ENVIRONMENT AND NATURAL RESOURCES ACT:

A

REPORT

TO

THE NORTH CAROLINA GENERAL ASSEMBLY

OCTOBER 1970

PREFACE

This Report represents a study conducted by the North Carolina State Department of Public Instruction relative to the Environment and Natural Resources Act enacted by the 1969 General Assembly. Implementation of the recommendations contained herein will, hopefully, generate positive attitudes and action toward the protection of North Carolina's total environment.

For the purposes of this Report, environmental education is defined as education dealing with the relationship between man and his bio-physical environment and is aimed at producing a citizenry which: is aware of environmental interrelationships and processes; understands how to solve environmental problems that arise; and is motivated to work toward their solution.

It includes the study of: ecology and the interaction of events in the natural world which affect the quality of life; environmental contamination and enhancement of natural areas; as well as the impact of technology and human population on our environmental heritage.

TABLE OF CONTENTS

CHAPTER I

THE CHARGE

THE IMPLEMENTATION OF THE STUDY

ACTION TAKEN BY THE TASK FORCE

THE CHARGE

Currently, an environmental conscience seems to be evolving among the citizenry of this nation. North Carolina has been a leader in attempting to arouse this concern. However, to the 1969 North Carolina General Assembly, it appeared that such concern might not be adequately reflected in comprehensive and cooperative action programs in the public schools of the state. The need to foster attitudes and understandings essential for the continuance of a healthy physical and social environment was recognized. To meet this need, the 1969 North Carolina General Assembly passed the Environment and Natural Resources Act. This legislation reflected the concern of legislators for the future quality of the state's environment. Implicit in this policy was the recognition that probably the worst enemy of the environment is ignorance. Thus, to prevent further deterioration and degradation, it was imperative that immediate action be taken to alleviate this basic enemy. The legislation fostered such action.

Specifically, the act directed the State Board of Education " . . . to study the need for and to formulate proposals relating to the introduction into the curriculum in the Public School System of North Carolina of a Study of Environment and Natural Resources . . . . "

The act further directed the study to include an examination of:

- the status of the existing curriculum;
- available textbooks;
- current instruction in other states;
- available curriculum guides and instructional materials;
- the need for in-service education for teachers.

In order to insure the widest possible public participation in the establishment of new directions in education, the act directed the State Board of Education to also hold public hearings.

THE IMPLEMENTATION OF THE STUDY

The State Board of Education and the Superintendent of Public Instruction determined that, in order to accomplish the purposes of the legislative act, the establishment of a Task Force on Environment and Natural Resources would be required. The Task Force needed to be broadly representative of the special areas involved. At its creation, the Task Force on Environment and Natural Resources was composed of forty-two members representing the following agencies, organizations and institutions:

I. State Government--Departments of Administration, Agriculture, Conservation and Development, Health, Social Service, Highway, and Water and Air Resources; the Recreation Commission, the Wildlife Resources Commission and the North Carolina Board of Science and Technology.

II. Federal Agencies--the agencies and services of the Department of Agriculture, the agencies and services of the Department of Health, Education and Welfare, the agencies and services of the Department of the Interior, Regional Commissions, and the National Science Foundation.

III. Institutions of Higher Learning--Schools and departments of education, biological and physical sciences, selected areas of the social sciences, and representatives from community colleges.

IV. Business and Industry--Insurance, banking, wood industries, mining, manufacturing and commercial fishing.

V. Other institutions, agencies and organizations--Farm organizations, civic and service clubs, North Carolina Academy of Science, State Soil and Water Conservation Committee, the North Carolina Committee on Children and Youth, the North Carolina Commission on Population and Family Life.

ACTION TAKEN BY THE TASK FORCE

The major objectives of the study appeared to the Task Force to have already been established by the language of the legislative act. During the 1969-1970 academic year, the Task Force was organized to achieve those objectives. A Steering Committee composed of the Director and five at-large members was charged with directing the work of the Task Force. The Committee felt the study could best be carried out through the selection of four working committees from the Task Force membership. The Honorable Norwood E. Bryan, Jr., Representative of Cumberland County, was selected as chairman of the Steering Committee. It was decided that each remaining member would chair one of the four working committees.

The Working Committee on Teacher Education, chaired by Dr. Calvin Doss of the University of North Carolina at Wilmington, was charged with the responsibilities of:

1. Determining to what extent pre- and in-service teacher education programs in North Carolina provide instruction in the environment and natural resource areas.

2. Surveying pre- and in-service teacher preparation programs in other states to determine to what extent they provide instruction in the environment and natural resource areas.
3. Offering, if necessary, suggestions or recommendations as to what pre- and in-service teacher education programs should include in the environment and natural resource areas.
4. Offering, if necessary, suggestions or recommendations as to what changes should take place in certification requirements of teachers.

The Working Committee on the Efforts of Other Agencies, chaired by Mr. Peter Chenery of the North Carolina Board of Science and Technology was charged with the responsibilities of:

1. Surveying public and private agencies, institutions and groups to determine what they are doing to enhance environmental control and natural resource education.
2. Determining, if possible, to what degree efforts of other agencies supplant what is being done in the public schools in the area of environmental control and natural resource use education.
3. Offering, if necessary, suggestions or recommendations as to how public schools can better utilize what is being done by other agencies, groups and institutions.

The Working Committee on Position Papers, chaired by Dr. Arthur Cooper of North Carolina State University, was charged with the responsibilities of:

1. Determining what areas are included in environmental studies.
2. Soliciting position papers by authorities as to "What knowledge is of most worth?" in each of these areas.
3. Identifying, from the position papers, those concepts or ideas of most importance.
4. Offering, if necessary, suggestions or recommendations as to what concepts should be reflected in an environment and natural resource curriculum.

The Working Committee on Curriculum, chaired by Dr. Paul B. Hounshell of the University of North Carolina at Chapel Hill, was charged with the responsibilities of:

1. Examining textbooks, grades K-12, utilized in the public schools of North Carolina and ascertaining to what degree information about environment and natural resources may be found in them.
2. Surveying what is being done by other state education agencies in the area of environment and natural resources.
3. Analyzing curriculum materials which have been developed in the environment and natural resource areas for the purpose of determining what has been done regarding curriculum development by others in this area.
4. Comparing ideas presented in position papers with those which are reflected in textbooks and curriculum guides to determine what should be reflected in a curriculum.
5. Recommending what concepts, if any, should be found in an environment and natural resource study and at what level.

The Task Force held its initial meeting on January 6, 1970, at the Faculty Club of North Carolina State University in Raleigh. At that time each committee met and charted its own course of action for the remainder of the spring. Each committee was free to meet at the discretion of its members. The Director requested that all reports to the complete Task Force be presented to him on or before July 1, 1970.

To execute completely the desire of the 1969 General Assembly, the Steering Committee of the Task Force conducted a series of six public hearings to enable the public to express any views concerning the need for, importance of, and suggestions concerning implementing an effective program of environmental education in the public schools of North Carolina.

The public hearings were held in Charlotte, Asheville, Wilmington, Greenville, Winston-Salem, and Raleigh. A brief synopsis of the theme of each hearing is as follows:

CHARLOTTE January 13, 1970 10:00 a.m.

The Charlotte Public Hearing had a large representation from the academic and business community. An overwhelming majority of witnesses appealed to the Steering Committee to recognize that, above all, environmental education centered around the development of a positive environmental attitude. It was felt that there was a need to develop an attitude that would foster a new dimension of concern towards the environment.

ASHEVILLE January 13, 1970 2:00 p.m.

The public hearing held at Asheville had the largest number of witnesses offering their opinions to the Steering Committee. While a number

of those present represented the academic community, an even larger number of students and lay public were heard. The majority of the speakers recognized the attitudinal nature of environmental conservation. However, they felt that it was difficult for any one person to effect change over such a large population as the state of North Carolina. The Steering Committee was encouraged to press for and support stronger laws regulating private and public environmental contamination.

WILMINGTON January 20, 1970 10:00 a.m.

At the Wilmington Public Hearing local citizens representing the business community impressed upon the Committee that they were currently analyzing their companies' impact upon the local environment. The Committee was asked to recognize that past emphasis upon growth and production by a developing country cannot be erased overnight. Also, the job of clean-up will cost everyone--the business community cannot absorb the entire expense. Company representatives reminded everyone that they were very much interested in solving their pollution problems; however, complaints about pollution should be tempered with solutions. At present solutions to all environmental problems do not exist. Some aspect of patience would have to be employed.

GREENVILLE January 20, 1970 2:00 p.m.

The public hearing held in Greenville had a large representation from individuals concerned with public education. Each witness outlined his personal views on the environmental crisis. Representatives from higher education appealed to the Steering Committee to recognize the need for

adequately preparing teachers to implement any program for change. Local business representatives emphasized that their companies recognized their responsibilities and they were currently analyzing the impact of company operations on the state's environmental resources.

WINSTON-SALEM January 27, 1970 10:00 a.m.

The Winston-Salem Public Hearing was widely representative of the community. Witnesses from the academic and business community reminded the Committee of the importance of the interdisciplinary aspects of the approach to the problem. No one subject area presently in our schools could adequately handle the material. In addition, the witnesses emphasized that the approach to environmental education should begin at the earliest possible time in a child's educational experience.

RALEIGH January 27, 1970 2:00 p.m.

The Raleigh Public Hearing provided an opportunity for the Steering Committee of the Task Force to hear witnesses representing various agencies of state government concerned with environmental problems. The witnesses supported the work of the Task Force and emphasized that a great deal of cooperation among state and private agencies is needed if the full potential of the law is to be realized.

It appeared to the Steering Committee that overwhelming public support of the efforts of the Task Force was exhibited at each public hearing.

During the summer of 1970, the Steering Committee reviewed the reports of each working committee and then submitted them to the Director of the Task Force and his staff for the drafting of the final report.

CHAPTER II

REPORT OF THE WORKING COMMITTEE ON TEACHER EDUCATION

WORKING COMMITTEE ON TEACHER EDUCATION

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The Steering Committee of the Task Force on Environment and Natural Resources charged the Teacher Education Committee with the following responsibilities of:

1. Determining to what extent pre- and in-service teacher education programs in North Carolina provide instruction in the environment and natural resource areas.

2. Surveying pre- and in-service teacher preparation programs in other states to determine to what extent they provide instruction in the environment and natural resource areas.

3. Offer, if necessary, suggestions or recommendations as to what pre- and in-service teacher education programs should include in the environment and natural resource areas.

4. Offer, if necessary, suggestions or recommendations as to what changes should take place in certification requirements of teachers.

After an initial meeting, the Committee formally engaged the four major areas of its responsibility. An extensive review of the present state certification requirements was undertaken. The Committee studied at length the various programs offered by the state's institutions of higher learning responsible for the professional preparation of teachers. In addition, the Committee surveyed the in-service programs offered by the State Department of Public Instruction and local systems in an effort to ascertain information concerning the certification renewal programs for teachers which related to environmental education.

The Committee also made inquiries into the pre-service and in-service programs for professional teachers of neighboring states. States contacted were generous with the information they had, but it appeared to the Committee that the area of environment and natural resources was not particularly emphasized in the majority of the states contacted.

After a thorough analysis of the State of North Carolina's teacher certification requirements and an investigation into the requirements of other states, the Working Committee on Teacher Education of the Task Force on Environment and Natural Resources makes the following recommendations:

I. Pre-Service Education

A. We recommend that a study be conducted by the State Board of Education as to the feasibility of changing present certification requirements of primary teachers from six to nine semester hours of science. Three hours of the nine should bnclude instruction in the environment and natural resources. The eighteen hours of science required for an elementary concentration would also include three semester hours of instruction in the environment and natural resource areas.

B. We recommend that a study be conducted by the State Board of Education as to the feasibility of changing certification requirements for secondary teachers to include an interdisciplinary environmental course. Such a course would replace the science elective.

C. Persons possessing certification other than primary, elementary or science would be encouraged to take an interdisciplinary environmental course, plus one elective from the biological, earth or physical sciences.

C. Any proposed course in environment and natural resources at the college or university level should be interdisciplinary. It might include the areas of the: natural sciences, earth sciences, physical sciences, fine arts, social sciences, language arts and professional education.

E. In addition, any proposed interdisciplinary course should be taught by a team of specialists who plan and provide instruction as one cohesive unit, and where possible, resources from industry and government should be utilized.

F. The proposed course would include involving students in a variety of laboratory or environmental experiences.

G. The proposed interdisciplinary course would include a study of environmental problems relevant to man. Such a program would encourage the learner to develop a thorough understanding of the human needs of today's complex society.

A possible outline of such a course follows:

1. Human Needs
   a. Air
   b. Water
   c. Food
   d. Shelter
   e. Clothing
   f. Physical and Mental Well-Being
   g. Transportation and Communications
   h. Space
2. Environmental Sources
   a. Atmospheric Resources
      1) Atmospheric Processes
      2) Air Pollution
      3) Solar Energy as a Source of Power
   b. Water Resources
      1) Marine

a) Food from the Sea

b) Minerals from the Sea

c) Marine Energy Sources

d) Recreation

2) Terrestrial

a) The Hydrologic Cycle

b) Water Requirements and Supplies

c) Water Quality

d) Water Power as a Source of Energy

e) Fresh Water Food Supplies

f) Recreation

c. Land Resources

1) Soil Conservation and Use

a) Agriculture

b) Forestry

c) Grazing

d) Wildlife Conservation and Management

2) Mineral Resources

a) Metals and Non-Metals

b) Energy Sources

(1) Fossil Fuels

(2) Nuclear Fuels

d. Man's Additions

1) Pesticides, Herbicides

2) Urbanization

3) Waste Disposal

3. Constraints

a. Biological

1) Ecological Principles (food chains, types of ecosystems, checks and balances)

2) Population Dynamics

3) Environmental Health

4) Losses (disease, insects, weeds, fire and various other destructive agents)

b. Resource Economics and Policy

1) Scarcity and Value

2) Resources and Economic Development

3) Development of Good Environmental Principles

4) Public vs. Private Responsibility

5) Aesthetics

II. In-Service Education

A. We recommend that good educational principles and practices, including resources from industry, government foundations and so forth, should be utilized in all in-service education programs.

B. It is also felt that the state should use the regular school calendar to find in-service time for environmental education through:

1. Local Workshops

2. Workshops sponsored by the State Department of Public Instruction

3. Extension Courses through Colleges and Universities
4. Local In-Service
    a. Renewal Courses
    b. Educational Tours of Local Environmental Areas
5. Educational Television

C. Special Programs
1. Summer Institutes
2. Academic Year Institutes
3. Topical Courses
4. Seminars

It was the intent of the Working Committee on Teacher Education to offer suggestions to the Task Force to facilitate the implementation of environmental education into the schools of North Carolina. It is important to realize that such an extensive program involving pre-service and in-service education of teachers must be accompanied by a commitment on the part of the state. The importance of the program demands no less.

CHAPTER III

REPORT OF THE WORKING COMMITTEE ON THE EFFORTS OF OTHER AGENCIES

WORKING COMMITTEE ON THE EFFORTS OF OTHER AGENCIES

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The goals of this Committee were as follows:

1. To survey public and private agencies, institutions and groups to determine what they are doing to enhance environmental control and natural resource use education.

2. To determine, if possible, to what degree efforts of other agencies supplant what is being done in the public schools in the area of environmental control and natural resource use education.

3. To offer, if necessary, suggestions or recommendations as to how public schools can better utilize what is being done by other agencies, groups and institutions.

The Committee undertook an effort to collect as much information as possible from those agencies and institutions having any degree of concern with the environment and natural resources. The Department of Education of every state in the Nation was contacted for information concerning its particular environmental education program. Major universities and colleges were also solicited for a description of their efforts in this field. In addition, the Committee surveyed the educational programs provided by North Carolina State Government agencies, federal agencies, and selected private agencies. A careful review of the collected materials was made to determine the nature and extent of these programs.

Recognizing the need for the immediate education of numbers of public school teachers, the Committee first attempted to identify those programs which could immediately be used by educators to more adequately inform themselves about the nature of the current environmental crisis. Agencies were identified which had programs applicable to the education of public school teachers in selected aspects of our present environmental condition. A brief description of these agency programs is listed below:

U. S. GOVERNMENT AGENCIES

U. S. Department of Agriculture

Soil Conservation Service

The Soil Conservation Service is charged with the responsibility for developing and carrying out a comprehensive soil and water conservation program. It aids adults in developing the skills and knowledge needed to develop and execute practical alternatives to land use.

U. S. Department of Health, Education and Welfare

National Air Pollution Control Administration

The National Air Pollution Control Administration conducts a national program for the prevention and control of atmospheric pollution. It operates programs involving regulatory controls, research and development, technical and financial assistance.

The National Air Pollution Control Administration also functions to develop manpower resources through its agency, the Institute for Air Pollution Training. This Institute offers a variety of courses for scientists, engineers, and other professional people interested in the field of air pollution control and related activities.

N. C. STATE GOVERNMENT

Consolidated University of North Carolina

The Consolidated University of North Carolina offers many courses for teachers and other interested adults in the field of environmental science. Specific areas might include Institute for Environmental Health, School of Public Health, Carolina Population Center, Institute of Marine Science at Morehead City, and the Departments of Botany, Zoology, Chemistry and Physics. Much of the emphasis of these Departments is in the area of graduate education, but interested teachers can avail themselves of some of the opportunities they provide.

N. C. State Department of Public Health

The Radiological Health Section

The Radiological Health Section of the Department of Public Health is charged with providing for the radiation safety of the North Carolina public, and users of radiation in North Carolina, through the operation of the North Carolina Radiation Protection Programs. The Radiological Health Section makes its staff available for the presentation of lectures and discussion groups. Professional groups, such as teachers and administrators, as well as medical groups and college and university classes can avail themselves of the services of this Section of the Department.

PRIVATE AGENCIES

The North Carolina Outward Bound School

Outward Bound is an educational concept originated in England over twenty-five years ago by Kurt Hahn. It is a program of outdoor education in the North Carolina mountains. The activities are intense and rigorous and include preparatory training, rock climbing, conditioning and initiative development, rescue and fire training, expeditions, solo experience, and value formation. The students include university and prep-school students, secondary school students, and young job holders.

The Committee also recognized the need to identify those agencies which, through their own information programs, could possibly supply the environmental educator with up-to-date, pertinent information concerning the present environmental crisis. Such information would include supplemental course materials, individual publications, films, and possible field trip locations. Hopefully, such information would be of use to the educator enabling him to refine and enhance his educational program.

A great deal of the data gathered by the Committee was compiled by the Task Force and a publication giving its source, description, and

usability has been produced by the State Department of Public Instruction as a service to the teachers of the state.

The agencies listed below were identified as having information and programs of a supplemental nature applicable to an environmental education program. A brief description of the service of each agency is included.

FEDERAL GOVERNMENT AGENCIES

U. S. Department of Agriculture

Forest Service

The Forest Service is charged with the responsibility for promoting the conservation of the nation's forest lands. This amounts to approximately one-third of the total land area of the United States. The national forests are managed under the twin conservation policies of multiple use and sustained yield.

A catalog listing a series of materials to help teach forest conservation is available. The Service also provides a listing of Forest Service films available on loan for educational purposes to schools, civic groups, churches and television.

Soil Conservation Service

The Soil Conservation Service has the responsibility for developing and carrying out a national soil and water conservation program for soil erosion control, flood prevention, sediment reduction, land-use planning, recreation, beautification, and water development for agriculture, recreation and wildlife.

The Soil and Water Conservation Program is carried out through technical help to locally organized and operated Soil Conservation Districts. More than 3,000 Soil Conservation Districts cover almost two billion acres in the nation. Assistance to districts includes:

1) giving cooperator a soil and land capability map of his land;
2) providing information about practical alternatives for land use;
3) helping to develop an orderly plan and installation of the suggestions needed; and
4) helping with skills and knowledge in the plan's development.

More information may be received by contacting the local or district Soil Conservation Headquarters.

Agricultural Stabilization and Conservation Service

In addition to providing local farmers with (1) price support, (2) production adjustment, and (3) disaster relief, the Agricultural Stabilization and Conservation Service provides conservation and land-use adjustment assistance, carried out through sharing with individual farmers the cost of installing needed soil, water, woodland, and wildlife conserving practices.

National Agricultural Library

The National Agricultural Library provides services to agricultural colleges, research institutions, government agencies, industry, farmers, and the general public. With resources of 1,300,000 volumes, next to the Library of Congress, it is the largest U. S. Government library. Information in the Library's collection is disseminated through loans, photocopies, reference services, and bibliographies (including the Bibliography of Agriculture). It also publishes the Pesticides Documentation Bulletin, a bi-weekly computer produced index of worldwide published literature on pesticides-related research. These services and information from the collection are available to anyone in the United States and abroad.

U. S. Department of Health, Education and Welfare

Public Health Service

Environmental concerns of the Public Health Service include expanded programs for air pollution control and solid waste disposal.

The Public Health Service is the federal agency specifically charged with promoting and assuring the highest level of health attainable for every person, in an environment which contributes positively to healthful individual and family living.

The major environmental functions include:

1) to identify health hazards in man's environment and in the products and services which enter his life; to develop and promulgate, and assure compliance with standards for the control of such hazards;

2) to support the development of, and improvement of, the delivery of comprehensive physical and mental health services to all Americans;
3) to conduct and support research in medical and related sciences furthering the development of health education to insure an adequate supply of qualified health manpower.

Food and Drug Administration

The mission of the Food and Drug Administration is to protect the public health of the Nation as it may be impaired by foods, drugs, cosmetics, therapeutic devices, hazardous household substances, poisons, pesticides, food additives, flammable fabrics and various other types of consumer products.

Environmental Control Administration

The mission of the Environmental Control Administration is to preserve and improve the physical environment in order to promote the health and welfare of man through programs designed to reduce the levels of exposure of people to the hazards of improper housing, noise, rodents, insects, occupational and community accidents, waterborne diseases, radiation, and waste accumulation.

National Air Pollution Control Administration

The National Air Pollution Control Administration's duties are to operate a National program for the prevention and control of air pollution. It encompasses programs for regulatory controls, research and development activities, technical and financial assistance, and the development of air pollution manpower resources.

Institute for Air Pollution Training

The Office of Manpower Development, Institute for Air Pollution Training offers a variety of courses for scientists, engineers, and other professional people in the field of air pollution control and related activities. No tuition or registration fee is charged, but early application is advised since course rosters are limited.

U. S. Department of the Interior

The Department of the Interior is the nation's principal conservation agency. The Department has the basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. The Department works to assure the wisest choice in managing all the Nation's resources so each will make its full contribution to the United States--today and tomorrow.

Bureau of Sport Fisheries and Wildlife

The Bureau of Sport Fisheries and Wildlife handles hunting and fishing license sales and statistics; Federal aid to fish and wildlife restoration; fish and wildlife research; duck stamp data; migratory bird hunting regulations; recreational use of National Wildlife Refuges and National Fish Hatcheries; river-basin studies; pesticide research related to fish and wildlife; rare and endangered wildlife; and photographs.

Bureau of Commercial Fisheries

The Bureau of Commercial Fisheries conducts biological and technical research; market promotion programs; compiles statistical facts on commercial fisheries; makes economic studies; administers fisheries Loan Fund and Commercial Fisheries Research and Development Act; and manages the fur-seal resources of the Pribilof Islands, Alaska.

National Park Service

The National Park Service has information on 259 national park administered areas, including 32 national parks, 11 national recreation areas, seven national seashores, and dozens of national monuments and historic sites.

Bureau of Land Management

The Bureau of Land Management has information on Wildlife Management on 467 million acres of public lands; camping, hunting, fishing, hiking, pack trips on public land, mostly in the West and Alaska; wildlife use of lands; forests and watershed practices aiding wildlife and recreation; outdoor pursuits on public land areas; obtaining public lands for state and community parks; photographs.

Bureau of Indian Affairs

The Bureau of Indian Affairs distributes information on Indians and their relationship to the Federal Government; tribes, when the tribe is specified; locations of specific reservations as well as ceremonial and celebration information.

Bureau of Outdoor Recreation

The Bureau of Outdoor Recreation has information on national recreation needs and plans; State, government and private programs for recreational development; statistics on needed areas, travel, outdoor pursuits; coordination of various Federal recreation programs; forecasts of future recreational needs.

Bureau of Mines

The Bureau of Mines maintains a free-loan library of 16 mm motion pictures in sound and color, several of which picture the mineral and other natural resources--such as parks, scenic and tourist attractions of various states. Also, the Bureau publishes technical literature useful to amateur and professional prospectors and gem-stone collectors; photographs.

Office of Saline Water

The Office of Saline Water distributes information and pamphlets on the Department's program to develop low-cost processes for desalting sea or brackish water through operation of demonstration plants; plant visits welcome; Saline Water Conversion Research and Development Test Station, Wrightsville Beach, N. C., and demonstration plants at Freeport, Texas, Roswell, N. M. and Webster, S. D.

Federal Water Pollution Control Administration

The Federal Water Pollution Control Administration produces popular booklets and leaflets on importance of clean water; material on citizen action for cleaning up rivers, lakes, streams, estuaries; 16 mm color films on water quality and pollution control; photographs of pollution problems and water uses.

To obtain clean water the agency:

- Administers grants to communities for construction of municipal sewage treatment plants.
- Administers enforcement provisions of the Federal Water Pollution Control Act.

- Encourages and supports states in the establishment of water quality standards.
- Provides technical assistance to states on water pollution problems.
- Develops long-range water pollution control programs in major river basins and estuaries.
- Operates monitoring stations on the nation's waterways.
- Studies and prepares reports on special problems such as oil pollution, watercraft wastes and thermal pollution.

Geological Survey

The Geological Survey produces general and detailed geologic and topographic maps; geologic reports on mining districts, mineral occurrences, laboratory investigations and many areas of general interest; water resource studies; information from 18,000 stations on stream flow quality, sediment, and ground water levels; aerial photographs at 1:60,000 scale of entire country and at other scales of many local areas; photographs of activities.

Bureau of Reclamation

The Bureau of Reclamation distributes information on widespread recreational use of more than 100 reservoirs--fishing, water sports, boating, swimming, scenic tours and camping areas; sight-seeing attractions at dams and related works; recreational development plans on basin-wide pattern; photographs.

STATE GOVERNMENT AGENCIES

North Carolina Department of Administration

The Department of Administration represents the consolidation of all state fiscal and management agencies in one department. Two of the Department's divisions are directly involved in the conservation and development of the state's natural resources.

The Property Control Division

The Property Control Division is responsible for all state-owned land. The sale, purchase, lease, or transfer of state property is handled by this agency of state government.

The State Planning Division

The objectives of the State Planning Division are the development of the total resources of North Carolina. Its operations are divided according to the three basic areas of the state--the Appalachian region, the Piedmont region, and the Coastal Plain region. This Department functions to coordinate federal-state programs of resource use. Joint federal-state programs include:

(1) The Appalachian Regional Commission

- The Division of Water Resources in Appalachia - a comprehensive study participated in by virtually all of the federal agencies with water-related interests. A final report is available.
- A Stayed-Development Program of Water Resources for the Appalachian Corridors - in cooperation with other state agencies. A final report is available.
- Soil Stabilization and Conservation - with the Soil Conservation Service and Agricultural Stabilization and Conservation Service as well as other state agencies, this program provides funds to farmers in Appalachia for soil conservation purposes.
- Parks and Recreation - Funds are available for parks and recreation areas.

(2) The Coastal Plains Regional Division Commission

- Sanitary River Basin Study - with the Soil Conservation Service, the Planning Division is coordinating studies of these regions.
- Upper Cape Fear River Basin Study - with the Soil Conservation Service, the Planning Division is coordinating studies of these regions.
- Wild, Scenic, and Recreational Rivers - with the Bureau of Outdoor Recreation, this Division is coordinating state efforts to designate such areas.

The State Planning Division sponsors seminars and public meetings demonstrating the importance of planning to conservation. It publishes numerous reports and periodicals that deal with conservation. The Division has produced a movie relevant to the conservation needs of the Piedmont. It is available on loan from the Institute of Government, Chapel Hill, or the Department of Public Instruction, Raleigh.

North Carolina Department of Agriculture

The Department of Agriculture is the agency that serves the state's farm population. In addition, the Department carries out services

and activities designed to protect the consumer. The Department is responsible for administering many laws governing materials affecting the total environment. The regulatory responsibilities are accompanied by educational programs, news releases, speeches, special articles, and the Department's own paper, Agricultural Review. Of special interest to educators is the Department's Division controlling the State Museum of Natural History. The Division is responsible for the exhibit halls in Raleigh, scientific information, natural history publications, literature, lantern and 35 mm programs, slide specimens for wildlife training courses, traveling exhibit loans, and administering the Hampton Marine Museum, Morehead City.

Governor's Beautification Council

The Committee sponsors many community and state-wide beautification awards programs involving both adults and children. It supplies information to teachers, home extension workers, area development coordinators and many other organized groups in the state. The Committee receives requests for films, brochures and other information on youth projects.

North Carolina State Board of Health

The State Board of Health is charged with the protection of the public health interests of the state, especially in connection with communicable and infectious diseases, water supplies, sewage disposal, and registration of births and deaths. There are seven divisions of the State Board of Health. Following is a brief description of each program which produces information of environmental concern:

The Dental Health Division

The Dental Health Division is charged with conducting programs in education, prevention, research, and dental care. The Division conducts educational and preventive programs involving the use of fluorides. The Division prepares and distributes materials at all levels relating to fluorides and would be glad to participate in developing curriculum programs in dental health.

The Radiological Health Section

The Radiological Health Section is charged with providing for the radiation safety of the North Carolina public and users of radiation in North Carolina through the operation of the North Carolina Radiation Protection Programs. The Radiological Health Section

makes its staff available for the presentation of lectures and discussions to any group including: public school classes, professional groups, medical groups, college and university classes, and federal and civil defense training courses. A limited quantity of printed material is also available from the Radiological Health Section upon request.

The Community Health Division, Nursing Section

The Section's principal programs include: (1) in-service education for nurses employed in ESEA programs, and (2) workshops and seminars for ESEA nurses. The Section's education program encourages school nurses to participate in in-service programs covered by local public health nurses. Subjects could include: school health, administration and service, mental health, child growth and development, nutrition, health counseling, case finding and follow-up records, etc.

Several Public Health Service short training grants are available to allow school nurses to improve their background and experience both at the local and nursing school level.

The Division of Epidermiology, Veterinary Public Health Section

The Section operates a Pesticides Program under contract with the Food and Drug Administration of the U. S. Public Health Service. The Section operates periodically in-service training programs emphasizing potential health hazards.

The Community Health Division, Health Education Section

The Section provides consultation and technical assistance in the planning and implementation of the educational components of health and health-related programs. Specific competencies are in the areas of community organization, identification of target groups, educational methods, selection and preparation of materials, training programs and evaluation. A quarterly bulletin on suggested bulletin boards and education materials is sent to local health departments. Services are available to state and community agencies and organizations concerned with health problems.

The Sanitary Engineering Division, Engineering Section

The Section is responsible for the surveillance of all public water supplies in North Carolina. The Engineering Section keeps

in touch with waterworks officials, water treatment facility operators, city officials, and others in an effort to assure that all public water supplies in the state furnish at all times, water safe for human consumption. The Section has available color pamphlets which explain water treatment and water supply protection to school-age children. Also, technical publications on protection of water supplies and waste water disposal are available. The personnel of the Section attend and participate in regional and state water works meetings, and frequently conduct educational training programs.

Film Library, Central Administration

The State Board of Health also operates a Film Library on a free-lending basis to the public and private schools, colleges, universities, civil groups, and many others on a state-wide basis. The Library has approximately 3,650 films with about 1,000 individual titles. These films are in the field of health and health-related areas.

Department of Conservation and Development

There are eight departmental divisions which cover the varied functions of the Department.

The Division of Commerce and Industry

The Division promotes industrial development for the entire state. The Division's technical services provide market surveys and supporting studies in an effort to locate industrial concerns. It produces graphic work and publishes a newsletter as well as transportation and airport directories and special brochures.

The Division of Commercial and Sport Fisheries

The Division has jurisdiction over all activities connected with the conservation and regulation of marine and estuarine resources. The Division's program consists of the following activities: (1) research to develop information upon which to base management and regulatory action; (2) management to enhance the value of marine and estuarine resources; (3) regulation of activities which may endanger marine and estuarine resources; and (4) education of the public in order to provide more general understanding of the value of these resources and the factors which affect them. A monthly newsletter is available for dissemination to all interested persons.

The Division of State Parks

The Division develops, maintains, and administers North Carolina's state parks. It is the aim of the State Park System to:

(1) preserve and protect the natural areas of unique or exceptional scenic value for the citizens of today and for the generations to come;
(2) operate the state parks to provide recreational use of natural resources, and;
(3) to portray and interpret plant and animal life, geology and all other natural features and processes included in the various state parks.

The Division's education program provides: museums and public displays; park naturalist slide lectures; cooperation with universities in implementing research on park land; publications including State Park Brochures, travel maps, information sheets, and bulletins; cooperation with secondary schools involving outdoor education and school camping, and; special lectures for civic and cultural groups.

The Division of Geodetic Survey

The Division locates and erects boundary markers on monuments. It is responsible for the compilation and evaluation of accurate geodetic data, the publishing of geodetic maps, and providing technical help of value to land owners, developers and construction projects. The Division furnishes published data to City Engineers and Registers of Deeds, distributes newsletters to engineers and land surveyors, and conducts talks to civic groups.

The Division of Forestry

The Division is the largest of the eight divisions of the Department of Conservation and Development. It is in charge of protecting more than 18,000,000 acres of state woodland from fire, insects, and disease. The Division also promotes and carries out reforestation across the state. It is charged with the enforcement of laws governing forests and works to promote better forestry practices and management.

The education program of the N. C. Forest Service is carried out by the county personnel and district personnel at the local level. Literature concerning all programs is distributed to schools. Programs for schools, civic clubs, and other interested groups are a regular part of the information program.

The Division of Community Planning

The Division has the responsibility for community planning studies and assists counties, cities, and towns in mapping long-range plans for future growth.

The Division of Mineral Resources

The Division encourages and conducts research on the state's mineral resources, publishes reports and geological maps and assists the private sector in promoting development of the state's mineral resources. The Division prepares and distributes an Educational Series of publications describing the geology and mineral resources of North Carolina. A special effort is made to place this material in the hands of teachers and earth science students. Staff geologists are available to a limited degree to give talks to civic and school groups.

The Division of Travel and Promotion

The Division is in charge of North Carolina's industrial and tourist development. It manages advertising programs and conducts a general campaign for tourist promotion.

North Carolina Department of Local Affairs

The Department of Local Affairs is an advisory agency serving public and private agencies and organizations. Much of its responsibilities directly relate to education of the public. Of particular concern is environment and natural resource education. As presently constituted, the Department can serve environmental education through the following Divisions:

- The Division of Community Planning - helps in the planning and zoning of cities, towns, and counties.
- The Division of Governmental Relations - offers technical services, housing, model cities, and Operation Breakthrough.
- The Human Resources Division - serves the "people related programs" of Head Start, OEO, CAP, and pilot project programs.
- The Recreation Division - is involved in an advisory capacity to North Carolina's environment and natural resources services. It is the headquarters for the North Carolina Recreation and Park Society, Inc. The Society's publication, Recreation and Park Review, published every other month, is a medium through which North Carolina's schools can be kept informed on articles and information relating to environment and natural resources.

The Department has a public information officer responsible for publishing the Department's newsletter. This release contains service information which can be utilized by the public schools of North Carolina.

North Carolina Department of Water and Air Resources

The Department of Water and Air Resources is responsible for the protection, wise management, regulation, and use of the water and air resources of the state. Some of the principal programs of the Department include:

(1) Water Pollution Control - a program based on a stream classification system whereby the best use of a body of water is determined and a suitable classification and water quality standard is established.
(2) Air Pollution Control - a program based on the development and adoption of ambient air quality standards adequate to protect public health, plant and animal life, property, and the development, adoption and implementation of emission control standards adequate to achieve the ambient air quality standards.
(3) Water and Air Information Program - this program includes all measures reasonably necessary to assure that those affected by water and air management decisions and plans have had an adequate opportunity to be heard. The program publicizes the activities of the Department to assure the fullest possible understanding of actions, to protect and support beneficial water and air resource use, to assure that the public understands the need for and content of long range plans and other activities to keep the public informed.

A supply of the Department's material and information is available to special interest groups, schools, and students in higher institutions. Staff personnel participate in meetings and seminars and deliver talks to civic clubs and professional organizations.

North Carolina Wildlife Resources Commission

The Wildlife Commission has the duty of protecting, restoring, and producing a harvestable supply of wildlife species for the enjoyment of the general public. It is basically a regulatory commission with the authority to establish regulations for wildlife control. A considerable amount of attention is given to research to develop a more efficient program of wildlife conservation.

The Commission's education program includes a monthly magazine, Wildlife in North Carolina; the issuance of books, bulletins, brochures, and releases on various subjects relating to game and fish and their relation to the other renewable natural resources; the production of 16 mm films for distribution; the production of weekly television and radio programs on conservation; and personal contacts with schools and teachers across the state.

PRIVATE AGENCIES

Audubon Society

The National Audubon Society was organized in 1905 by conservationist, George Bird Grinrell. The Society cares not only about birds but all wildlife, especially nearly 1,000 endangered species. The organization cares about any and all conservation which serves to preserve the balance of nature in a world in which that condition is highly threatened. The organization works to educate the public to conservation needs. It maintains a staff of lecturers, sends out special mailings and pleads for public awareness of the natural wildlife needs of the Nation through its bi-monthly publication, Audubon. It has battled against the use of DDT, and for the preservation of endangered species and wilderness areas such as North Carolina's Bald Head Island.

To support sea birds, the Society owns or leases islands for the protected breeding of ducks and sea birds. With a membership of around 80,000, the organization is affiliated with an additional 250 environmental groups. The membership also supports wildlife films, camps, Audubon Centers, aids in natural science, and wildlife research.

Belle W. Baruch Foundation

The Belle W. Baruch Foundation is dedicated to teaching and research in forestry, marine biology, and the care and propagation of wildlife, flora, and fauna. The Foundation centers many of its activities in South Carolina. It was responsible for supporting the development of the South Carolina Conservation Curriculum Improvement Project's Teacher Guide series, People and Their Environment.

Ford Foundation

The Ford Foundation, through the Resources and Environment Program of the National Affairs Division, assists in the search for the underlying causes of the present environmental crisis. Human well-being is effected by air and water pollution, wildlife extinction and land misuse. The Foundation encourages a focus upon the causes rather than the symptoms of the neglect.

National Geographic Society

The National Geographic Society is a non-profit scientific and educational organization for increasing and diffusing geographic knowledge and promoting research and exploration.

The Society publishes a variety of materials of interest to educators. In addition to its journal, National Geographic, the Society also publishes maps, books, and special publications. The School Service Section produces a National Geographic School Bulletin and various educational filmstrips. The Society periodically produces a television program related to environmental education.

Keep America Beautiful, Inc.

Keep America Beautiful, Inc. is the national public service organization for the prevention of littering and it aims to preserve and improve America's scenic beauty through a continuing program of public education awareness to stimulate individual responsibility. It is supported by industry, business, labor and trade associations representing nearly every industrial category and other information to education and the general public. Several teacher's guides with suggestions for litter prevention activities and youth group projects are available at low cost upon request.

Nature Museums

Nature museums are numerous in the state of North Carolina. The museums are designed to appeal especially to school age children and their parents and accordingly, they encourage local school interest in their activities. Each museum has a somewhat different program so the reader may wish to contact the nearest museum center and request additional information. Most of the state's museums interpret exhibits based on ecology and relate the delicate balance of nature to the role man is playing in maintaining that balance.

The Winston-Salem Nature Science Center

The Nature Science Center provides numerous programs which have been well received by local schools. Adults use the center for various nature-oriented club meetings. Volunteers give guided tours, teach classes and develop exhibits for the Center.

The Schiele Museum of Natural History

School classes from kindergarten to college can make extensive use of the planned exhibits, illustrated nature talks, and planetarium programs. The natural history and planetarium programs are planned to closely correlate with the related subject matter currently presented in the public schools. The Museum is located in Gastonia.

Charlotte Nature Museum

The Museum is a supplemental education center for the students and teachers of the Charlotte-Mecklenburg School System, and for the surrounding areas. The Museum has a spectacle of changing exhibits and programs on natural history and the physical sciences. In addition, the Museum has planetarium programs, health theater programs, lecture-demonstrations, and field trips.

The Children's Museum Association, Inc.

The Children's Museum, located in Durham, offers a regular series of classes on science and nature from the study of ancient fossils to modern space exploration. Field trips by school classes and other groups are encouraged. The Museum operates a zoo for its live animal exhibits.

The Nature Science Center

The Nature Science Center in Greensboro offers outdoor learning and enjoyment by stimulating an appreciation of the state's natural resources. Special programs with staff naturalists as instructors can be arranged by appointment for schools and youth groups from kindergarten to college.

North Carolina Wildlife Federation, Inc.

The North Carolina Wildlife Federation is a statewide, non-profit, non-political organization interested in the present and future well-being of the state. It supports conservation, good farming practices, wildlife and forest management, and wholesome outdoor recreation. Its purpose is to coordinate the efforts of conservationists to correct the abuses to people in conservation issues. The Federation assists in many conservation education projects with interested youth and adult groups. The North Carolina Wildlife Federation works with schools, newspapers, radio, television and through its affiliated clubs to inform the public of the need for the solution of the state's overall conservation and pollution problems.

National Wildlife Federation

The National Wildlife Federation operates as a membership organization whose objective is to create and encourage an awareness among the people of this nation of the need for wise use and proper management of those resources of the earth upon which the

lives and welfare of men depend: the soil, the water, the forests, the minerals, the plant life and the wildlife. The Federation publishes a bi-monthly National Wildlife and a monthly Ranger Rick's Nature Magazine. The latter offers a year-round program of activities, adventure, and knowledge for elementary school children which helps them appreciate and enjoy nature. In addition, the Federation publishes numerous information bulletins and packets for educators to supplement their conservation education programs.

Sierra Club

This is a membership organization devoted to exploring, enjoying, and protecting natural scenic resources. Active in conservation administration, litigation, and legislation, it publishes books on wilderness and other scenic resources, guide books, and a monthly bulletin and other conservation education materials.

The Committee completed its task with the full realization that the "information explosion" of environmental education materials has just begun. Society is developing a new awareness of its surroundings. Agencies are established to serve society and thus their efforts will reflect an even greater concern than the Committee experienced. Accordingly, the scope and depth of subsequent information and education programs will be significantly increased. This is as it should be.

The Committee was able to draw several conclusions from the information gathered. They are reflected in the following recommendations offered by the Committee:

1. Numerous agencies have available materials which could be used to supplement a public school curriculum in environmental education. However, such information is not readily available to public school educators. The need for a "clearing house" of environmental education

information is evident within the state. Such a need can only be magnified in the future as the information explosion continues. Therefore, the Committee recommends the immediate establishment of such a "clearing house" within the Department of Public Instruction to research and examine every possible source of pertinent information and to then make this information available to the interested educator.

2. The Committee could find no programs wiich could be transferred directly to the public school curriculum for environment and natural resource education. Therefore, the Committee recommends the assignment to a division of the State Department of Public Instruction the responsibility for development of such programs.

3. A number of agency programs offered opportunities for specialized training for public school teachers of environmental subjects. However, a majority of these agencies had programs too specialized for the generalist in the profession. Therefore the Committee recommends that a concerted effort on the part of the State Board and the State Department be exerted to encourage business and industry, public and private agencies, and other interested groups to support the development of special educational programs designed for the classroom teacher. Such agencies should be encouraged to financially underwrite educational workshops, institutes, and seminars. The programs need not be limited. The crisis demands active participation at all levels, and the lay public, and parents need not be excluded.

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2. The Committee could find no programs which could be transferred directly to the public school curriculum for environment and natural resource education. Therefore, the Committee recommends the establishment of a state level agency, perhaps a division of the State Department of Public Instruction, to be responsible for the development of such programs.

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CHAPTER IV

REPORT OF THE WORKING COMMITTEE ON POSITION PAPERS

WORKING COMMITTEE ON POSITION PAPERS

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The goals of this Committee were as follows:

1. To determine what areas are included in environmental studies.
2. To solicit position papers by authorities as to "What knowledge is of most worth?" in each of these areas.
3. To identify, from the position papers, those concepts or ideas of most importance.
4. To offer, if necessary, suggestions or recommendations as to what concepts should be reflected in an environment and natural resource curriculum.

The Committee secured the names of outstanding North Carolinians with expertise in selected facets of environmental education. Position papers were solicited from these persons. In addition, selected individuals outside the state were asked to submit position papers. Thus, the Committee made every effort to secure a breadth and depth regarding man and his environment.

As a result of the Position Papers submitted to it, and as a result of its own discussions, the Working Committee on Position Papers submits the following recommendations regarding the material which should be included in a strengthened public school program dealing with the environment and natural resources.

1. We are unanimously agreed that a program of instruction be carried out through the entire public school experience and that it should not take the form of a single course to be offered in any given year. It may be that the general subject of environment should be emphasized during one, or several years, but the basic concepts should permeate the entire public school curriculum from kindergarten through the twelfth grades.

2. Environmental education deals chiefly with attitude building and sound attitudes can only be developed through constant attention in the curriculum. Therefore, we recommend four broad areas which should be included in an environmental education program. The four areas are:

   a. Ecological concepts - the interrelatedness of all life.

   b. Natural resources - the basic facts as they particularly relate to North Carolina's resources.

   c. Pollution - its nature and the problems it raises.

   d. Environmental decision-making - the basic tools for change.

To better understand the Committee's choice of these four areas, a brief description of the ideas involved is discussed on the following pages:

I. ECOLOGICAL CONCEPTS

Environmental education should, first of all, present basic ecological principles. These should be presented as early as possible in the child's educational experience and should be amplified and expanded as he matures. These concepts form the factual basis for understanding how the environment works and how one can intelligently approach the problem of environmental management, either as practitioner or as a voter.

The important ecological principles which should be presented are:

A. The Ecosystem Concept

This is perhaps the most fundamental of all the basic principles of ecology. The student should understand the ecosystem as consisting of a community of plants and animals interacting with the

physical properties of the environment in the site which it occupies. The student should grasp the ecosystem as a closed system with finite boundaries and finite matter which operates according to well-established principles. In addition, the student must understand the principles of ecosystem function. These are:

1. Ecological energetics--the physical and biological aspects of energy transformations (energy flow).
2. Biogeochemical and hydrological cycles--the finite amount of matter in our ecosystems is distributed and cycled according to well-established principles, chief among which are nutrient cycling and bioaccumulation.

B. Organism-Environment Interaction

Each organism lives and thrives only within a finite range of environmental conditions. This is determined by its genetic inheritance. The interaction between the organism's genetic inheritance and its physical and biological environment determines where and whether it will survive in nature. The student must grasp the basic concepts of:

1. Ecological tolerance (each organism survives only within a finite range of environmental conditions).
2. What is meant by the term <u>environment</u>?
3. The principles of interaction of environmental factors--the so-called "holocoenotic" nature of the environment.
4. The basics of physiological response to environmental stress--how the organism adapts to environmental change and the limits of change which may characterize an individual organism. This is the field often called physiological ecology.

C. Variation in Environmental Factors

Here the student should grasp the nature of each of the factors which we include when we talk about the "environment." He should understand what is inherent in factors such as solar radiation, light, temperature, gaseous composition of the atmosphere, the nature of water, etc. He should be familiar with how these factors vary in nature and how these variations may act to limit the growth and performance of living things. Such information is vital to an understanding of pollution. When discussing pollution, the emphasis is placed on how man alters environmental factors and how these altered factors affect functioning of organisms and ecosystems. Each of the major habitats on earth should be discussed so that the student grasps how terrestrial, fresh water (lakes and streams), and salt water habitats "work."

D. Population Biology

Students here should grasp the fundamentals of growth in numbers of plant and animal populations, and the implications of these fundamentals for their own lives. The following principles should be treated:

1. Reproduction and multiplication--an understanding of the basic mathematics of plant and animal reproduction and the bearing of these concepts on the growth in numbers of populations, including man.

2. Composition of populations (demography)--should include the concepts of age and sex distribution of individuals, optimal number, a discussion of over- and under-population, census methods, regions classified by geographic or economic standards, and rates of birth and death.

3. Population regulation--the concepts of finite resources and that populations tend to regulate themselves within the limits of these resources; the concept of earth as a spaceship. The topic can be treated from birth and death rates and it can be shown that regulation comes about through change in the birth rate and/or the mortality rate.

4. Inter- and Intraspecies Interactions--the distinction between interactions between species, which determine the kinds of evolution which occur, and those within species, which determine the population level, should be made. Emphasis should be placed on the point that because of the functional relationships which exist in ecosystems, the presence and behavior of any organism affect to a greater or lesser degree all organisms in the ecosystem.

5. Cultural factors--should consist of an integration of material from sociology, economics, history, etc., with material on the ecology of man.

E. The Gross Biology of Ecosystems

The concepts of ecosystem function should come very early. Later, aspects such as those dealing with ecosystem change and the distribution of ecosystems on earth should be treated. Included should be:

1. Succession concept--change in species composition of ecosystems through time and its functional implications.

2. The climax concept--ultimate achievement of a functional steady state in nature and the implications of this for ecosystem management. Management of successional and "balanced" (climax) ecosystems.

3. Distribution of biomes across the face of the earth--major types of biomes, their composition in terms of plant and animal types (adaptations), their functioning, and their management.

F. Human Ecology

A treatment of man and his problems within the context of basic ecological principles.

II. NATURAL RESOURCES

A conscious effort should be made to explain to public school students the basic nature of natural resources. Distinction should be made between renewable and non-renewable resources. Although the approach should not be parochial, an effort should be made to emphasize those resources peculiar to North Carolina or problems which are particularly important to North Carolina. The resources should include:

Air	Forests	Marine Resources
Water	Climate	Agriculture
Soil	Wildlife and Freshwater Fish	People
Minerals		

Principles to be emphasized should include:

A. The historical background--what is available, how much did we have, and what has happened to it?

B. The present state of the resource--its use, problems associated with its use, and how its use may be improved.

C. The basic principles of managing renewable versus non-renewable resources--regrowth and cycling.

D. Emphasis at all times should be placed on the concept of "stewardship." The present generation is merely the steward of its resources and it must pass these on for countless future generations. Exploitation will deny the concept of stewardship.

III. POLLUTION

The student must be introduced to the fundamentals of pollution, what it is, the magnitude of the problem, and how we may cope with it. Types of pollution to be discussed should include:

Air	Noise	Thermal effects
Water	Pesticides	Visual and aesthetic
Soil	Radioactive materials	

Some important principles to emphasize include:

A. What is pollution?--pollution from increases in naturally-occuring substances as opposed to environmental poisons.

B. Re-cycling as a method of coping with pollution.

C. The importance of understanding ecosystem function in order to understand how a pollutant affects a system and how one may cope with it.

IV. ENVIRONMENTAL DECISION-MAKING

Once the student has been exposed to concepts such as those outlined above, and once he has gathered basic knowledge in other areas (history, communications, government, mathematics, other sciences), he can then be exposed to the area of environmental decision-making. In this area, we are simply suggesting that, by case studies and discussion, the student (obviously of high-school age) can become involved in the complicated business of decision-making about environmental management. He must learn that decisions about the environment are complex and are conditioned by inputs from many areas of man's experience. This area probably should best be approached via discussion, perhaps in the context of a consideration of the problems of the Twentieth Century society. The student should be encouraged to bring his experience from different fields, such as economics, ecology, biology, law, government, religion,

aesthetics, politics, human behavior, culture, sociology, and planning, to bear on real management problems. In a sense, he will play the game of citizen, but hopefully will be guided to utilize his available information about the environment more intelligently than it has been used in the past. The approach probably will have to be through discussions of specific case histories of environmental management problems. It will probably be most effective if it uses those issues which are topical and about which there is debate, in the state or nation, at the time. Some broad areas should certainly be covered, such as:

A. The distinction between legal and legislative solutions to environmental problems.

B. The importance of education at every level of environmental decision-making.

C. The role of the individual citizen as voter (the ultimate decision-maker) and as opinion former, particularly as a member of pressure groups.

The above description should be thought of as a guide in the development of subsequent programs in environmental education in the public schools of North Carolina. It is the result of extensive discussions by the Committee as well as the intelligent interpretation of the position papers presented to the Task Force.

A synopsis of each position paper submitted to the Committee follows:

JOSEPH G. BOYETTE

The public schools should not offer false hope to youth about the environment. Youth should be taught from the earliest levels of education that the earth is probably the permanent home of man; and, it is his obligation to maintain and perpetuate it as a suitable home. Schools should explain that if man expands his habitat beyond earth it will be through his own effort and will not free him from dependence on his environment and its natural resources. Man's environment and natural resources have real limits which directly affect the quality and quantity of life. Man, the chooser, ultimately has the final responsibility and choice for avoiding environmental catastrophe.

ALBERT B. CARR

To facilitate an awareness and concern for the air man breathes, teachers should provide information about air pollution to their students. This can be most successfully accomplished through utilization of a laboratory approach to the examination of the air in one's own community. One possible approach might include an extensive field experience to collect and analyze many air samples.

Although many communities have enacted laws regarding the contamination of the atmosphere, much remains to be done. Laws, in and of themselves, will never be successful in overcoming air pollution. If we do not have a sensitive, enlightened citizenry, aware of their obligations and needs in this area, increased contamination of the atmosphere will continue.

DAVID E. DAVIS and STERLING BRACKETT

This paper sets forth suggestions of principles, concepts and ideas which should be explored and examined in an environmental education curriculum. Two basic biological premises which should be considered are: (1) The population must be balanced against resources to give maximum benefit to all without injury to the ecosystem; and (2) the living world is an integrated system with every living thing related to everything else. These two premises should be introduced to each student as early as possible in his educational experience.

Energy, the most basic concept for living organisms, cannot be introduced to a student too early. Metabolic resources, that is food and food chains, assume fundamental roles in the interdependence of all life. "Outside" biotic factors which affect life need to be considered in all facets of one's general education. The origin and nature of the earth's wealth is fundamental to an awareness of its abuse.

The curiosity of our origins could channel an increasing complexity of answers and discussions which can easily lead a student to the fundamentals of the genetic mechanisms involved in heredity. The interrelationships of species should advance the idea of competition, natural selection, and evolving living systems. Thus, the end result should promote an understanding and awareness of the significance of life's complexity and a commitment to developing appropriate means of maintaining it.

Distribution of individuals, defined optimal number, overpopulation, census methods, economic standards, birth and death rates are concepts of demography which future generations must understand. Failure to be aware of these conditions will produce unbearable pressures upon future citizens of our society.

Man is more than an animal; he is a cultural being. Man's influence on himself is one of the most powerful factors affecting him. Natural study apart from humanistic study is an inadequate approach. Man must develop an ecological appreciation and conscience for the natural world and his dependence upon it. He must understand the aesthetic and psychological values of nature to man and man to man.

Essentially, an environmental education curriculum should foster a genuine feeling of responsibility for nature and its role as a system of life support, both physically and spiritually, for man.

JAMES L. DICKE

Man is well adapted to most of the range of natural variations in the physical characteristics of the ocean of air which surrounds him. He is directly dependent upon this valuable resource for his metabolism and indirectly dependent on it for the food he consumes. This utter dependence upon the air for his very existence makes it essential that the conservation of air become mandatory. Yet, man fouls this resource daily with all types of pollutants.

State and federal governments are attempting at this time to reduce the contamination of air through regulatory means. Some local efforts have also been successful recently. However, the increasing population and inadequate enforcement of regulations continues to make contamination a major problem for man.

The need for air quality standards and development of anti-air pollutant devices is critical. Unless such measures are taken, perpetuation of this problem will become increasingly evident.

The necessity for incorporating the principles of air pollution control and air resource management into the existing North Carolina education curriculum is reinforced daily by mounting public concern for environmental quality. We must provide education to maintain a well-informed public and open pathways to careers in the environmental field for our children. The air pollution problems of North Carolina should not be allowed to grow to unmanageable size. The air around us is a vital natural resource. It must be preserved. The healthy economic development of North Carolina will occur only when North Carolina provides a total environment of superior quality to all its citizens.

CAROLYN H. HAMPTON

A spiral curriculum is essential for a program of depth and breadth with environmental sciences. The following major environmental concepts should be introduced at grade levels one through seven, high school biology, and other related disciplines at the high school level.

GRADE	ENVIRONMENTAL CONCEPTS
1	I. Interrelationships between living organisms and the environment A. Organisms 1. Birth 2. Death B. Environment 1. Habitat 2. Detritus 3. Simple food web
2	II. Patterns of growth and development in living organisms A. Life histories 1. Stages of growth 2. Metamorphosis B. Succession of generations

GRADE	ENVIRONMENTAL CONCEPTS
3	III. Populations A. Habitat B. Niche C. Food chain D. Food web E. Predator-prey relationships F. Population growth
4	IV. Environmental factors A. Light B. Temperature C. Water D. Gases: CO_2 and O_2 E. Chemicals F. Other living organisms
5	V. The community A. Interdependence of living organisms B. Interacting populations C. Trophic levels 1. Producers 2. Primary consumers 3. Secondary consumers 4. Decomposers D. Natural balance The effect of disruption of any part E. Succession
6	VI. The ecosystem A. All the concepts introduced at previous levels should be integrated into a conceptual whole. Emphasis should be placed on man's niche. B. Human population 1. Human population growth 2. Need for zero population growth 3. Pollution 4. The effects of urbanization, industrialization, agriculture 5. Need for citizen participation thru legislation 6. The effect of crowding on individuals

GRADE	ENVIRONMENTAL CONCEPTS
7	VII. Life science ("I would hope that North Carolina will continue to emphasize the life sciences in the seventh grade. Texts should be selected primarily on the basis of their emphasis on ecology.") A. Energy flow B. Geochemical cycles 1. Water cycle 2. Carbon cycle 3. Mineral cycles C. Ecology of populations D. Community E. Ecological succession F. Ecosystems G. World biomes H. Man and ecology
HIGH SCHOOL	
10 (Biology)	All the important concepts of biology should be woven into an integrated whole. Again, man's role in nature should be emphasized. In the past, too much emphasis in this course has been placed on factual information. Less emphasis should be placed on college preparation and more on those biological principles that relate to every citizen--whether he will be a "drop-out" or college bound. I must remind the professional biologist that the "drop-out's" vote counts the same as his own and that his reproductive potential (unless his attitudes are changed) are greater.
OTHER DISCIPLINES	
English	Reading assignments should include current articles on pollution, over-population, foreign aid, drug addiction, etc.; could be themes of student compositions.
Mathematics	Problems in the geometric (logarithmic) growth of populations.
History	Readings and discussions based on current issues.
Civics	Relationship between human population and historical events.
Economics	Ecology and the gross national product. The effects of urbanization, industrialization, agriculture on man's environment.

ALBERT V. HARDY

Our knowledge of climate comes from a summarization and study of many different weather observations. Weather is ultimately produced by the heat energy from the sun. The daily warming and cooling of the earth and the seasonal attitude of the earth each play a part in determining the climate of North Carolina.

Because of its varied geography, North Carolina has many climates, the greatest variety of any eastern state. Temperature variations of twenty degrees can be expected from one end of the state to the other during any season. The mountains play a major role in the variety of North Carolina's climate. They are high and thus cooler. They force rain to fall on their windward slopes. Precipitation, vital to the economy of the state rarely fails to fall over some part of the state each month.

The weather records of various areas of the state can be an interesting and exciting addition to the study of climate. Personal knowledge of local climatic conditions can add pride and value to one's local region. Such knowledge is also valuable for the agricultural potential of the region.

Violent weather conditions, such as hurricanes, tornadoes and floods, rarely affect North Carolina. However, a knowledge of their causes can be the first form of personal protection, should they occur.

Through a study of North Carolina's natural climate, students should more readily understand, appreciate, and enjoy the opportunities afforded by it.

MILTON S. HEATH, JR.

Man can better understand and preserve his natural resources through a study of the laws and policies which relate to these resources. The following ideas should be considered when trying to promote such knowledge:

I. Regulation and use of natural resources
   A. Legal aspects
   B. Federal regulations, incentives and other programs
   C. State regulations, incentives and other programs
   D. Interstate programs and controversies
   E. Alternatives to regulation
II. Public utility regulation
III. The licensing approach

JAMES N. HOSEY

The power of the weather cannot be underestimated. The concepts of weather forecasting can be important to everyone. People in all walks of life know how weather events affect them. To avoid uncomfortable conditions, many people listen to professional forecasters as they report from available

evidence what the weather is likely to be. They rely on a complicated network of reporting stations and instruments to be as accurate as possible with their predictions. Fortunately, they are correct most of the time.

Parents use the information to properly dress their children each day. Many businesses rely on the weather prediction to plan meetings, programs and countless other business activities. Police and highway patrolmen are able to plan for adverse conditions on the basis of weather forecasts. Fruit growers, shippers, airplane pilots are all interested in accurate weather information. A great deal of our country still moves to the pace of the weather. Any educated citizen should be able to take advantage of this service.

DAVID H. HOWELLS

At present North Carolina has abundant water resources. Water is in constant circulation within the environment. It moves from earth and water surfaces to the atmosphere through evapotranspiration. It returns through the processes of condensation and precipitation, infiltration into the ground and runoff of the surface and ground waters to lakes, rivers and oceans. From this point, a recycling of water begins. This continuous interaction of water with other facets of the environment underscores the importance of unified planning and management of water and natural resources.

Floods are a result of natural forces. Often when damage occurs to property it is the result of man's encroachment into a stream's flood plain.

Very little water is consumed in North Carolina. Most of it is withdrawn, used and returned where it is available for reuse. This means

that the recycled water must be as clean as possible. Where water quality is maintained, it can be reused in an endless cycle from the headwaters to the sea.

Sediment created by inappropriate water control is one of the most serious threats to North Carolina today. While natural waters have some capacity to cleanse themselves through bacterial decomposition of degradable organic wastes, the oxygen supply is often depleted in the process. Oxygen is essential to fish and other aquatic life. Environmental education must include the use and management of watershed land.

North Carolina has a program of stream classification. Water quality standards include permissible levels of dissolved oxygen, toxicity, floating and settling materials, temperature, bacteria, color, taste and odor and other factors. Permits for waste discharge are issued by the state. These are designed to maintain water quality standards for the future. Requirements for each type classification should become a part of the well-informed citizen's environmental knowledge.

North Carolina will need more reservoirs to meet its future demands for water. Water supply should move in the direction of regional sources and distribution systems in contrast to many hundreds of individual systems. This would enable the state to make maximum use of its available resources. If North Carolina is to be an effective participant in future water resource planning, it needs to be in a position to influence planning on the basis of its own program for the utilization of its water resources. This should include long term concepts of water use which could serve to guide the location of industry, urban development, recreational development and agriculture, on the one hand, and necessary conservation of the natural

environment on the other. This can be greatly influenced by citizen interest and participation. Institutional means for public participation are limited. As water resource and other environmental problems grow more complex, it will be increasingly important to provide better means for public participation in this important area.

ADRIAN D. HURST

This nation was once blessed with a wealth of resources. These resources have, in the past, been poorly managed. Many forms of wildlife have completely disappeared from the earth. Much of the topsoil has been allowed to escape through the erosive effects of wind and water. The water has become fouled and unable to support aquatic life and the atmosphere becomes less desirable each day. Mankind is surely fouling his environment. Yet, after realizing the damage caused by ignorance in the past, we continue to exploit without truly understanding the consequences.

The same mentality operates in areas plagued with air pollution. Some scientists say such quantities of pollutants now entering the air may even change the earth's weather patterns. Only an informed citizenry can bring about the changes necessary to combat this type of pollution.

A major effort must soon be undertaken on two fronts: First, man's attitude toward his environment must change from that of exploiter to conserver. Second, man's actions should reflect such thought through a major effort at cleaning up and restoring what has been damaged. There is no better place to start this restoration program than with the teachers and students in our public schools. Facts concerning the poor environmental quality

which our own country and the world at large possess can influence the thinking of pupils in our schools. We can hope that they will go out in the world as adults with a much better understanding of, and greater appreciation for, our environment. We inherited a country once laden with forests, clean streams and coastal waters, pure air, teeming wildlife and rich in natural resources. We must not die and leave it barren for the generations yet unborn.

HELMUT LIETH

In any examination of man's environment the main features of plants, animals and typical biological communities from the seashore, coastal plain, piedmont and mountains must be considered. They should include the main crops and livestock from each region and explanations as to why each lives in its particular habitat. An explanation of environmental problems, such as pollution, urban misplanning, industrial impact, exploration, possible solutions, and the involvement of students in cleaning up areas, planting gardens and participating in small field trips are possible alternative approaches that may be desirable.

WALTON R. SMITH and BRUCE ZOBEL

North Carolina has long been known as the land of the pine. However, pines actually make up only a small part of the state's forests. There are far more acres of hardwoods than pines. The ratio is two to one.

North Carolina has sixty-five percent of its 31.3 million acres of land in commercial forests. Of that number, seventy-nine percent are owned by private citizens. This causes forest managers concern because much of it

is not under scientific management and therefore contributes only a fraction of the benefits that could be obtained from properly managed land.

Management practices in North Carolina have been good over recent years. More board feet of timber has been grown each year than cut. Often people mistake lumbering operations as destroyers of a resource. Actually, lumbering is a harvesting process. No one would allow a corn field to grow to maturity and then rot in the field without harvesting its products. The same is true for a forest.

The forestry picture looks good in North Carolina. Nonetheless, it could still be improved. Most of the total growth in forests is recorded in conifers, yet these forests compose only one-third of the state's total forest land. There are about one billion cubic feet of trees presently in the forests that are not suitable for use. These are dead and dying trees which result from insect damage, tree diseases, fires and old age. All these causes can be controlled by proper protection and harvesting of mature lumber before it becomes too old and is ruined.

The state's forests play an important role in recreation, watershed management and wildlife preservation. The climate and soil of the state are favorable to more than one hundred commercial species of trees. The number is greater than any other state. With spruce and fir in the high mountains to the tropical hardwoods of the southeastern coast, North Carolina's forests have a variety unmatched by any other state.

Forests of North Carolina are for all of the people. They need to be managed and harvested without despoiling the soil, the beauty or other uses. Some forest areas need to be preserved for protection of soils and water only; some need to be set aside for recreation and study for future

generations to visit. North Carolina's forests must fulfill many uses and many desires. Our forests must provide the greatest good for the greatest number. To accomplish this purpose our youth must be cognizant of the value of this natural resource.

SOIL SCIENCE DEPARTMENT, NORTH CAROLINA STATE UNIVERSITY

Soil is North Carolina's most valuable non-renewable resource. We lack oil, coal, gas and iron ore, but are blessed with large areas of soils well suited for agricultural and non-farm uses. Of the approximately 31.2 million acres of land area in North Carolina, all but approximately 1,000,000 acres are covered with an appreciable thickness of soil.

Soil is a vital component of our ecosystems. It is the nourisher and supporter of our crop plants, forests, lawns and gardens. It undergirds our $1.5 billion annual income from crops, animals and forestry. Soil is the support of our highways and buildings. It is an artery in the hydrologic cycle through or over which most of our water must pass.

Soil also serves as a sink for many of our potential pollutants. These include pesticides, fertilizers and sewage effluents from septic tank fields. It is able to degrade, decompose, weaken or otherwise dispose of most of the excess of pesticides and fertilizers and of the septic tank effluents. Some soils, however, have very limited capacity to do this and consequently failure to recognize these soil limitations in the use of pesticides and fertilizers and design of septic tank systems causes these pollutants to be discharged into ground water, streams and estuaries.

Knowledge of the soil resource and its variation from place to place is important in land-use policy decisions. Our expanding population

and its increasing demands on the current reduction in agricultural acreage place even greater stress on the soils left in production. Thus, it seems imperative that soils capable of producing high levels of food and fiber be maintained for agricultural purposes wherever possible, rather than be diverted to other uses which are important, but of lower priority.

Soil is a basic resource for every North Carolina citizen. The relevance of soil knowledge to non-farmers is increasing rapidly. The selection of homesites, performance of septic tank fills, and growth of shrubs, lawns and gardens are just a few of the ways soils are important directly.

Equally important is the citizen's responsibility in policy decisions regarding land use. This decision is often expressed at the ballot box and one needs to be well-informed to make intelligent decisions.

It is not enough to be concerned with the great calamities that destroy our resources. One must also concern himself with the "everyday" changes taking place--development of flood plains into commercial areas, construction of homes on unstable soils, increased air pollution from auto exhaust, etc. The urgency of this matter is most dramatically revealed when we realize that some changes in land use are permanent and irreversible. Soils are fragile. Their vital organs are usually vested in the upper twelve inches. Once this is destroyed, it is almost impossible for a soil to ever regain its earlier potential. Prime cropland covered by concrete and asphalt is removed from food production for all practical purposes. The soil drainage system that converts a wildlife habitat to an airport usually will not work in reverse. What a soil is suited for is often more important in the scheme of things than how much there is of it.

Today's citizen needs to realize that he has the challenge and responsibility of maintaining a desirable environment in which to live and raise his family today and in the days to come.

DR. THEODORE R. SPEIGNER

Human society and natural resources must be the core of any program concerned with the present environmental crisis. In addition, emphasis should be placed on the decision-making processes which affect man. The most important problem facing man is that of overpopulation. As the state's population increases, the demands upon the resources will increase accordingly. Many of our resources are finite and our population cannot continue to increase without some compromise with the quality of life we can now experience. Thus, students must understand such relations and the implications thereof and possess decision-making skills needed to cope with such problems.

It is hard for people to understand why this is so without first being armed with adequate facts and concepts about the environment. Thus, North Carolinians must develop an awareness of the environment and its resources; pollution and its prevention and cure; and man, as a person, a natural resource and a social being.

A society which understands the finite supply of most of our resources will strongly advocate their wise use. A society which understands the oneness of the ecosystem will demand its protection.

BOYD STRAIN

Environmental education should be presented as ecological principles encompassing the entire school curriculum. The important ecological principles which should be considered include: (1) ecosystems, (2) energetics, (3) biochemical and hydrological cycles, (4) population biology, (5) organism interaction and (6) human ecology.

RICHARD WILKINSON, et al.

" . . . An educated, dedicated, morally responsible individual equals survival of earth and the ecosystem thereon." Our society is using an arsenal of anti-nature weapons against the environment. It is now imperative that we reeducate ourselves to nature's systems and begin to restructure man's actions into nature's cooperative channels. Our ageless attitude of "man against nature" must be radically changed as quickly as possible. Man must soon develop a new environmental ethic. A concept of man with nature rather than man against nature will have to be adopted.

The recognition of the limits of the earth's resources demands that man adjust his consumptive patterns. Recycling and reuse of all components of living systems must be incorporated into action in everyday social affairs. The natural recycling can be put back in balance through: (1) insuring that everything used in our daily lives is recycled and fit for consumption; (2) understanding that indescriminate use of hard insecticides has a far-reaching effect on all organisms and realizing that (3) pollutants of the air, water and land are not a necessary result of civilization, but a careless, poorly understood by-product. Man's problem is to learn how to make the best use of potentials and to develop an environment where they can flourish.

CHAPTER V

REPORT OF THE WORKING COMMITTEE ON CURRICULUM

WORKING COMMITTEE ON CURRICULUM

CHAIRMAN

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Under the direction of the Steering Committee of the Task Force, the Working Committee on Curriculum was given the responsibility to:

1. Examine textbooks, grades K-12, utilized in the public schools of North Carolina to ascertain to what degree information about environment and natural resources may be found in them.
2. Survey what is being done by other state education agencies in the area of environment and natural resource studies.
3. Analyze curriculum materials which have been developed in the environment and natural resource areas for the purpose of determining what has been done regarding curriculum development by others in this area.
4. Compare ideas presented in position papers with those which are reflected in textbooks and curriculum guides to determine what should be reflected in a curriculum.
5. Recommend, if necessary, what concepts should be found in an environment and natural resource study and at what level.

The Curriculum Committee gathered data, surveyed the situation, analyzed the issues, and began to systematically identify and examine the alternatives to curriculum innovation in regard to environmental education. The task was monumental because the alternatives were numerous.

There seemed to be a hierarchy of decisions; the two primary ones being (a) "what are we trying to accomplish" and (b) "how shall we go about the task?" The Committee, the literature and the experts agreed that a

change of behavior of individuals, achieved hopefully through greater understanding of environmental science, would indeed suffice for the future.

Understanding what? is the next logical step. The Committee on Position Papers identified four major areas of concern, as follows:

I. Ecosystems

II. Natural Resources

III. Pollution Problems

IV. Environmental Decision-Making

With staff exploration and study, these areas were worded as themes and then further expanded to include a series of the more important concepts relating to the particular theme. An understanding of these is a considered essential. They are to serve as a focus for environmental education at all grade levels. The environmental themes are as follows:

I. Ecosystems

Theme: Biotic and abiotic factors influence our environment.

Concepts:

A. All living things continually react to stimuli in their environment.

B. Living things are not evenly distributed over the earth but are found in definite zones and areas where conditions are favorable to their survival.

C. There is an interdependency of plants and animals in the ecosystem.

D. Food, oxygen, certain optimal conditions of temperature, moisture and light are among the factors essential to the life of most living things.

E. Ecosystem analysis will contribute to more constructive action on social and economic problems.

F. Biochemical and hydrological cycles are essential to the maintenance of ecosystems.

G. Biological and physical factors in ecosystems are closely related to energy flow.

H. Population growth is an important aspect of the ecosystem.

I. Ecosystems function in response to both immediate and long-time environmental changes.

II. Natural Resources

Theme: Natural resources influence ecosystems.

Concepts:

A. Every human being is in constant contact with the world's natural resources.

B. All natural resources are interrelated; injury to one may affect another.

C. The economy of a region depends on the wise use of management of its natural resources.

D. Natural resources are renewable and non-renewable factors that influence ecosystems.

E. Establishing a balanced cycle of harvest and renewal will insure a continuous yield of natural resources.

III. Pollution Problems

Theme: Pollution results in changes within the environment.

Concepts:

A. Pollution may bring about the removal of a species of organism from a community.

B. The development of an ecological community may be limited by an increase in population.

C. Pollution reduces the quantity and quality of resources available to man.

D. Pollution, unless limited, will affect the natural resources of a community.

E. Pollution may create harmful effects on a species or organism.

F. Polluted natural resources are unsuitable for consumption or recreation by living organisms.

IV. Environmental Decision-Making

Theme: Man's decision about the environment will determine his future.

Concepts:

A. Each individual in America has a privilege and obligation to make decisions which will affect the environment.

B. Decisions concerning the environment today will affect future generations.

C. Each individual must behave according to decisions made concerning the environment.

D. All elements of society, economic, legal, medical, political, artistic, educational and all others must be involved in environmental decisions.

"How shall we go about the task?" is the next question that was considered and, again, the alternatives were numerous. The ones discussed by the Committee were:

1. NEW COURSES: REPLACEMENT

   The Committee discussed the feasibility of developing an entirely new program of courses designed to introduce specific environmental concepts and replace selected courses currently in the public school curriculum with these courses, specifically, seventh grade life science and high school biology.

2. NEW COURSE: ADDITION

   This alternative would require the development of a new course in environmental education to be introduced into the public school curriculum in addition to the present program of instruction currently being offered.

3. ENVIRONMENTAL SCIENCE UNITS--MANY GRADE LEVELS: ADDITION TO PRESENT OFFERINGS

   The development of a series of units based on the concepts identified by the Committee could be undertaken. Such units would aid teachers in developing an additional area of instruction.

4. ENVIRONMENTAL SCIENCE UNITS--MANY GRADE LEVELS: REPLACEMENT OF CERTAIN UNITS NOW IN THE CURRICULUM

   A series of units on the environment could be developed to be used to replace some of the instructional materials now used by public school teachers.

5. TEACHER EDUCATION MATERIALS

   The Committee examined the alternatives of preparing an extensive set of teacher materials to enable the teacher to develop an individual program of environmental education. The use of such material would be at the discretion of the teacher.

6. ADULT EDUCATION PROGRAMS

Cognizant of the fact that there will be some time before school children can effect noticeable change upon the decision-making process of our society, the Committee examined the possibility of developing an extensive environmental education program aimed at the adult population of the state. The impact of such a program may enhance the development of an environmental awareness among the large adult population and support the efforts of the educators in the classroom. This program could be enacted through local nature museums and community colleges.

7. ENRICHMENT ACTIVITIES FOR STUDENTS

The examination of natural areas can be a rewarding experience to impressionable students. It may be imperative that the field experiences of school children be enlarged and enriched to facilitate the reawakening of our natural heritage.

8. EDUCATIONAL TELEVISION

Educational television is a medium that can have extensive influence across the state. The university's television network is another alternative to be considered in effecting and supporting change in the classroom.

9. TRAVELING EXHIBITS AND LECTURES

This resource has not been widely used by the state before. Its potential for effectiveness has been successfully demonstrated in numerous other areas of our society. Here the state can make an investment in one or a few facilities and have those facilities reach the population of the entire state.

An overriding consideration with each of the alternatives listed above involved a recommendation concerning approach. Should the recommendations encompass an attitude reflecting a "disciplinary" or separate subject approach or should the effort reflect an interdisciplinary or integrated-subject approach? It was the unanimous opinion of the Committee that the nature of environmental education exhibited a system of thought and action that cut across established subject matter areas. Therefore any effort to implement an environmental education program must embody an interdisciplinary approach.

On the basis of available data, including position papers, public hearings, and the literature, the Curriculum Committee recommends the following:

1. A major environmental effort should be directed toward increasing understanding of the environmental science concepts (identified earlier) in grades one through twelve.
2. (a) The development of environmental science source material for use in grades K-6, 7-9, and 10-12. These materials, perhaps similar to a source book, would provide ideas, directions and approaches for teachers to utilize as they plan for and carry out science instruction in their particular grade levels.

   (b) The establishment of a committee and sub-committee to work with an environmental education staff within the State Department of Public Instruction. These committees should include teachers at the grade levels concerned, scientists, and science curriculum specialists.

3. The employment of an environmental science specialist within the Department of Public Instruction to conduct environmental education curriculum workshops for teachers in all grade levels across the state. These should be extensive enough to enable teachers to feel confident in working with environmental science and to recognize the possibilities of working the material into their curriculum.
4. Conduct a study of the feasibility of replacing the present seventh grade science course with an environmental science course.
5. In 1-4 above, emphasis should be on environmental science with an interdisciplinary humanistic approach.
6. The creation of a high level Advisory Council on Environmental Education whose membership would include teachers, administrators, scientists, lay people, legislators and students. The functions shall include:
   a. "Sounding board" for ideas by the environmental education staff within the State Department of Public Instruction.
   b. Secure ideas for the development of resource and other instructional materials by the environmental education staff within the Department of Public Instruction.

The six items listed above are recommendations for immediate action and could be implemented rather quickly. Below are listed other recommendations, all of which would improve the situation in regard to environmental education but are not considered as immediate or crucial as those in the above list.

7. The creation of task forces in the various regions of the state to develop "Guides to Environmental Science" unique to that region and available for use and study by students and teachers.

8. The development of materials for distribution to various school districts across the state. These might include films, filmstrips, models, and photographs among others relating to the environment and natural resources of North Carolina.

9. The encouragement of the establishment of local (school district) Environmental Education Advisory Committees across the state.

10. The encouragement of the establishment of local and regional student task forces to identify and focus on environmental science problems in their regions.

11. A study of the feasibility of developing a North Carolina Center for Environmental Education. Such a center would be the focal point for environmental education, kindergarten through graduate school, in North Carolina. The center's mission would include a "think-tank function," a coordinating function, a research and development function and an implementation function.

12. A study, through adequate research techniques, of the effectiveness of the materials and programs instituted, both immediate and long-range.

13. The creation of the machinery to study and begin to develop plans for the establishment of extensive outdoor education programs in North Carolina. The merits of such programs can be cited indefinitely; suffice it to mention that these programs would benefit teachers, teachers in training, students and curriculum specialists.

14. A study of the feasibility of abolishing the present high school biology course and replacing it with an elective, highly relevant program with emphasis on environmental education.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The 1969 General Assembly enacted the Environment and Natural Resources Act directing the State Board of Education to " . . . study the need for and to formulate proposals relating to the introduction into the curriculum in the Public School System of North Carolina of a study of Environment and Natural Resources . . . ." The Act further directed that the study include an examination of: the status of the existing curriculum, available textbooks, current instruction in other states, available curriculum guides and instructional materials, and the need for in-service education for teachers. Public hearings were also to be conducted in order to insure the widest possible public participation in the establishment of any new directions in education.

The State Board of Education directed the State Department of Public Instruction to establish a Task Force, composed of forty-two members from government, industry, public education, and the general public, to carry out the study.

The Task Force was organized into four working committees: The Working Committee on Teacher Education, The Working Committee on Efforts of Other Agencies, The Working Committee on Position Papers, and The Working Committee on Curriculum.

The chairman of each committee was also a member of the Steering Committee of the Task Force. The Steering Committee conducted a total of six public hearings across the state during January of 1970. These hearings were held in Charlotte, Asheville, Wilmington, Greenville, Winston-Salem and Raleigh.

The various working committees conducted activities relevant to the task each was assigned. These were conducted during the spring and summer of 1970 and reports were submitted to the Chairman.

CONCLUSIONS

The conclusions of each committee were as follows:

I. The Working Committee on Teacher Education

A. There is an apparent weakness in the present teacher education program in the state. Specifically, there is a lack of instruction relating to environmental concepts in pre-service preparation of professional teachers.

B. There is an apparent weakness by many professional teachers in the understanding of environmental concepts. There appears to be a limited opportunity for these teachers to gain needed concepts and information about their environment.

C. Present teacher certification requirements fail to stress the importance of the environment and natural resources in the professional preparation of teachers.

II. The Working Committee on Efforts of Other Agencies

A. There is, at present, an information explosion of environmental education materials.

B. There are many agencies, both public and private, which have been established to develop and provide inexpensive environmental education materials. However, information about these

materials is not readily available to public school educators. There is a need for a "clearing house" of environmental education information.

C. There is, at present, an increasing number of publications reflecting the public's concern for the quality of the environment. Some of the publications are accurate and responsible. Others are of questionable value in the school curriculum.

D. There are a few programs sponsored by business and industry offering specialized training for public school teachers. However, most of these programs are too specialized for the generalist in the teaching profession.

E. There are apparently no programs that could be universally transferred directly into the public school curriculum for environment and natural resources.

III. The Working Committee on Position Papers

A. There is indeed a pending environmental crisis present in the state of North Carolina.

B. There is a demonstrated need for more information about this crisis to be distributed to the general public via the public school system.

C. Specifically, environmental education should include the following topics: ecology, organism-environment interaction, variation in environmental factors, population biology, the

gross biology of ecosystems, natural resources, pollution, and environmental decision-making.

D. Major concepts in environmental education should be identified.

E. Society is now developing a new awareness of environmental contamination and degradation and will soon demand more environmental information.

IV. The Working Committee on Curriculum

A. There are very few textbooks, grades K-12, utilized in the public schools of North Carolina that have a significant amount of information about the environment and natural resources.

B. Other state education agencies have not produced a significant amount of information about the environment and natural resources. Several states do appear to show an interest in the area and are now actively developing and evaluating new environmental programs which may be implemented in these states. The work is incomplete at this time.

C. There has been a vast amount of curriculum materials produced by both public and private agencies. However, much of this material is inappropriate for the needs of North Carolina. There is a recognized need for the establishment of some agency responsible for the development and evaluation of implementing programs for North Carolina.

D. The four major areas of environmental education suggested by the Working Committee on Position Papers should contribute to an outline for an environmental education program.

E. There are a number of concepts that could be included under the suggested areas: ecology, natural resources, pollution, and environmental decision-making.

RECOMMENDATIONS

I. The Working Committee on Teacher Education

A. Pre-Service Education

1. We recommend that a study be conducted by the State Board of Education as to the feasibility of changing present certification requirements of primary and intermediate teachers to nine semester hours of science. Three hours of the nine should include instruction in the environment and natural resources. The eighteen hours of science required for an elementary concentration would also include three semester hours of instruction in the environment and natural resource areas.
2. We recommend that a study be conducted by the State Board of Education as to the feasibility of changing certification requirements for secondary teachers to include an interdisciplinary environmental course. Such a course would replace the science elective.
3. Persons possessing certification other than primary, elementary or science would be encouraged to take an interdisciplinary environmental course, plus one elective from the biological, earth or physical sciences.
4. Any proposed course in environment and natural resources at the college or university level should be interdisciplinary.

It might include the areas of the: natural sciences, earth sciences, physical sciences, fine arts, social sciences, language arts and professional education.

5. In addition, any proposed interdisciplinary course should be taught by a team of specialists who plan and provide instruction as one cohesive unit, and where possible, resources from industry and government should be utilized.
6. The proposed course would include involving students in a variety of laboratory or environmental experiences.
7. The proposed interdisciplinary course would include a study of environmental problems relevant to man. Such a program would encourage the learner to develop a thorough understanding of the human needs of today's complex society.

   A possible outline of such a course follows:

   a. Human Needs
      1) Air
      2) Water
      3) Food
      4) Shelter
      5) Clothing
      6) Physical and Mental Well-Being
      7) Transportation and Communications
      8) Space

   b. Environmental Sources
      1) Atmospheric Resources
         a) Atmospheric Processes

b) Air Pollution

c) Solar Energy as a Source of Power

2) Water Resources

a) Marine

(1) Food from the Sea

(2) Minerals from the Sea

(3) Marine Energy Sources

(4) Recreation

b) Terrestrial

(1) The Hydrologic Cycle

(2) Water Requirements and Supplies

(3) Water Quality

(4) Water Power as a Source of Energy

(5) Fresh Water Food Supplies

(6) Recreation

3) Land Resources

a) Soil Conservation and Use

(1) Agriculture

(2) Forestry

(3) Grazing

(4) Wildlife Conservation and Management

b) Mineral Resources

(1) Metals and Non-Metals

(2) Energy Sources

(a) Fossil Fuels

(b) Nuclear Fuels

4) Man's Additions

a) Pesticides, Herbicides

b) Urbanization

c) Waste Disposal

c. Constraints

1) Biological

a) Ecological Principles (food chains, types of ecosystems, checks and balances)

b) Population Dynamics

c) Environmental Health

d) Losses (disease, insects, weeds, fire and various other destructive agents)

2) Resource Economics and Policy

a) Scarcity and Value

b) Resources and Economic Development

c) Development of Sound Environmental Principles

d) Public vs. Private Responsibility

e) Aesthetics

B. In-Service Education

1. We recommend that good educational principles and practices, including resources from industry, government foundations and so forth, be utilized in all in-service education programs.

2. It is also felt that the state should use the regular school calendar to find in-service time for environmental education through:

   a. Local Workshops

   b. Workshops sponsored by the State Department of Public Instruction

   c. Extension Courses through Colleges and Universities

   d. Local In-Service

      1) Renewal Courses

      2) Educational Tours of Local Environmental Areas

   e. Educational Television

3. Special Programs

   a. Summer Institutes

   b. Academic Year Institutes

   c. Topical Courses

   d. Seminars

II. The Working Committee on the Efforts of Other Agencies

A. Numerous agencies have available materials which could be used to supplement a public school curriculum in environmental education. However, such information is not readily available to public school educators. The need for a "clearing house" of environmental education information is evident within the state. Such a need can only be magnified in the future as the information explosion continues. Therefore, the Committee recommends the immediate establishment of such a "clearing house" within the Department of Public Instruction to research and examine every possible source of pertinent information and to then make this information available to the interested educator.

B. The Committee could find no programs which could be transferred directly to the public school curriculum for environment and natural resource education. Therefore, the Committee recommends the establishment to a division of the State Department of Public Instruction the responsibility for the development of such programs.

C. A number of agency programs offered opportunities for specialized training for public school teachers of environmental subjects. However, a majority of these agencies had programs too specialized for the generalist in the profession. Therefore, the Committee recommends that a concerted effort on the part of the State Board and the State Department be exerted to encourage business and industry, public and private agencies, and other interested groups to support the development of special educational programs designed for the classroom teacher. Such agencies should be encouraged to financially underwrite educational workshops, institutes, and seminars. The programs need not be limited. The crisis demands active participation at all levels, and the lay public and parents need not be excluded.

III. The Working Committee on Position Papers

A. We are unanimously agreed that a program of instruction be carried out through the entire public school experience and recommend that it should not take the form of a single course to be offered in any given year. It may be that the general

subject of environment should be emphasized during one, or several years, but the basic concepts should permeate the entire public school curriculum from the first through the twelfth grade.

B. Environmental education deals chiefly with attitude building and sound attitudes can only be developed through constant attention in the curriculum. Therefore, we recommend four broad areas which should be included in an environmental education program. The four areas are:

1. Ecological concepts - the interrelatedness of all life.
2. Natural resources - the basic facts as they particularly relate to North Carolina's resources.
3. Pollution - its nature and the problems it raises.
4. Environmental decision-making - the basic tools for change.

IV. The Working Committee on Curriculum

A. A major environmental effort should be directed toward increasing understanding of the environmental science concepts (identified earlier) in grades one through twelve.

B. The development of environmental science source material for use in grades K-6, 7-9, and 10-12. These materials, perhaps similar to a source book, would provide ideas, directions and approaches for teachers to utilize as they plan for and carry out science instruction at their particular grade levels.

The establishment of a committee and sub-committee to work with an environmental education staff in the development of these materials. These committees should include teachers at the grade levels concerned, scientists, and science curriculum specialists.

C. The employment of an environmental science specialist within the Department of Public Instruction to conduct environmental science curriculum workshops for teachers in all grade levels across the state. These should be extensive enough to enable teachers to feel confident in working with environmental science and to recognize the possibilities for working the material into their curriculums.

D. Conduct a study of the feasibility of replacing the present seventh grade science course with an environmental science course.

E. In A-D above, emphasis should be on environmental science with an interdisciplinary humanistic approach.

F. The creation of a high level Advisory Council on Environmental Education whose membership would include teachers, administrators, scientists, lay people, legislators and students. The functions shall include:

1. "Sounding board" for ideas by the environmental education staff within the State Department of Public Instruction.
2. Secure ideas for the development of resource and other instructional materials by the environmental education staff within the Department of Public Instruction.

G. The creation of task forces in the various regions of the state to develop "Guides to Environmental Science" unique to that region and available for use and study by students and teachers.

H. The development of materials for distribution to various school districts across the state. These might include films, filmstrips, models and photographs among others relating to the environment and natural resources of North Carolina.

I. The encouragement of the establishment of local (school districts) Environmental Education Advisory Committees across the state.

J. The encouragement of the establishment of local and regional student task forces to identify and focus on environmental science problems in their regions.

K. A study of the feasibility of developing a North Carolina Center for Environmental Education. Such a center would be the focal point for environmental education, kindergarten through graduate school, in North Carolina. The center's mission would include a "think-tank function," a coordinating function, a research and development function and an implementation function.

L. A study, through adequate research techniques, of the effectiveness of the materials and programs instituted, both immediate and long-range.

M. The creation of the machinery to study and begin to develop plans for the establishment of extensive outdoor education programs in North Carolina. The merits of such programs can be cited indefinitely; suffice it to mention that these programs would benefit teachers, teachers in training, students and curriculum specialists.

N. Conduct a study of the feasibility of abolishing the present high school biology course and replacing it with an elective, highly relevant program with emphasis on environmental education.

APPENDIX A

HOUSE BILL 118

NORTH CAROLINA
GENERAL ASSEMBLY
1969 SESSION
RATIFIED BILL

CHAPTER 1103

HOUSE BILL 118

AN ACT DIRECTING THE STATE BOARD OF EDUCATION TO CONDUCT A STUDY AS TO THE FEASIBILITY OF INTRODUCING INTO THE PUBLIC SCHOOL SYSTEM CURRICULUM INSTRUCTION IN THE ENVIRONMENT AND NATURAL RESOURCES AND APPROPRIATING FUNDS FOR SAID STUDY.

WHEREAS, there is growing recognition that we are approaching an environmental crisis of global proportions; and

WHEREAS, this crisis is the result of long-standing and increasing abuse of the environment brought about by the heightened demands of an ever-increasing population; and

WHEREAS, if the long-range hopes of the future are to be served, a healthy environment must be maintained not only for ourselves, but for generations yet to come; and

WHEREAS, the State of North Carolina is blessed with many natural resources which have not been spoiled by the abuses of reckless exploitation; and

WHEREAS, an understanding of the principles of conservation and ecology is essential to maintaining both the amenities and the necessities of a healthy environment; and

WHEREAS, the students in the Public School System of North Carolina represent a vital part of our State's investment in the future; and

WHEREAS, the students in the Public School System will one day be the custodians of all the State's resources, and the

quality of such custody will depend upon their making decisions to preserve the permanent resources of our State; Now, therefore, The General Assembly of North Carclina do enact:

Section 1. The State Board of Education is directed to study the need for and to formulate proposals relating to the intrcduction into the curriculum in the Public School System of North Carolina of a study of Environment and Natural Resources through the addition of a course cr courses of study, or through the inclusion of a study thereof in any other course or courses.

Said Board shall:

a. Make an investigation concerning the value of such a course of study,

b. Make inquiry concerning the degree to which various aspects of the Environment and Natural Resources are covered in the existing curriculum,

c. Examine available textbooks in the subject area and evaluate courses which are being taught elsewhere, and

d. Examine the development of curriculum guides and instructional materials relating to the Environment and Natural Resources.

e. Examine the needs for in-service training for teachers in the subject area of the Environment and Natural Resources.

Sec. 2. It is the explicit intent of this Act that the Board shall work closely with the Superintendent of Public Instruction and shall hold Public Hearings in order that the widest public participation can be achieved in establishing this new direction for our educational enterprise.

Sec. 3. There is hereby appropriated to the State Board of Education, out of the General Fund, the sum of Five thousand dollars for the biennium beginning July 1, 1969, to defray the expenses of said study.

Sec. 4. The State Board of Education shall, on or before October 1, 1970, publish the results of said study and the recommendations of said Board and shall make said report available to the news media and members of the 1971 Session of the General Assembly.

Sec. 5. All laws and clauses of laws in conflict with this Act are hereby repealed.

Sec. 6. This Act shall be in full force and effect from and after July 1, 1969.

In the General Assembly read three times and ratified, this the 30th day of June, 1969.

H. P. TAYLOR, JR.

H. P. Taylor, Jr.
President of the Senate.

EARL W. VAUGHN

Earl W. Vaughn
Speaker of the House of Representatives.

APPENDIX B

STEERING COMMITTEE MEMBERS

TASK FORCE MEMBERS

S T E E R I N G C O M M I T T E E

TASK FORCE ON ENVIRONMENT AND NATURAL RESOURCES

Chairman of Task Force	Representative Norwood E. Bryan, Jr. P. O. Box 24 Fayetteville, North Carolina 28302
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Chairman, Working Committee on Curriculum	Dr. Paul B. Hounshell, Director Institutes in Science University of North Carolina at Chapel Hill Chapel Hill, North Carolina 27514
Chairman, Working Committee on Teacher Education	Dr. Calvin Doss Department of Education University of North Carolina at Wilmington Wilmington, North Carolina 28401
Chairman, Working Committee on Position Papers	Dr. Arthur W. Cooper Institute of Biological Sciences Department of Botany North Carolina State University Box 5186 Raleigh, North Carolina 27607
Director	Dr. Edwin L. West, Jr. Director of Development State Department of Public Instruction Raleigh, North Carolina 27602

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Miss Kay Webb, Student, Enloe High School, Raleigh 27604

Mrs. Lee Wilder, Governor's Beautification Committee, State Highway Building, Raleigh 27602

Mr. Ralph C. Winkworth, Department of Conservation and Development, Forestry Division, Administration Building, Raleigh 27602

APPENDIX C

PARTICIPANTS IN PUBLIC HEARINGS

PARTICIPANTS IN PUBLIC HEARINGS

CHARLOTTE

Mr. Roy Alexander, Independence High School

Dr. Lawrence Boggs, President, Charlotte-Mecklenburg Medical Society

Mr. Lynn Cagle, Cabarrus County Schools

Dr. Maurice Camp, Director, Mecklenburg County Health Department

Dr. John Chase, Jr., University of North Carolina at Charlotte

Mr. Charles Coble, Charlotte-Mecklenburg Schools

Dr. James Clay, University of North Carolina at Charlotte

Dr. Herbert Heckenbleikner, University of North Carolina at Charlotte

Mrs. Dolly Hickman, Charlotte Country Day School

Mr. Robert Owen, Marketing Manager, North Carolina National Bank

Mr. Russell Peithman, Director, Charlotte Nature Museum

Mr. John Smith, Charlotte-Mecklenburg Schools

Mr. C. D. Spangler, Spangler Realty Company

Mr. Charles Vicinni, Charlotte-Mecklenburg Schools

Mrs. C. T. Watkins, State President, P. T. A.

ASHEVILLE

Mrs. Jeanette Austin, President, Western North Carolina Tuberculosis and Respiratory Disease Association, Brevard

Mr. Frank Bell, Mondamin Corporation, Tuxedo

Dr. Richard Berne, Western Carolina University

Mr. Forest Carpenter, National Forestry Service

Miss Jean Carr, Student Representative, Asheville Country Day School

Mr. Culver Dale, Superintendent, McDowell County Schools

Mr. Jack Davis, National Park Service

Mr. Roy Davis, Engineer

Mr. Randall Duckett, Assistant Superintendent, Buncombe High School

Mr. Bob Gillespie, Camp Acoria

Mrs. Miriam Hearn, Buncombe County

Mr. James G. Hollandsworth, Director, The Asheville School for Boys

Dr. John Huff, Mars Hill College

Dr. Harvey Jolly, Mars Hill College

Mrs. Marjorie P. Lockwood, Teacher, A. C. Reynolds High School

Mr. Steve Longnecker, Instructor, Asheville Country Day School

Mr. John Ramsey, Buncombe County

Mrs. Helen T. Reed, Asheville Country Day School

Mr. Karl Rhonkee, Outward Bound

Mr. Andrew Staff, Buncombe County

Mrs. Andrew Staff, Buncombe County

Mr. Wally Wallace, Student, Furman University

Mr. Jed Williamson, Outward Bound

Mr. Ken Wright, University of North Carolina at Asheville

WILMINGTON

Mr. Roger Averette, President, Wilmington Junior Chamber of Commerce

Mr. Jerry Beaver, Director of Secondary Education, New Hanover County Schools

Dr. Heywood C. Bellamy, Superintendent, New Hanover Schools

Dr. Ralph Brauer, Director, Wrightsville Bio-Medical Laboratory, Wrightsville Beach

Mrs. Howard Burgin, Fayetteville

Senator John Burney

Mr. John Cowan, Reigel Paper Corporation, Reigelwood

Mrs. Shirley Davis, Chemistry Teacher, Harnett High School

Mr. Clarence Dozgens, Dean, Cape Fear Technical Institute

Dr. Harold Hulon, Department of Education, University of North Carolina at Wilmington

Mr. M. J. McLeod , President, Cape Fear Technical Institute

Dr. Ann McCrary, Department of Biology, University of North Carolina at Wilmington

Dr. James F. Parnell, Department of Biology, University of North Carolina at Wilmington

Mr. C. C. Peters, Vice-President, Reigel Paper Corporation, Reigelwood

Mrs. Frank Shaw, Chairman of the Board, HANDS Program, Fayetteville

Mr. Mike Vaughn, Vaughn and Company

Dr. William Wagoner, Chancellor, University of North Carolina at Wilmington

GREENVILLE

Senator Julian Allsbrook

Mr. G. Sterling Bailey, Director, Environmental Resources, Weyerhaeuser Company, Plymouth

Mr. Turner W. Battle, Executive Director, North Carolina Wildlife Federation

Dr. Vincent Bellis, Department of Biology, East Carolina University

Dr. Joseph Boyette, Department of Biology, East Carolina University

Mr. George Dainty, Southern Forest Institute, Atlanta, Georgia

Mr. William Finch, for Dr. William E. Fulford, Jr., President of Pitt Technical Institute

Miss Sandra Foley, Student, East Carolina University

Dr. Carolyn Hampton, Department of Science Education, East Carolina University

Mr. Will Hon, Director, Carteret County Marine Science Center

Dr. David Kirtley, Director, Marine Science Center, Manteo

Dr. Floyd Mattheis, Chairman, Department of Science Education, East Carolina University, for Dr. Leo Jenkins, President, East Carolina University

Dr. Michael P. O'Connor, Department of Geology, East Carolina University

Representative David Reid

Mr. James Willis, Carteret County Environmental Council

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Dr. Donald Allen, Department of Sociology and Anthropology, University of North Carolina at Greensboro

Mr. Walter Barnhill, Chairman, North Carolina Council of Engineering Societies

Dr. Anthony Calluci, R. J. Reynolds Company

Mr. Robert Connor, Architect, High Point

Dr. John Dimmick, Biology Department, Wake Forest University

Mr. Noel Donavent, Director, Winston-Salem Service Learning Project in Community Resource Development

Mrs. C. C. Gracia, League of Women Voters, Winston-Salem and Forsyth County

Dr. Larry R. Harrington, Winston-Salem

Mr. Royce C. Hough, Wachovia Bank and Trust Company

Mr. Lincoln Ladd, Sierra Club

Representative Dempsey McDaniel

Mr. Fred Parker, Winston-Salem/Forsyth Schools

Mr. Grant Queen, Biology Teacher, Forsyth County Schools

Mr. Henry Robertson, Soil Conservation Service

Dr. Hollis Rogers, Biology Department, University of North Carolina at Greensboro

Dr. Theodore Speigner, North Carolina Central University

Mr. Myron Vourax, Director, Nature Science Center, Winston-Salem

Mrs. Donald Whitener, Winston-Salem

Mr. Jim Wilhelm, Winston-Salem/Forsyth Schools

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Dr. Norman Anderson, North Carolina State University

Mrs. Preston Edsall, Democratic Committee Women of Wake County

Mr. Herman Gatlin, Director of Education, Durham County Schools

Dr. Nell Hirshberg, Department of Biology, North Carolina Central University

Mr. Joe Holliday, Director, Secondary Education, Raleigh City Schools

Mr. James Hosey, United States Weather Bureau, Raleigh-Durham Airport

Mrs. Hazel Jackson, Director of Elementary Education, Durham County Schools

Dr. Terry W. Johnson, Chairman, Department of Botany, Duke University

Dr. Wilbert Johnson, Chairman, Division of Natural Sciences, St. Augustine College

Mr. Clyde Patton, North Carolina Wildlife Commission

Dr. Craig Phillips, Superintendent of Public Instruction

Dr. C. W. Ralston, Dean, School of Forestry, Duke University

Mrs. Charles Remming, State Board of the League of Women Voters of North Carolina

Mrs. Lola Solice, Supervisor of Elementary Schools, Durham City Schools

Miss Helen Spencer, Earth Science Teacher, Logan Junior High School, Durham

Mr. James Stamey, President, Wake County Young Democratic Club

Mr. James S. Stevens, Jr., Administrator, Recreation Division, Department of Local Affairs

Dr. Boyd R. Strain, Ecologist, Associate Professor of Botany, Duke University

Representative H. W. "Pop" Taylor

Mr. Bernard Toan, Director of Secondary Education, Durham City Schools

Representative Howard Twiggs

Mrs. Richard J. Volk, representing Pines of Carolina Council, Girl Scouts of America

Mrs. Joyce Wasdell, Assistant Superintendent, Durham County Schools

Mrs. Lee Wilder, Governor's Beautification Committee, Raleigh