and management of, resources for outdoor recreational opportunities at some distant vantage point, far away and separate from local communities and local problems. Greater opportunities are encountered, however, when we examine local resources and make an effort to determine outdoor recreational needs at local, county, and state levels. Such decisions become environmental decisions.

In areas where efforts have been most successful, solutions to problems have been preceded by the formation of outdoor recreation committees at local, county, and state levels to provide coordinated planning and inventorying of available recreational resources and to offer proper coordination with other planning bodies and agencies. It is not feasible to examine a single tract of land for proposed use as (1) a park or (2) a high rise hotel complex without first examining the needs of the overall community. The need for more hotel accommodations in some areas may far exceed the need for better park facilities. On the other hand, the need for better parks and more open space may be paramount. Between these extremes, however, only inventory and coordination at all levels of government will furnish the proper answer.

It is important to realize that no plan is ever complete, nor is it likely that any new plan will be a lasting one, for as the times change so do people and their interests. However, proper planning has proved to be, to date, the best available means that we have for land use decision-making. After all, it is at least a start, a positive direction in which to move, It is important to realize the need for citizen participation. It is important to realize that even in those cases where outdoor recreation needs are not fully met, the very fact that such a need is expressed has significant value in our system of democracy.

Teaching Activity

The objective of this activity is to inventory the participant's use of the outdoor recreational resources at his disposal and the effect these resources and the quality of his surroundings have on his present life style.

The instructor should first have the participant list the 10 major outdoor recreation activities that are available to him.

Following a brief discussion of these 10 activities by the class, or subgroups (at the discretion of the instructor), the instructor should discuss briefly and then ask the class to list minor and less obvious factors that relate to the environment and their outdoor recreational opportunities. These might include removal of billboards along the traveled route to work, underground power lines, or the view from their living room window.

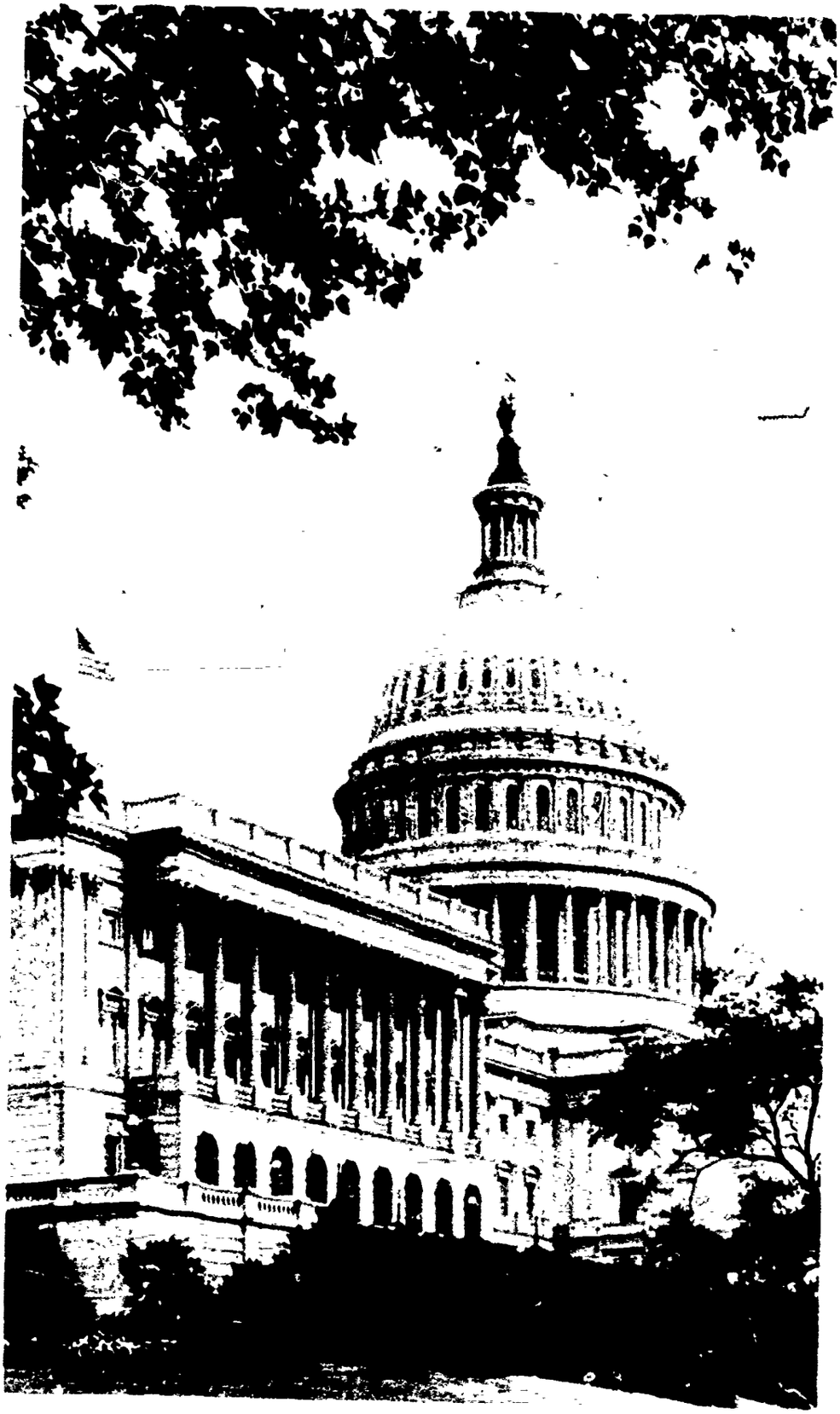
The instructor should then ask each class participant to list five improvements that he or she believes would most significantly improve their outdoor recreational opportunities. Sub-groups might then discuss these ideas. During this

discussion, consideration should be given to the economics of various proposals, other pressures and trade-offs involved with competing land uses, and the willingness on the part of the participant to pay (through taxation or otnerwise) for the completion and availability of such resources.

In summary, the class should discuss various means of citizen participation in improving their recreational opportunities. Outside speakers, such as a city council member, could possibly be brought in to illustrate the importance of citizen participation and citizen expression of opinion—with regard to need for, or location of, parks, etc., irregardless of final decision.

REFERENCES

1. Bohart, Charles. 1972. *Recreation in land use planning.* In *The Earth Around Us,* the proceedings of the 27th annual meeting. Soil Conservation Society of America, Ankeny, Iowa.
2. Clawson, Marion. 1963. *Land and water for recreation.* Rand McNally, Chicago, Illinois.
3. deGrazia, Sebastian. 1962. *Of time, work and leisure.* Twentieth Century Fund, New York, New York.
4. Economic Research Service. 1970. *Outdoor recreation.* U.S. Department of Agriculture, Washington, D. C.
5. Hay, John. 1969. *In defense of nature.* Little Brown, Boston, Massachusetts.
6. Leopold, Aldo. 1968. *Sand County Almanac.* Oxford University Press, New York, New York.
7. Outdoor Recreation Resources Review Commission. 1962. *Outdoor recreation for America.* U.S. Government Printing Office, Washington, D. C.
8. U.S. Department of Agriculture. 1967. *Outdoors USA, the Yearbook of Agriculture.* U.S. Government Printing Office, Washington, D. C.



SESSION 10

Environmental Quality for You

Objectives

1. To understand the local agencies and groups working to maintain a quality environment.
2. To be familiar with state and federal objectives and programs related to the environment.
3. To develop individual responsibility in influencing and working to maintain a quality environment.
4. To relate the environment and its management to the home, the community, and the nation.

Background Information

"A man's home is his castle." Most individuals strive to have a pleasant and enjoyable home. Some factors that influence the individual and his living can be controlled by the individual, at least to a degree. For example, a man with a home and a lot can plant flowers, trees, and shrubs to beautify his surroundings.

There are other situations in which an individual and his environment depend on group action, either officially or unofficially. The municipality is usually involved when a sewer system is established. The county, state, and/or federal governments influence the development and location of highways and airports.

Many cooperative programs in the public interest are supported with public funds, and it is logical that the individual citizen should be aware of, or involved in, the way public property, such as parks, are developed and used. There are literally dozens of situations where the individual will have a special or passive interest in environmental related factors and trade-offs. This lesson should be a summary of all that has gone before.

Often there is a communication gap between community officials and citizens with regard to local objectives, alternatives, and problems. Officials have difficulty perceiving what citizens want, and citizens may not understand all the problems and issues involved. Each public policy decision in the environmental area has costs and benefits to be considered. These costs and benefits have to be measured in terms of dollars, social and cultural effects, time and environmental impact. Environmental quality in the local area is a major issue that requires full understanding and cooperation of all involved. It is important that course participants realize the importance of citizen participation. Solutions to problems will not be arrived at without a certain degree of compromise. It is important that the individual understand such trade-offs and the likelihood of problems that will be associated with alternative solutions to local problems.

Teaching Activity

There are two suggested teaching activities for the final lesson. A field trip, carefully arranged to view, study, and discuss the factors affecting the environment and discussed in the first nine lessons, would be highly desirable. This might include visits to developing areas and such public developments as power plants, highways, airports, or residential areas. Visits to rural areas, recreation areas, farms, or areas involving water management would also be educational. Field trips may mean an all-day session.

Where a field trip is not possible, the following activity could be considered:

NOTICE: Public hearing of the Environmental Impact Review Commission, to

hear proposals and determine the best course of action for the Tallyho watershed.

Have the class divide into groups of 4 or 5 individuals. Each group is to analyze a real or hypothetical local problem and, based on the resources and background they have gained in the earlier stages of the course, present their recommendations to a reviewing commission that in a real situation would make its final decision on the basis of recommendations made by consultant testimony.

The instructor may stage the activity to best fit the needs of the local community. In some cases, a local environment issue may offer sufficient challenge. In other instances, the instructor may wish to offer an entirely hypothetical situation or add certain hyopthetical factors to an already real situation.

To increase the challenge of the situation, qualified members of the class or selected outside people could serve as members of the reviewing commission, which will hear the various cases presented by the class groups. Although a two- or three-member commission will suffice, actual size and make-up are left to the instructor. Types of local officials who could serve on the hypothetical environmental reviewing commission are county supervisors, city councilmen, soil and water conservation district commissioners, state fish and game commission employees, federal resource agency employees, farmers, ranchers, industry representatives, legislators, and any other individuals whose interests or position would in some way or fashion come to bear on an environmental decision.

The instructor may also choose to establish additional parameters with regard to the teaching activity.

REFERENCES

The bibliography that follows was prepared by a special committee of the Soil Conservation Society of America. It contains a great deal of literature on a variety of topics that may be helpful to course participants who are looking for additional information.

NATURAL RESOURCES AND ENVIRONMENT, 1970-71
A bibliography

General

Adams, Alexander B. 1970. *Eleventh hour: a hard look at conservation and the future.* G. P. Putnam's Sons, New York. New York: 378 pp.

American Chemical Society. 1969. *Cleaning our environment: the chemical basis for action.* Washington, D. C. 249 pp.

Arthur, Don R. 1970 (second edition). *Man and his environment.* American Elsevier Publishing Company, New York, New York. 218 pp.

Arvill, Robert. 1970. *Man and environment.* Penguin Book Company, New York, New York. 332 pp.

Benarde, Melvin A. 1970. *Our precarious habitat.* W. W. Norton and Company, Inc., New York, New York. 362 pp.

Berkowitz and Squires, editors. 1971. *Power generation and environmental change.* MIT P Cambridge, Massachusetts. 440 pp.

Blau, Sheridan D., and John von B. Rodenbeck. 1971. *The house we live in.* Macmillan Company, New York, New York. 515 pp.

Bracey, H. E. 1970. *People and the countryside.* Routledge and Keegan, London, England. 310 pp.

Brierley, John Keith. 1970. *A natural history of man.* Heinemann Educational Books, Ltd., London, England. 184 pp.

Brown, Hastings, Palmer. 1970. *The biological clock.* Academic Press, Inc., New York, New York. 94 pp.

Brown, William E. 1971. *Island of hope.* National Recreation and Park Association, Washington, D. C. 194 pp.

Burch, William R., Jr. 1971. *Daydreams and nightmares: a sociological essay on the American environment.* Harper and Row, New York, New York. 175 pp.

Cailliet, Greg, Paulette Setzer, and Milton Love. 1971. *Everyman's guide to ecological living.* Macmillan Company, New York, New York. 119 pp.

Caldwell, Lynton Keith. 1970. *Environment.* Natural History Press, New York, New York. 292 pp.

Caras, Roger A. 1971. *Death as a way of life.* Little, Brown and Company, Boston, Massachusetts.

Carvell, Fred, and Max Tadlock. 1971. *It's not too late.* Glencoe Press, Beverly Hills, California. 312 pp.

Caudell, H. M. 1971. *My land is dying.* Dutton and Company, Inc., New York, New York.

Commoner, Barry. 1971. *The closing circle: nature, man, and technology.* Alfred A. Knopf, New York, New York. 326 pp.

Commoner, Barry. 1970. *Science and survival.* Viking Press, New York, New York. 150 pp.

Cotton, Steve, editor. 1970. *Earth day—the beginning: a guide for survival.* Bantam Books, New York, New York. 233 pp.

Darmstadter, Joel, Perry D. Teitlebaum, and Jaroslav G. Polach. 1971. *Energy in the world economy: a statistical review of trends in output, trade, and consumption since 1925.* Johns Hopkins Press, Baltimore, Maryland. 876 pp.

Dasmann, Raymond F. 1970. *A different kind of country.* Collier Books, New York, New York. 268 pp.

De Bell, Garrett, editor. 1970. *The environmental handbook.* Ballantine Books, New York, New York. 367 pp.

Detwyler, Thomas R., editor. 1971. *Man's impact on environment* McGraw-Hill Book Company, New York, New York. 731 pp.

Dorst, Jean. 1970. *Before nature dies.* Houghton Mifflin Company, Boston, Massachusetts. 367 pp.

Douglas, Donald G., and John R. Stewart. 1970. *The vanishing landscape.* National Textbook Company, Skokie, Illinois. 212 pp.

Editors of Fortune. 1970. *The Environment.* Harper and Row, New York, New York. 220 pp.

Editors of Ramparts. 1970. *Eco-catastrophe.* Harper and Row, New York, New York. 158 pp.

Ehrlich, Paul R., and Richard L. Harriman. 1971. *How to be a survivor.* Ballantine Books, Inc., New York, New York. 207 pp.

Eiseley, Loren. 1970. *The invisible pyramid.* Chas. Scribner's Sons, New York, New York. 173 pp.

Elder, Frederick. 1970. *Crisis in Eden.* Abingdon Press, New York, New York. 173 pp.

Elrick, D. E., editor. 1970. *Environmental change: focus on Ontario.* Science Research Associates, Ltd., Don Mills, Ontario. 173 pp.

Ewald, William R., Jr., editor. 1971. *Environment for man.* Indiana University Press, Bloomington, Indiana. 308 pp.

Fabun, Don. 1971. *Dimensions of change.* Glencoe Press, Beverly Hills, California. 230 pp.

Falk, Richard. 1971. *This endangered planet: prospects and proposals for human survival.* Random House, New York, New York. 485 pp.

Fanning, Odom. 1971. *Opportunities in environmental careers.* Universal Publishing Company, New York, New York. 271 pp.

Forrester, Jay. 1971. *World dynamics.* Wright-Allen Press, Cambridge, Massachusetts. 142 pp.

Gilbert, Douglas L. 1971. *Natural resources and public relations.* The Wildlife Society, Washington, D. C. 320 pp.

Goldstein, Jerome, editor. 1971. *How to manage your company ecologically.* Rodale Press, Inc., Emmaus, Pennsylvania. 119 pp.

Grunwald, Joseph, and Philip Musgrove. 1970. *Natural resources in Latin American development.* Johns Hopkins Press, Baltimore, Maryland. 494 pp.

Hall, Marie Boas. 1970. *Nature and nature's laws.* Walker and Company, New York, New York. 381 pp.

Harmer, Ruth Mulvey. 1971. *Unfit for human consumption.* Prentice Hall, Englewood Cliffs, New Jersey. 374 pp.

Harney, T. R., and R. Disch. 1971. *The dying generations.* Dell Publishing Company, New York, New York. 423 pp.

Helfrich, Harold W., editor. 1970. *The environmental crisis.* Yale University Press, New Haven, Connecticut. 187 pp.

Henshaw, Paul S. 1971. *This side of yesterday: extinction or utopia.* John Wiley and Sons, Inc., New York, New York. 186 pp.

Herbert, Frank, editor. 1970. *New world or no world: our ecology crisis and what to do about it.* Ace Books, New York, New York. 254 pp.

Hickel, Walter. 1971. *Who owns America?* Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Hottel, H. C., and J. B. Howard. 1971. *New energy technology: some facts and assessments.* MIT Press, Cambridge, Massachusetts. 364 pp.

Hunter, Beatrice Trum. 1971. *Consumer beware!* Simon and Schuster, New York, New York. 442 pp.

Institute of Ecology. 1971. *Man in the living environment.* Chicago, Illinois. 267 pp.

Jacoby, Erich H. 1971. *Man and the land: the fundamental issue in development.* Andre Deutsch Ltd., London, England 400 pp.

Johnson, Cecil E. 1970. *Eco-crisis.* John Wiley and Sons, Inc., New York, New York. 182 pp.

Klausner, Samuel Z. 1971. *On man and his environment.* Jossey-Bass, San Francisco, California. 224 pp.

Kneese, Allen V., Robert U. Ayres, and Ralph C. D'Arge. 1970. *Economics and the environment.* Resources for the Future, Inc., Washington, D. C. 119 pp.

Klotz, John William. 1971. *Ecology crisis.* Concordia Publishing House, St. Louis, Missouri. 176 pp.

Laycock, George. 1970. *The diligent destroyers.* Audubon/Ballantine Books, New York, New York. 243 pp.

Lees, Carlton B. 1970. *Gardens and man.* Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 251 pp.

Lindsey, Hal. 1971. *The late great planet earth.* Londerman Publishing Company, Grand Rapids, Michigan.

Linton, Ron M. 1970. *Terracide* Little, Brown and Company, Boston, Massachusetts. 376 pp.
Little, Charles E., and John G. Mitchell. 1971. *Space for survival.* Pocket Books, New York, New York, 228 pp.
Littleton, Taylor, editor. 1970. *Approaching the benign environment.* University of Alabama Press, University, Alabama.
Love, Glen A., and Rhoda M. Love. 1970. *Ecological crisis.* Jovanovich, Inc., New York, New York. 342 pp.
Mannix, Daniel P. 1971. *Troubled waters.* News Pocket Books, New York, New York. 185 pp.
Marine, Gene. 1970. *America the raped.* Simon and Schuster, New York, New York. 331 pp.
Massachusetts Institute of Technology. 1970. *Man's impact on the global environment.* MIT Press, Cambridge, Massachusetts 319 pp.
Mayr, Ernest. 1970. *Populations, species, and evolution.* Harvard University Press, Boston, Massachusetts. 453 pp.
McNall, P. E., and Harry B. Kircher. 1970 (third edition). *Our natural resources.* Interstate Printers and Publishers, Danville, Illinois. 296 pp.
Michener, James A. 1971. *The quality of life.* Fawcett Publications, Inc., New York, New York. 128 pp.
Milne, Lorus, and Margery Milne. 1970. *The nature of life, earth, plants, animals, man and their effect on each other.* Crown Publishing Company, New York, New York. 316 pp.
Murdoch, William W., editor. 1971. *Environment: resources, pollution and society.* Sinauer Associates, Inc., Stamford Connecticut. 440 pp.
Nicholson, Max. 1970. *The environmental revolution.* McGraw-Hill Book Company, New York, New York. 366 pp.
Odum, Howard T. 1970. *Environment, power and society.* Wiley-Interscience, New York, New York. 336 pp.
Opie, John, editor. 1971. *Americans and environment.* D. C. Heath and Company, Lexington, Massachusetts. 203 pp.
Owen, Oliver S. 1971. *Natural resource conservation.* Macmillan Company, New York, New York. 594 pp.
Pauline, Lawrence J., and Howard Weishaus. 1971. *Ecology: man's relationship to his environment.* Oxford Book Company Inc., New York, New York. 211 pp.
Pringle, Laurence. 1971. *The only earth we have.* Macmillan Company, New York, New York. 95 pp.
Rienow, Robert, and Leona T. Rienow. 1970. *Man against his environment.* Sierra Club/Ballantine Books, New York, New York. 307 pp.
Rockefeller, Nelson A. 1970. *Our environment can be saved.* Doubleday and Company, Inc., New York, New York. 176 pp.
Roueche, Berton. 1970. *What's left.* Berkley Publishing Corporation, New York, New York. 158 pp.
Savage, Henry, Jr. 1970. *Lost heritage* William Morrow and Company, Inc., New York, New York. 329 pp.
Segerberg, Osborn. 1970. *Where have all the flowers, fishes, birds, trees, water, and air gone?* David McKay Company, New York, New York. 303 pp.
Shiloh, Ailon. 1971. *Alternatives to doomsday.* Berger Press, Pittsburgh, Pennsylvania. 160 pp.
Shoenfeld, Clay. 1971. *Everybody's ecology: a field guide to pleasure in the out-of-doors.* A. S. Barnes and Company, Cranbury, New Jersey. 316 pp.
Shortney, Joan. 1971 (revised). *How to live on nothing.* News Pocket Books, New York, New York. 336 pp.
Smith, Guy-Harold, editor. 1971. *Conservation of natural resources* (fourth edition). John Wiley and Sons, Inc., New York, New York. 685 pp.
Snyder, Ernest E. 1971. *Please stop killing me!* New American Library, New York, New York. 207 pp.
Stoltenberg, Carl H., Kenneth D. Ware, Robert J. Marty, Robert D. Wray, and J. D. Wellons. 1971. *Planning research for resource decisions.* Iowa State University Press, Ames, Iowa. 183 pp.
Stultifer, Morton. 1971. *The case for extinction: an answer for conservationists.* Dial Press, New York, New York. 88 pp.
Szent-Gyorgyi, Albert. 1970. *The crazy ape.* Philosphical Library, New York, New York. 93 pp.
Szent-Gyorgyi, Albert. 1971. *What next?!.* Philosophical Library, New York, New York. 68 pp.
Taylor, Gordon Rattray. 1970. *The doomsday book.* Fawcett Publications, Inc., Greenwich, Connecticut. 320 pp.
United Nations Educational, Scientific and Cultural Organization. 1970. *Use and conservation of the biosphere.* Unipub, Inc., New York, New York. 272 pp.
U.S. News and World Report. 1970. *Our poisoned planet: can we save it?* Washington, D. C. 256 pp.
Van Sickle, Dirck. 1971. *The ecological citizen.* Harper and Row, New York, New York. 295 pp.
Wagner, Richard H. 1971. *Environment and man.* W. W. Norton and Company, Inc., New York, New York. 491 pp.
Zurhorst, Charles. 1970. *The conservation fraud,* Cowles Book Company, Inc., New York, New York. 164 pp.

Air

Barry, R. G., and R. J. Chorley. 1970. *Atmosphere, weather and climate.* Holt, Rinehart and Winston, Inc., New York, New York. 320 pp.
Conservation Foundation. 1970, *Your right to clean air a manual for citizen action.* Washington, D. C. 108 pp.
Esposito, John C. 1970 *Vanishing air, Ralph Nader's study group report on air pollution.* Grossmann Publishers, Inc., New York, New York. 328 pp.
Massachusetts Institute of Technology. 1971. *Inadvertent climate modification.* MIT Press, Cambridge, Massachusetts. 308 pp.
Matthews, William H., William W. Kellogg, and G. D. Robinson, editors. 1971. *Man's impact on the climate.* MIT Press, Cambridge, Massachusetts. 594 pp.

Forests

Clepper, Henry. 1971. *Professional forestry in the U.S.* Johns Hopkins Press, Baltimore, Maryland. 337 pp.
Ketchum, Richard M. 1970. *The secret life of the forest.* American Heritage Press, New York, New York. 111 pp.
Worrell, Albert C. 1970. *Principles of forest policy.* McGraw-Hill Book Company, New York, New York.

Grasslands

Humphrey, Robert R. 1970. *Arizona range grasses: their description, forage value and management.* University of Arizona Press, Tueson, Arizona; 159 pp.
Moore, Raymond Milton. 1970. *Australian grasslands.* Australian National University Press. 455 pp.
Vallentine, John F. 1971. *Range development and improvement.* Brigham Young University Press, Provo, Utah. 516 pp.

Human Populations

Adams, Lowell, editor. 1970. *Population ecology.* Dickenson Publishing Company, Inc., Belmont, California. 160 pp.
Aldrich, Daniel G., editor. 1970. *Research for the world food crisis.* American Association for the Advancement of Science. 323 pp.
Borgstrom, G. 1971. *Too many.* Colliers Books, New York, New York.
Demko, George J., Harold M. Rose, and George A. Schnell. 1970. *Population geography: a reader.* McGraw-Hill Book Company, New York, New York. 526 pp.
Ehrlich, Paul R., and Anne H. Ehrlich. 1970. *Population, resources, environment: issues in human ecology.* W. H. Freeman and Company, San Francisco, California. 383 pp.
Fraser, Dean. 1971. *The people problem* Indiana University Press, Bloomington, Indiana. 248 pp.
Hinriehs, Noel. 1971. *Population, environment and people.* McGraw-Hill Book Company, New York, New York. 227 pp.

McCue, Gerald M., William R. Ewald, and the Midwest Research Institute. 1970. *Creating the human environment.* University of Illinois Press, Urbana, Illinois. 339 pp.

Tamplin, Arthur R., and John W. Gofman. 1970. *Population control through nuclear pollution.* Nelson-Hall, Chicago, Illinois. 242 pp.

Tydings, Joseph D. 1970. *Born to starve.* William Morrow and Company, Inc., New York, New York. 159 pp.

Soil

Batten, J. W., and J. S. Gibson. 1970. *Soils: their nature, classes, distribution, uses and care.* University of Alabama Press, University, Alabama. 296 pp.

Bowles, Joseph. 1970. *Engineering properties of soils and their measurement.* McGraw-Hill Book Company, New York, New York. 187 pp.

Donahue, Roy L. 1970. (third edition). *Our soils and their management, increasing production through soil and water conservation.* Interstate Printers and Publishers, Inc., Danville, Illinois. 683 pp.

Hudson, Norman. 1971. *Soil conservation.* Cornell University Press, Ithaca, New York. 320 pp.

National Association of Counties Research Foundation. 1970. *Community action guidebook for soil erosion and sediment control.* Washington, D. C. 64 pp.

Szabolcs, I., editor. 1971. *European solonetz soils and their reclamation.* Akademiai Kiado Publishing House, Budapest, Hungary. 204 pp.

Zacher, Dusan. 1970. *Soil erosion.* Slovak Academy of Sciences, Bratislava, Czechoslovakia. 528 pp.

Water

Alexander, Lewis M., editor. 1971. *Law of the sea: the United Nations and ocean management.* University of Rhode Island, Kingston, Rhode Island. 390 pp.

American Institute of Chemical Engineers. 1970. *Water.* New York, New York. 610 pp.

American Water Works Association. 1971 (third edition). *Water quality treatment, a handbook of public water supplies.* McGraw-Hill Book Company, New York, New York. 672 pp.

Amos, William H. 1970. *The infinite river.* Random House, New York, New York. 269 pp.

Braun, Ernest, and Davis Cavagnaro. 1971. *Living water.* American West Publishing Company, Palo Alto, California. 184 pp.

Brown, Alison Leadley. 1971. *Ecology of fresh water.* Harvard University Press, Cambridge, Massachusetts. 130 pp.

Eagleson, Peter S. 1970. *Dynamic hydrology.* McGraw-Hill Book Company, New York, New York. 462 pp.

Ellis, H. H., J. H. Beuscher, C. D. Howard, and J. P. DeBraal. 1971. *Water—use, law and administration in Wisconsin.* University of Wisconsin Extension Law Department, Madison, Wisconsin. 720 pp.

Environmental Protection Agency. 1971. *Ocean disposal of barge-delivered liquid and solid wastes from U.S. coastal cities.* U.S. Government Printing Office, Washington, D. C. 119 pp.

Gibson, Ulric, and Rexford D. Singer. 1971. *Water well manual.* Premier Press, Berkeley, California. 156 pp.

Goldstein, Jon H. 1971. *Competition for wetlands in the Midwest.* Johns Hopkins Press, Baltimore, Maryland. 105 pp.

Graf, Walter Hans. 1971. *Hydraulics of sediment transport.* McGraw-Hill Book Company, New York, New York. 513 pp.

Hall, Warren A., and John A. Dracup. 1970. *Water resources systems engineering.* McGraw-Hill Book Company, New York, New York. 372 pp.

Hartman, L. M., and Don Seastone. 1970. *Water transfers: economic efficiency and alternative institutions.* Johns Hopkins Press, Baltimore, Maryland. 127 pp.

Heindl, L. A. 1970. *The water we live by.* Longmans Canada, Ltd., Toronto, Ontario. 127 pp.

Hood, Donald W., editor. 1971. *Impingement of man on the oceans.* John Wiley and Sons, Inc., New York, New York. 738 pp.

Howe, Charles W., and K. William Easter. 1971. *Interbasin transfers of water.* Johns Hopkins Press, Baltimore, Maryland. 196 pp.

Howe, Charles W. 1971. *Benefit-cost analysis for water system planning.* Publication Press, Inc., Baltimore, Maryland. 144 pp.

Hynes, H. B. W. 1970. *The ecology of running waters.* University of Toronto Press, Toronto, Ontario. 555 pp.

James, L. Douglas, and Robert R. Lee. 1971. *Economics of water resources planning.* McGraw-Hill Book Company, New York, New York. 615 pp.

Lauff, George H., editor. 1967. *Estuaries.* American Association for the Advancement of Science, Washington, D. C. 757 pp.

Morgan, Arthur E. 1971. *Dams and other disasters.* Porter Sargent, Boston, Massachusetts. 384 pp.

Platt, Rutherford. 1971. *Water: the wonder of life.* Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 274 pp.

Russell, Clifford S., David G. Arey, and Robert W. Kates. 1970. *Drought and water supply: implications of the Massachusetts Experiment for municipal planning.* Johns Hopkins Press, Baltimore, Maryland. 232 pp.

Walton, William C. 1970. *Groundwater resource evaluation.* McGraw-Hill Book Company, New York, New York. 664 pp.

Walton, William C. 1970. *The world of water.* Taplinger Publishing Company, New York, New York. 318 pp.

Water Information Center. 1970. *The water encyclopedia.* Port Washington, New York. 559 pp.

Wollman, Nathaniel, and Gilbert W. Bonem. 1971. *The outlook for water.* Johns Hopkins Press, Baltimore, Maryland. 286 pp.

Wildlife

Benson, Norman G., editor. 1970. *A century of fisheries in North America.* American Fisheries Society, Washington, D. C. 330 pp.

Guggisberg, C. A. W. 1970. *Man and wildlife.* Evans Brothers, London, England. 224 pp.

Hall, Gordon E., editor. 1971. *Reservoir fisheries and limnology.* American Fisheries Society, Washington, D. C. 511 pp.

Hoffmeister, Donald F. 1971. *Mammals of Grand Canyon.* University of Illinois Press, Urbana, Illinois. 183 pp.

McCoy, J. J. 1970. *Saving our wildlife.* Crowell-Collier, New York, New York. 232 pp.

Mech, L. David. 1970. *The wolf.* Natural History Press, Garden City, New York. 384 pp.

National Research Council. 1970. *Land use and wildlife resources.* National Academy of Sciences, Washington, D. C. 262 pp.

Olson, Jack. 1971. *Slaughter the animals: poison the earth.* Simon and Schuster, New York, New York. 288 pp.

Philip, Duke of Edinburgh, and James Fisher. 1970. *Wildlife crisis.* Cowles Book Company, Inc., New York, New York. 256 pp.

Roosevelt, Nicholas. 1970. *Conservation: now or never.* Dodd, Mead and Company, New York, New York. 238 pp.

Teague, R. D., editor. 1971. *A manual of wildlife conservation.* The Wildlife Society, Washington, D. C. 206 pp.

Van Dersal, William R. 1970 (revised). *Wildlife for America.* Henry Z. Walck, New York, New York. 160 pp.

Agriculture

American Society of Agronomy. 1971. *Agronomy in a changing world and research needs for the seventies.* Madison, Wisconsin. 66 pp.

Brown, Lester R. 1970. *Seeds of change, the green revolution and development in the 1970s.* Praeger Publishers, New

York, New York. 205 pp.
Clark, Colin. 1970 (second edition). *The economics of irrigation.* Pergamon Press, Inc., Elmsford, New York. 155 pp.
Clawson, Marion, Hans H. Landsberg, and Lyle T. Alexander. 1971. *The agricultural potential of the Middle East.* American Elsevier Publishing Company, New York, New York. 312 pp.
Crossom, Pierre R. 1970. *Agricultural development and productivity—lessons from the Chilean experience.* Johns Hopkins Press, Baltimore, Maryland. 198 pp.
Eastin, J. D., and R. D. Munson, editors. 1971. *Moving off the yield plateau.* American Society of Agronomy, Madison, Wisconsin. 89 pp.
Engelstad, O. P., editor. 1970. *Nutrient mobility in soils: accumulation and losses.* Soil Science Society of America, Madison, Wisconsin.
Evenari, Michael, Leslie Shanan, and Naphtali Tadmore. 1971. *The Negev: the challenge of a desert.* Harvard University Press, Cambridge, Massachusetts. 345 pp.
Fletcher, Lehman, Eric Graber, William Merrill, and Erik Thornbecke. 1970. *Guatemala's economic development: the role of agriculture.* Iowa State University Press, Ames, Iowa. 212 pp.
Hayami, Yujiro, and Vernon W. Ruttan. 1971. *Agricultural development: an international perspective.* Johns Hopkins Press, Baltimore, Maryland. 367 pp.
McVickar, Malcolm H. 1970. *Using commercial fertilizers.* Interstate Printers and Publishers, Inc., Danville, Illinois. 352 pp.
National Farm Institute. 1970. *Corporate farming and the family farm.* Iowa State University Press, Ames, Iowa. 118 pp.
Olson, R. A., T. J. Army, J. J. Hanway, and V. J. Kilmer, editors. 1971 (second edition). *Fertilizer technology and use.* Soil Science Society of America, Madison, Wisconsin. 611 pp.
Resources for the Future, Inc. 1971. *Agricultural development in the Mekong Basin: goals, priorities, and strategies.* Johns Hopkins Press, Baltimore, Maryland. 108 pp.
Schran, Peter. 1970. *The development of Chinese agriculture, 1950-1959.* University of Illinois Press, Urbana, Illinois. 240 pp.
Taylor, Henry C. 1970. *Tarpleywich, a century of Iowa farming.* Iowa State University Press, Ames, Iowa. 134 pp.

Ecology

Alexander, Martin. 1971. *Microbial ecology.* John Wiley and Sons, Inc., New York, New York. 511 pp.
Andrewartha, H. G. 1971 (second edition). *Introduction to the study of animal populations.* University of Chicago Press, Chicago, Illinois. 283 pp.
Boughey, Arthur S. 1971. *Fundamental ecology.* Intext Educational Publishers, San Francisco, California. 222 pp.
Boughey, Arthur S. 1971. *Man and the environment.* Macmillan Company, New York, New York. 472 pp.
Dasmann, Raymond F. 1971. *No further retreat.* Macmillan Company, New York, New York. 244 pp.
Dickinson, Robert E. 1970. *Regional ecology—the study of man's environment.* John Wiley and Sons, Inc., New York, New York. 199 pp.
Ellenberg, Heinz, editor. 1971. *Integrated experimental ecology.* Springer-Verlag-Heidelberg, New York, New York.
Handler, Philip, editor. 1970. *Biology and the future of man.* Oxford University Press, New York, New York. 936 pp.
Jacobs, J., O. L. Lang, J. S. Olson, W. Wieser, editors. 1971. *Ecological studies.* (volume 2). Springer-Verlag-Heidelberg, New York, New York.
Kinne, Otto, editor. 1970. *Marine ecology, environmental factors.* Wiley-Interscience, New York, New York. 681 pp.
McHale, John. 1970. *The ecological context.* George Braziller, New York, New York. 188 pp.
McLaren, Ian A., editor. 1971. *Natural regulation of animal populations.* Atherton Press, Chicago, Illinois. 195 pp.
Milne, Lorus, and Margery Milne. 1971. *The arena of life.* Natural History Press, Garden City, New York. 351 pp.
National Academy of Sciences. 1971. *Research programs constituting U.S. participation in the International Biological Program.* Washington, D. C. 121 pp.
Odum, Eugene P. 1971 (third edition). *Fundamentals of ecology.* W. B. Saunders Company, Philadelphia, Pennsylvania. 574 pp.
Patten, Bernard C., editor. 1971. *Systems analysis and simulation in ecology.* Academic Press, New York, New York. 607 pp.
Phillipson, J., editor. 1970. *Methods of study in soil ecology.* United Nations Educational, Scientific and Cultural Organizations, New York, New York. 303 pp.
Scientific American. 1970. *Special issue on the biosphere (September).* 266 pp.
Spedding, C. R. W. 1971. *Grassland ecology.* Oxford Press, Clarendon, London, England. 221 pp.
United Nations Educational, Scientific and Cultural Organizations. 1970. *Ecology of the subarctic regions.* United Nations, New York, New York.
Vernberg, J. R., and W. B. Vernberg. 1971. *The animal and the environment.* Holt Rinehard and Winston, New York, New York. 398 pp.
Whittaker, Robert H. 1970. *Communities and ecosystems.* Macmillan Company, New York, New York. 162 pp.

Land Use

Creighton, Roger L. 1970. *Urban transportation planning.* University of Illinois Press, Urbana, Illinois. 375 pp.
Erber, Ernest, editor. 1970. *Soils: their nature, classes, distribution, uses and care.* University of Alabama Press, University, Alabama. 296 pp.
Flawn, Peter T. 1970. *Environmental geology: land-use planning and resource management.* Harper and Row, New York, New York. 313 pp.
Pyles, H. K., editor. 1970. *What's ahead for our public lands?* Natural Resources Council of America, Washington, D. C. 360 pp.
Robinson, John. 1971. *Highways and our environment.* McGraw-Hill Book Company, New York, New York. 340 pp.
Shomon, Joseph James. 1971. *Open land for urban America.* Johns Hopkins Press, Baltimore, Maryland. 206 pp.
Strong, Ann Louise. 1971. *Planned urban environments.* Johns Hopkins Press, Baltimore, Maryland. 406 pp.
Sutton, S. B., editor. 1971. *Civilizing American cities: a selection of Frederick Law Olmsted's writing on city landscapes.* MIT Press, Cambridge, Massachusetts. 310 pp.

Law, Legislation and Politics

Andrassy, Juraj. 1970. *International law and the resources of the sea.* Columbia University Press, New York, New York. 191 pp.
Baldwin, Malcolm, and James K. Page, Jr., editors. 1970. *Law and the environment.* Walker and Company, New York, New York. 432 pp.
Citizens Advisory Committee on Environmental Quality. 1970. *Community action for environmental quality.* U.S. Government Printing Office, Washington, D. C. 42 pp.
Cooley, Richard A., and Geoffrey Wandesforde-Smith, editors. 1970. *Congress and the environment.* University of Washington Press, Seattle, Washington. 277 pp.
Davies, J. Clarence, III. 1970. *The politics of pollution.* Pegasus, New York, New York. 231 pp.
De Bell, Garrett. 1970. *The environment, the establishment and the law.* Houghton Mifflin Company, Boston, Massachusetts. 233 pp.
Dunscombe, Carroll. 1970. *Riparian and littoral rights: a survey of some of the legal problems involved in residential and commercial uses along the water's edge in relation to the substantive aspects of public policy.* William-Frederick

Press. New York, New York. 84 pp.
Grad, Frank P., George W. Rathjens, and Albert J. Rosenthal. 1971. *Environmental control: priorities, policies, and the law.* Columbia University Press, New York, New York. 311 pp.
Gray, Oscar S. 1970. *Environmental law, cases and materials.* Bureau of National Affairs, Inc., Washington, D. C. 1,252 pp.
Henkin, Harmon. 1971. *The environment, the establishment and the law.* Houghton Mifflin Company, Boston, Massachusetts. 223 pp.
Landau, Norman J., and Paul D. Rheingold. 1971. *The environmental law handbook.* Ballantine Books, New York, New York. 496 pp.
Levi, Donald R. 1971. *Agricultural law.* Lucas Brothers Publishers, Columbia, Missouri. 329 pp.
Natural Resources Journal. 1971. *Environmental policy: theory, concepts and process.* (July). University of New Mexico School of Law, Albuquerque, New Mexico. 403-594 pp.
Padelford, Norman J., and Jerry E. Cook. 1971. *New dimensions for U.S. marine policy.* MIT Press, Cambridge, Massachusetts. 250 pp.
Public Land Law Review Commission. 1970. *One-third of the nation's land.* U.S. Government Printing Office, Washington, D. C. 342 pp.
Ridgeway, James. 1970. *The politics of ecology.* E. P. Dutton and Company, Inc., New York, New York. 222 pp.
Sax, Joseph L. 1971. *Defending the environment: water law, planning and policy.* Alfred A. Knopf, New York, New York. 252 pp.
Sloan, Irving J. 1971. *Environment and the law.* Oceana Publications, Inc., Dobbs Ferry, New York. 120 pp.

Outdoor Recreation

Artz, Robert M., and Hubert Bermont, editors. 1970. *Guide to new approaches to financing parks and recreation.* National Recreation and Park Association, Washington, D. C.
Clawson, Marion, and Jack L. Knetsch. 1971. *Economics of outdoor recreation.* Johns Hopkins Press, Baltimore, Maryland. 328 pp.
Johnson, Warren A. 1971. *Public parks on private land in England and Wales.* Johns Hopkins Press, Baltimore, Maryland. 136 pp.
Rutledge, Albert J. 1971. *Anatomy of a park: the essentials of recreation area planning and design.* McGraw-Hill Book Company, New York, New York. 180 pp.

Pesticides

Epstein, Samuel S., and Marvin S. Legator. 1971. *The mutagenicity of pesticides.* MIT Press, Cambridge, Massachusetts. 220 pp.
Graham, Frank, Jr. 1970. *Since silent spring.* Houghton Mifflin Company, Boston, Massachusetts. 333 pp.
Pimentel, David. 1971. *Ecological effects of pesticides on non-target species.* Executive Office of the President, Washington, D. C. 220 pp.
U.S. Department of Health, Education and Welfare. 1969. *Report of the secretary's Commision on Pesticides and their relationship to environmental health.* U.S. Government Printing Office, Washington, D. C. 677 pp.
Whiteside, Thomas. 1971. *The withering rain.* E. P. Dutton and Company, New York, New York. 224 pp.

Pollution

Brown, Tom. 1971. *Oil on ice.* Sierra Club, San Francisco, California. 159 pp.
Christol, Carl Q. 1971. *Oil pollution of the marine environment—a legal bibliography.* U.S. Government Printing Office, Washington, D. C. 93 pp.
Fellows, James M. 1971. *The water lords: Ralph Nader's study on industry and environmental crisis in Savannah, Georgia.* Grossman Publishers, New York, New York. 294 pp.
Hamblin, Lynette. 1970. *Pollution: the world crisis.* Barnes and Noble, New York, New York. 168 pp.
Imhoff, Karl. 1971. *Disposal of sewage and other water-borne wastes.* Ann Arbor Science, Ann Arbor, Michigan. 405 pp.
Kneese, Allen V., Sidney E. Rolfe, Joseph W. Harned, editors. 1971. *Managing the environment – international and economic cooperation for pollution control.* Praeger Publishers, New York, New York. 356 pp.
Lund, Herbert, editor. 1971. *Industrial pollution control handbook.* McGraw-Hill Book Company, New York, New York. 735 pp.
Marx, Wesley. 1971. *Man and his environment: waste.* Harper and Row, New York, New York. 179 pp.
Montague, Katherine and Peter. 1971. *Mercury.* Sierra Club Battlebook, San Francisco, California. 158 pp.
National Academy of Sciences. 1970. *Eutrophication: causes, consequences, correctives.* Washington, D. C. 661 pp.
National Association of Manufacturers. 1971. *Industry government teleconference on pollution control.* New York, New York. 138 pp.
Nader, Ralph, Study Group. 1970. *Vanishing air.* Grossman Publishers, New York, New York. 310 pp.
Navarra, J. G. 1970. *The world you inherit: a story of pollution.* Natural History Press, Garden City, New York. 192 pp.
Schroeder, Henry A. 1971. *Pollution, profits and progress.* Stephen Greene Press, Brattleboro, Vermont. 136 pp.
Singer, S. Fred. 1970. *Global effects of environmental pollution.* Springer-Verlag, New York, New York. 218 pp.
Stewart, George R. 1970. *Not so rich as you think.* Houghton Mifflin Company, Boston, Massachusetts. 176 pp.
Turk, Amos, Jonathan Turk, and Janet T. Wittes. 1972. *Ecology, pollution, environment.* W. B. Saunders Company, Philadelphia, Pennsylvania. 217 pp.
Turner, James S. 1970. *The chemical feast.* Grossman Publishers, New York, New York. 273 pp.
Warren, Charles W. 1971. *Biology and water pollution control.* W. B. Saunders Company, Philadelphia, Pennsylvania. 480 pp.

Radioactivity

Byerton, Gene. 1970. *Nuclear dilemma.* Ballantine Books, New York, New York. 138 pp.
Curtis, Richard, and Elizabeth Hogan. 1970. *Perils of the peaceful atom.* Ballantine Books, New York, New York. 357 pp.

Solid Wastes

Small, William E. 1970. *Third pollution: the national problem of solid waste disposal.* Praeger Publishers, New York, New York. 173 pp.
U.S. Department of Health, Education and Welfare. 1970. *Developing a state solid waste management plan.* U.S. Government Printing Office, Washington, D. C. 50 pp.
U.S. Department of Health, Education and Welfare. 1970. *Solid waste management: a list of available literature.* Bureau of Solid Waste Management, Cincinnati, Ohio. 19 pp.

Wilderness

Brooks, Paul. 1971. *The pursuit of wilderness.* Houghton Mifflin Company, Boston, Massachusetts. 220 pp.
Darling, Frank Fraser. 1970. *Wilderness and plenty.* Houghton Mifflin Company, Boston, Massachusetts. 84 pp.
Milton, John P. 1970. *Nameless valleys, shining mountains, the record of an expedition into the vanishing wilderness of Alaska's Brooks Range.* Walker and Company, New York, New York. 195 pp.
Swain, Donald C. 1970. *Wilderness defenders.* University of Chicago Press, Chicago, Illinois. 347 pp.

Agencies

Clawson, Marion. 1971. *The Bureau of Land Management.* Praeger Publishers.

New York, New York. 209 pp.
Council on Environmental Quality. 1970. *Environmental quality.* (first annual report). U.S. Government Printing Office, Washington, D. C. 326 pp.
Council on Environmental Quality. 1971. *Environmental quality.* (second annual report). U.S. Government Printing Office, Washington, D. C. 360 pp.
Frome, Michael. 1971. *The Forest Service.* Praeger Publishers, New York, New York. 241 pp.
Mitchell, John G., and Constance L. Stallings, editors. 1970. *Ecotactics, the Sierra Club handbook for environmental activists.* Pocket Books, New York, New York. 288 pp.
Simms, D. Harper. 1970. *The Soil Conservation Service.* Praeger Publishers, New York, New York. 238 pp.
Wilson, Thomas W., Jr. 1971. *International environmental action.* Dunnellen-University Press, Cambridge, Massachusetts. 364 pp.

Education

Brainerd, John W. 1971. *Nature study for conservation: a handbook for environmental education.* Macmillan Company, New York, New York. 352 pp.
Swan, Malcolm D., editor. 1970. *Tips and tricks in outdoor education, approaches to providing children with educational experiences in the out-of-doors.* Interstate Printers and Publishers, Inc., Danville, Illinois. 184 pp.
Terry, Mark. 1971. *Teaching for survival.* Ballantine Books, New York, New York. 213 pp.

History

Biswas, Asit K. 1970. *History of hydrology.* American Elsevier Publishing Company, Inc., New York, New York. 336 pp.
Graham, Frank, Jr. 1971. *Man's dominion: the story of conservation in America.* M. Evans and Company, Inc., New York, New York. 339 pp.
Newton, Norman T. 1971. *Design on the land.* Harvard University Press, Cambridge, Massachusetts. 714 pp.
Pinkett, Harold I. 1970. *Gifford Pinchot, private and public forester.* University of Illinois Press, Urbana, Illinois. 167 pp.
Savage, Henry, Jr. 1970. *Lost heritage.* William Morrow and Company, Inc., New York, New York. 329 pp.
Scott, Roy V. 1971. *The reluctant farmer: the rise of agricultural extension to 1914.* University of Illinois Press, Urbana, Illinois. 362 pp.
Sterling, Philip. 1970. *Sea and earth: the life of Rachel Carson.* Thomas Y. Crowell Company, New York, New York. 213 pp.

Readings

Anderson, Walt, editor. 1970. *Politics and environment: a reader in ecological crisis.* Goodyear Publishing Company, Inc., Pacific Palisades, California. 362 pp.
Brown, H., and E. Hutchings, Jr., editors. 1970. *Are our descendants doomed?* Viking Press, New York, New York.
Chute, Robert M. 1971. *Environmental insight.* Harper and Row, New York, New York. 241 pp.
Dansereau, Pierre, editor. 1970. *Challenge for survival.* Columbia University Press, New York, New York. 235 pp.
Disch, Robert, editor. 1970. *The ecological conscience: values for survival.* Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 206 pp.
Editors of The Progressive Magazine. 1970. *The crisis of survival.* William Morrow and Company, New York, New York. 261 pp.
Ehrlich, Paul, Sir Julian Huxley, Loren Eiseley, Alan Watts, R. Buckminster Fuller, and William O. Douglas. 1971. *Project survival.* HMH Publishing Company, Inc., Chicago, Illinois. 255 pp.
Forstner, Lorne J., and John H. Todd, editors. 1971. *The everlasting universe.* D. C. Heath and Company, Lexington, Massachusetts. 370 pp.
Hamilton, Michael, editor. 1970. *This little planet.* Chas. Scribner's Sons, New York, New York. 241 pp.
Hazen, W. E. 1970. *Readings in population and community ecology.* W. B. Saunders Company, Philadelphia, Pennsylvania. 421 pp.
Holdren, John P., and Paul R. Ehrlich, editors. 1971. *Global ecology: readings toward a rational strategy for man.* Harcourt Brace Jovanovich, Inc., New York, New York. 295 pp.
Jackson, Wes. 1971. *Man and the environment.* W. C. Brown Company, Dubuque, Iowa. 322 pp.
Johnson, C. E. 1970. *Human biology: contemporary readings.* Van Nostrand Reinhold Company, New York, New York. 240 pp.
Johnson, Cecil E. 1972. *The natural world: chaos and conservation.* McGraw-Hill Book Company, New York, New York. 266 pp.
Lee, Douglas, H. K., and David Minard, editors. 1970. *Physiology, environment, and man.* Academic Press, New York, New York. 239 pp.
Meek, Ray L., and John A. Strayer, editors. 1971. *Politics of neglect: the environmental crisis.* Houghton Mifflin Company, Boston, Massachusetts. 256 pp.
Nybakken, James W. 1971. *Readings in marine ecology.* Harper and Row, New York, New York. 544 pp.
Purdom, P. Walton, editor. 1971. *Environmental health.* Academic Press, New York, New York. 584 pp.
Revelle, Roger, Ashok Khosla, and Maris Vinovskis, editors. 1971. *The survival equation.* Houghton Mifflin Company, Boston, Massachusetts.
Sauer, Rob, editor. 1971. *Voyages.* Zero Population Growth/Ballantine Books, New York, New York. 316 pp.
Schoenfeld, Clay, editor. 1971. *Outlines of environmental education.* Dembar Educational Research Services, Inc., Madison, Wisconsin. 246 pp.
Shepard, Paul, and D. McKinley. 1971. *Environmental essays on the planet as a home.* Houghton Mifflin Company, Boston, Massachusetts. 308 pp.
Strobbe, Maurice A. 1971. *Understanding environmental pollution.* C. V. Mosby Company, St. Louis, Missouri. 357 pp.
Weisz, Paul B., editor. 1970. *The contemporary scene: readings on human nature.* McGraw-Hill Book Company, New York, New York. 345 pp.

Bibliographies

Institute of Public Affairs. 1971. *Pollution: a selected bibliography of U.S. Government publications on air, water, and land pollution.* Western Michigan University, Kalamazoo, Michigan.
Palmer, Wayne C., and Lyle M. Denny. 1971. *Drought bibliography.* U.S. Department of Commerce, Silver Spring, Maryland. 236 pp.
van der Leeden, Frits, editor. 1971. *Ground water: a selected bibliography.* Water Information Center, Port Washington, New York. 116 pp.

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