

ALASKA LEGISLATURE COMMITTEE FILES 1991-1992 8672

6884 HOUSE HEALTH EDUCATION & SOCIAL SERVICES

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1 E. THE DEPARTMENT OF EDUCATION, IN CONSULTATION WITH THE ARIZONA
2 BOARD OF REGENTS, SHALL DEVELOP A LIST OF SKILLS IN ENVIRONMENTAL
3 EDUCATION TO BE INCLUDED IN TEACHER TRAINING PROGRAMS.

4 F. IN THIS SECTION "ENVIRONMENTAL EDUCATION" MEANS THE EDUCATIONAL
5 PROCESS DEALING WITH THE RELATIONSHIP OF HUMANS TO THEIR NATURAL AND
6 ARTIFICIAL SURROUNDINGS AND INCLUDES THE RELATION OF POPULATION,
7 POLLUTION, RESOURCE ALLOCATION, RESOURCE DEPLETION, CONSERVATION,
8 TRANSPORTATION, TECHNOLOGY AND URBAN AND RURAL PLANNING TO THE
9 ENVIRONMENT.

10 Sec. 4. Title 15, chapter 10, Arizona Revised Statutes, is amended
11 by adding article 7.1, to read:

12 ARTICLE 7.1. DEPARTMENT OF EDUCATION ENVIRONMENTAL EDUCATION FUND
13 15-1211. Department of education environmental education
14 fund

15 A. A DEPARTMENT OF EDUCATION ENVIRONMENTAL EDUCATION FUND IS
16 ESTABLISHED FOR THE PURPOSE OF PROVIDING MONIES TO THE DEPARTMENT OF
17 EDUCATION FOR PERSONNEL AND OTHER EXPENDITURES NECESSARY TO ASSIST SCHOOL
18 DISTRICTS IN IMPLEMENTING ENVIRONMENTAL EDUCATION PROGRAMS AND TO PROVIDE
19 TRAINING AS PRESCRIBED IN SECTION 15-706.

20 B. THE SUPERINTENDENT OF PUBLIC INSTRUCTION SHALL ADMINISTER THE
21 FUND.

22 C. MONIES FOR THE FUND MAY BE PROVIDED FROM LEGISLATIVE
23 APPROPRIATIONS AND BY DONATIONS FROM INTERESTED INDIVIDUALS AND
24 ORGANIZATIONS.

25 D. THE FUND ESTABLISHED BY THIS SECTION IS EXEMPT FROM THE
26 PROVISIONS OF SECTION 35-190, RELATING TO LAPSING OF APPROPRIATIONS.

27 Sec. 5. Title 15, chapter 13, article 2, Arizona Revised Statutes,
28 is amended by adding section 15-1643, to read:

29 15-1643. Environmental education training programs

30 EACH OF THE UNIVERSITIES UNDER THE JURISDICTION OF THE ARIZONA BOARD
31 OF REGENTS SHALL PROVIDE TRAINING IN THE ENVIRONMENTAL EDUCATION SKILLS
32 PRESCRIBED IN SECTION 15-706, AS FOLLOWS:

33 1. INCORPORATE TRAINING IN ENVIRONMENTAL EDUCATION INTO ITS TEACHER
34 TRAINING PROGRAMS. THE TRAINING IS ENCOURAGED TO BE PROVIDED THROUGH
35 EXISTING UNIVERSITY COURSES OR THROUGH NEW COURSES ON ECOLOGICAL CONCEPTS
36 AND METHODS OF TEACHING AND SHALL INCLUDE TEACHING METHODS TO INCREASE
37 AWARENESS OF ENVIRONMENTAL ISSUES AND TO PROMOTE KNOWLEDGE OF
38 ENVIRONMENTAL CONCEPTS, DEVELOP POSITIVE ATTITUDES AND VALUES TOWARD THE
39 ENVIRONMENT AND ENCOURAGE CIVIC AND SOCIAL RESPONSIBILITY TOWARD
40 ENVIRONMENTAL ISSUES.

41 2. IN COLLABORATION WITH THE DEPARTMENT OF EDUCATION AND OTHER
42 RECOGNIZED ENVIRONMENTAL EDUCATION PROGRAMS, PROVIDE ENVIRONMENTAL
43 EDUCATION TRAINING PROGRAMS FOR CERTIFICATED TEACHERS. THE PROGRAMS SHALL
44 INCLUDE THE TOPICS PRESCRIBED IN PARAGRAPH 1 AND MAY INCLUDE:

45 (a) WORKSHOPS ON ENVIRONMENTAL EDUCATION PROVIDED AT THE
46 UNIVERSITIES, IN SCHOOL DISTRICTS OR AT CONFERENCES.

47 (b) SPECIAL INSTITUTES ON ENVIRONMENTAL EDUCATION FOR TEACHERS WHO,
48 AFTER RECEIVING INSTRUCTION IN ENVIRONMENTAL EDUCATION, ARE ENCOURAGED TO

1 RETURN TO THEIR INDIVIDUAL SCHOOL DISTRICTS AND PROVIDE ENVIRONMENTAL
2 EDUCATION INSTRUCTION TO OTHER TEACHERS 'N THE SCHOOL DISTRICT.

3 Sec. 6. Section 28-301.03, Arizona Revised Statutes, is amended to
4 read:

5 28-301.03. Director as registering officer; special fund;
6 reversion

7 A. The department is entitled to establish a special fund composed
8 of the monies retained pursuant to section 28-1591, subsection F and one
9 dollar of each registration fee, one dollar of each title fee and two
10 dollars of each late registration penalty collected by the director as the
11 registering officer, the air quality compliance fee collected pursuant to
12 section 49-542, FROM AND AFTER SEPTEMBER 30, 1992 AN EIGHT DOLLAR
13 ENVIRONMENTAL NUMBER PLATE ANNUAL ADMINISTRATION FEE COLLECTED UNDER
14 SECTION 28-308.08 and an eight dollar collegiate plate annual
15 administration fee collected under section 28-308.01. The department may
16 use the monies to carry out the duties imposed by this title for
17 registration or titling of vehicles, to cover the administrative costs of
18 issuing the air quality compliance sticker or modifying the year
19 validating tab and to cover expenses and costs in issuing the collegiate
20 number plates provided by section 28-308.01 AND FROM AND AFTER SEPTEMBER
21 30, 1992 THE ENVIRONMENTAL NUMBER PLATES PROVIDED BY SECTION 28-308.08.

22 B. The special fund established in this section is exempt from
23 section 35-190 relating to lapsing of appropriations. Any amounts in
24 excess of one hundred thousand dollars for each county which enters into a
25 contract pursuant to section 28-301.02 remaining in the fund at the close
26 of each fiscal year revert to the state highway fund.

27 C. The state treasurer may invest inactive monies in the special
28 fund. The state treasurer shall credit all interest earned on the special
29 fund monies to the special fund.

30 Sec. 7. Title 28, chapter 3, article 1, Arizona Revised Statutes,
31 is amended by adding section 28-308.08, to read:

32 28-308.08. Environmental number plates; fee; fund

33 A. A PERSON WHO IS THE REGISTERED OWNER OF A VEHICLE REGISTERED
34 WITH THE MOTOR VEHICLE DIVISION OR WHO MAKES APPLICATION FOR AN ORIGINAL
35 OR RENEWAL REGISTRATION OF A VEHICLE, ON PAYMENT OF THE REGISTRATION FEE
36 PRESCRIBED IN SECTION 28-205, MAY APPLY TO THE MOTOR VEHICLE DIVISION FOR
37 AN ENVIRONMENTAL NUMBER PLATE, WHICH SHALL BE AFFIXED TO THE VEHICLE FOR
38 WHICH REGISTRATION IS SOUGHT IN LIEU OF THE REGULAR NUMBER PLATE.

39 B. THE ENVIRONMENTAL NUMBER PLATE DESIGN SHALL BE SELECTED BY THE
40 GOVERNOR FROM AMONG THE ENTRIES RECEIVED IN AN OPEN COMPETITION SPONSORED
41 BY THE GOVERNOR'S OFFICE.

42 C. A PERSON WHO REQUESTS AN ENVIRONMENTAL NUMBER PLATE SHALL PAY
43 THE ENVIRONMENTAL PLATE ANNUAL ADMINISTRATION FEE AS PROVIDED BY SECTION
44 28-301.03 AND AN ADDITIONAL SEVENTEEN DOLLAR ENVIRONMENTAL PLATE ANNUAL
45 DONATION. THE DIRECTOR SHALL TRANSMIT ALL ENVIRONMENTAL PLATE ANNUAL
46 DONATIONS TO THE STATE TREASURER. THE STATE TREASURER SHALL TRANSMIT THE
47 MONIES FROM THE ENVIRONMENTAL PLATE ANNUAL DONATION TO THE DEPARTMENT OF
48 EDUCATION FOR DISBURSEMENT TO ENVIRONMENTAL EDUCATION PROGRAMS.

1 D. AN ENVIRONMENTAL NUMBER PLATE SHALL BE ISSUED ONLY TO THE
2 REGISTERED OWNER OF THE VEHICLE ON WHICH IT IS TO BE DISPLAYED.
3 E. IF A PERSON WHO HAS BEEN ISSUED AN ENVIRONMENTAL NUMBER PLATE
4 APPLIES TO THE MOTOR VEHICLE DIVISION FOR TRANSFER OF THE PLATE TO A
5 SUBSEQUENTLY ACQUIRED VEHICLE, THE MOTOR VEHICLE DIVISION SHALL CHARGE A
6 TRANSFER FEE OF TWELVE DOLLARS IN ADDITION TO ALL OTHER APPROPRIATE FEES.
7 F. IF A PERSON WHO HAS BEEN ISSUED AN ENVIRONMENTAL NUMBER PLATE
8 SELLS, TRADES OR OTHERWISE RELEASES OWNERSHIP OF THE VEHICLE ON WHICH THE
9 PLATE HAS BEEN DISPLAYED, HE SHALL IMMEDIATELY REPORT THE TRANSFER OF THE
10 PLATE TO THE MOTOR VEHICLE DIVISION OR HE SHALL SURRENDER THE PLATE TO THE
11 MOTOR VEHICLE DIVISION.
12 G. IF THE LESSEE OF A VEHICLE FOR WHICH AN ENVIRONMENTAL NUMBER
13 PLATE HAS BEEN ISSUED SUBSEQUENTLY PURCHASES THE SAME VEHICLE, THE MOTOR
14 VEHICLE DIVISION, ON REQUEST OF THE NEW OWNER, SHALL ISSUE THE
15 ENVIRONMENTAL NUMBER PLATE TO THE NEW OWNER OF THE VEHICLE. THE NEW OWNER
16 SHALL PAY A FEE OF TWELVE DOLLARS IN ADDITION TO ALL OTHER APPROPRIATE
17 FEES BUT IS NOT REQUIRED TO PAY THE ADMINISTRATION FEE OR ANY ANNUAL
18 DONATION UNTIL THE EXPIRATION OF THE FULL YEAR FOR WHICH THE FEE AND
19 DONATION WERE PAID.
20 Sec. 8. Title 49, chapter 1, Arizona Revised Statutes, is amended
21 by adding article 4, to read:
22 ARTICLE 4. INTERAGENCY COMMITTEE ON ENVIRONMENTAL EDUCATION
23 49-161. Interagency committee on environmental education;
24 appointment; meetings; duties
25 A. THE INTERAGENCY COMMITTEE ON ENVIRONMENTAL EDUCATION IS
26 ESTABLISHED CONSISTING OF SIXTEEN MEMBERS. THE HEAD OF EACH AGENCY LISTED
27 IN SUBSECTION B OF THIS SECTION SHALL APPOINT ONE EMPLOYEE OF THAT AGENCY
28 TO SERVE ON THE INTERAGENCY COMMITTEE ON ENVIRONMENTAL EDUCATION. THE
29 MEMBERS SERVE AT THE PLEASURE OF THE HEAD OF EACH AGENCY LISTED IN
30 SUBSECTION B OF THIS SECTION.
31 B. THE COMMITTEE SHALL BE COMPOSED OF PERSONS WITH EXPERIENCE IN
32 ENVIRONMENTAL EDUCATION AND THE MEMBERS SHALL CONSIST OF:
33 1. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
34 DEPARTMENT OF TRANSPORTATION.
35 2. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
36 DEPARTMENT OF WATER RESOURCES.
37 3. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
38 DEPARTMENT OF ENVIRONMENTAL QUALITY.
39 4. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
40 STATE LAND DEPARTMENT.
41 5. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
42 STATE PARKS.
43 6. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
44 OFFICE OF TOURISM.
45 7. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
46 DEPARTMENT OF EDUCATION.
47 8. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
48 COMMISSION ON THE ARIZONA ENVIRONMENT.

- 1 9. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
- 2 ARIZONA GEOLOGICAL SURVEY.
- 3 10. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
- 4 ENERGY OFFICE.
- 5 11. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
- 6 SOLAR ENERGY ADVISORY COUNCIL.
- 7 12. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
- 8 ARIZONA GAME AND FISH DEPARTMENT.
- 9 13. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
- 10 DEPARTMENT OF AGRICULTURE.
- 11 14. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
- 12 STATE MINE INSPECTOR.
- 13 15. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
- 14 DEPARTMENT OF HEALTH SERVICES.
- 15 16. AN EMPLOYEE IN AN ADMINISTRATIVE OR MANAGERIAL CAPACITY WITH THE
- 16 OFFICE OF THE ATTORNEY GENERAL.
- 17 C. THE GOVERNOR SHALL APPOINT THE CHAIRPERSON OF THE COMMITTEE.
- 18 D. THE COMMITTEE SHALL MEET AT LEAST FOUR TIMES A YEAR.
- 19 E. MEMBERS OF THE COMMITTEE ARE NOT ELIGIBLE TO RECEIVE
- 20 COMPENSATION AND ARE NOT ELIGIBLE FOR REIMBURSEMENT OF EXPENSES FROM THE
- 21 COMMITTEE.
- 22 F. THE COMMITTEE SHALL:
- 23 1. ENCOURAGE THE COORDINATION OF INTERAGENCY ACTIVITIES REGARDING
- 24 ENVIRONMENTAL EDUCATION TO PROMOTE THE EFFICIENT DISTRIBUTION OF
- 25 INFORMATION AND TO FACILITATE THE PLANNING AND DEVELOPMENT OF EDUCATIONAL
- 26 MATERIALS.
- 27 2. DEVELOP AND MAINTAIN A MEMORANDUM OF UNDERSTANDING TO SPECIFY
- 28 METHODS BY WHICH THE AGENCIES CAN SHARE THEIR RESOURCES TO BENEFIT
- 29 ENVIRONMENTAL EDUCATION IN THIS STATE.
- 30 3. RECOMMEND ACTION BY AGENCIES REGARDING THE IMPROVEMENT OF
- 31 ENVIRONMENTAL EDUCATION PROGRAMS AND THE IMPLEMENTATION OF THE MEMORANDUM
- 32 OF UNDERSTANDING.
- 33 4. ASSESS EACH AGENCY'S CAPABILITY TO MANDATE ENVIRONMENTAL
- 34 EDUCATION PROGRAMS.
- 35 5. ASSESS EACH AGENCY'S CURRENT ENVIRONMENTAL EDUCATION PUBLIC
- 36 AWARENESS PROGRAMS.
- 37 6. ASSIST IN THE INTEGRATION OF STATEWIDE ENVIRONMENTAL EDUCATION.
- 38 7. PROVIDE A LINK BETWEEN THIS STATE AND FEDERAL AND LOCAL AGENCIES
- 39 AND DEPARTMENTS RELATING TO ENVIRONMENTAL EDUCATION.
- 40 8. KEEP A WRITTEN RECORD OF THE PROCEEDINGS OF EACH MEETING. THESE
- 41 RECORDS SHALL BE KEPT ON FILE BY AN AGENCY SELECTED BY THE COMMITTEE.
- 42 Sec. 9. Arizona environmental education task force:
- 43 appointment; meetings, duties.
- 44 A. The Arizona environmental education task force is established
- 45 consisting of thirty-one members appointed by the governor.
- 46 8. The members shall each have experience in environmental issues
- 47 and shall consist of:

- 1 1. One employee in an administrative or managerial capacity of the
- 2 department of education.
- 3 2. One employee in an administrative or managerial capacity of one
- 4 of the universities under the jurisdiction of the Arizona board of
- 5 regents.
- 6 3. One employee in an administrative or managerial capacity of a
- 7 community college under the jurisdiction of the state board of directors
- 8 for community colleges.
- 9 4. Two teachers from public schools of this state, one teacher from
- 10 grades one through eight and one teacher from grades nine through twelve.
- 11 5. One member of the commission on the Arizona environment.
- 12 6. Four members from recognized private organizations which promote
- 13 conservation of the environment.
- 14 7. Two members from the private business sector.
- 15 8. One member from a health organization.
- 16 9. One teacher from a private school located in this state.
- 17 10. One employee of a federal natural resource agency.
- 18 11. One member of the interagency committee on environmental
- 19 education.
- 20 12. Four members of the general public each of whom must reside in a
- 21 different region of this state.
- 22 13. One Native American who resides on a reservation in this state.
- 23 14. One member of the governor's staff.
- 24 15. One member of the communications media.
- 25 16. Two members of the house of representatives, one of whom shall
- 26 be a republican and one of whom shall be a democrat.
- 27 17. Two members of the senate, one of whom shall be a republican and
- 28 one of whom shall be a democrat.
- 29 18. One employee in an administrative or managerial capacity with
- 30 the department of environmental quality.
- 31 19. One employee in an administrative or managerial capacity with
- 32 the Arizona geological survey.
- 33 20. One employee in an administrative or managerial capacity with
- 34 the department of health services.
- 35 21. One employee in an administrative or managerial capacity with
- 36 the game and fish department.
- 37 C. The task force shall:
- 38 1. Select a chairperson and vice-chairpersons. The chairperson
- 39 shall organize the task force into subgroups to effectively carry out the
- 40 mandates of the task force.
- 41 2. Prepare a status report providing a current assessment of
- 42 environmental education activities within this state for submission to the
- 43 governor by December 1, 1990. The report shall include findings and
- 44 recommendations necessary to establish a unified and coordinated
- 45 environmental education program within this state and may include draft
- 46 legislation or rules necessary to implement the recommendations.
- 47 3. Issue a comprehensive plan for environmental education in this
- 48 state to the governor by June 1, 1991.

- 1 4. Advise the governor, the legislature and the agencies of this
2 state on policies and practices needed to provide environmental education
3 to visitors and residents who have little or no contact with the public
4 education system of this state.
- 5 5. Recommend a priority list for the types of programs to be funded
6 through the environmental education trust fund.
- 7 6. Establish programs to promote public awareness of environmental
8 issues by recommending the production of media programs relating to
9 environmental issues with the assistance of state agencies.
- 10 7. Provide assistance to and obtain information from the
11 interagency committee on environmental education to coordinate the
12 environmental education programs of the state agencies.
- 13 8. Develop a mechanism for spending monies appropriated and donated
14 for environmental education.
- 15 9. Recommend legislation to disburse monies held in the
16 environmental number plate fund pursuant to section 15-214, Arizona
17 Revised Statutes.
- 18 10. Conduct a feasibility study of implementing regional resource
19 centers that best meet the environmental education needs of this state and
20 are consistent with the policy and philosophy of this act and make
21 recommendations to the universities regarding this implementation.
- 22 11. Submit recommendations regarding environmental education issues
23 to the department of education and encourage the department of education
24 to implement such recommendations.
- 25 D. The task force may:
 - 26 1. Evaluate the environmental education programs for visitors and
27 residents who do not regularly receive services from the public education
28 system of this state and, as appropriate, prepare studies and
29 recommendations to improve the effect of those programs on public support
30 for environmental protection.
 - 31 2. Examine proposed and existing programs that affect the
32 environment and recommend statewide policies that will direct a unified,
33 coordinated effort to educate the public about the programs.
 - 34 3. Encourage and, when appropriate, coordinate studies relating to
35 the environment and environmental education conducted by the universities
36 and by state, local and federal agencies.
- 37 E. The task force may use the resources and staff of the governor's
38 office, the Arizona commission on the environment, the university system,
39 state agencies and the legislature to accomplish its goals and duties.
- 40 Sec. 10. Arizona environmental education task force fund
- 41 A. An Arizona environmental education task force fund is
42 established in the Arizona environmental education task force consisting
43 of monies received from private individuals and organizations.
- 44 B. The task force shall develop a plan for the expenditure of
45 monies in the fund. All monies in the fund shall only be used to carry
46 out the duties of the task force.
- 47 C. The fund established in this section is exempt from the
48 provisions of section 35-190, Arizona Revised Statutes, relating to

1 lapsing of appropriations. Any monies remaining in the fund after June
2 30, 1991 revert to the environmental education fund established pursuant
3 to section 15-1211, Arizona Revised Statutes, as added by this act.

4 Sec. 11. Delayed repeal

5 Sections 9 and 10 of this act are repealed from and after June 30,
6 1991.

7 Sec. 12. Implementation of environmental education
8 programs

9 A. Notwithstanding section 15-706, Arizona Revised Statutes, as
10 added by this act:

11 1. School districts shall implement environmental education
12 programs in the academic year following the fiscal year in which the
13 environmental education information resource system is established as
14 provided in paragraph 3 of this subsection.

15 2. The state board of education is required to develop guidelines
16 for environmental programs by June 30, 1991 and assessments of
17 environmental education programs by September 1, 1992.

18 3. The department of education is required to establish and
19 maintain an environmental education information resource system during the
20 fiscal year in which the department of education environmental education
21 fund contains at least one hundred thousand dollars.

22 B. Notwithstanding section 15-1643, Arizona Revised Statutes, as
23 added by this act, a university under the jurisdiction of the Arizona
24 board of regents is not required to incorporate training in environmental
25 education into its teacher training programs, provide environmental
26 education training programs to certificated teachers or establish an
27 environmental resource center until fiscal year 1991-1992.

28 C. The department of education, in consultation with the Arizona
29 board of regents, shall submit a report on the implementation and
30 assessment of environmental education programs and the training of
31 certificated teachers in environmental education to the president of the
32 senate, the speaker of the house of representatives and the governor by
33 November 15, 1993.

34 Sec. 13. Delayed effective date

35 Sections 15-214 and 28-308.08, Arizona Revised Statutes, as added by
36 this act, are effective from and after September 30, 1992.

Approved by the Governor June 6, 1990

Filed in the Office of Secretary of State June 6, 1990

STRATEGIC PLAN

Strategic Plan
For Establishing
The EPA
Environmental
Education
Program

DRAFT

July 1990

"In the end, environmental education boils down to a simple yet profoundly important imperative: preparing ourselves for life and all its surprises in the next century. When the 21st century rolls around, it will not be enough for a few specialists to know what is going on while the rest of us wander around in ignorance"

- William K. Reilly, Administrator
U.S. Environmental Protection Agency

PREFACE

In November, 1989, EPA Deputy Administrator F. Henry Habicht established an Environmental Education Task Force to provide a cross-media and cross-program forum for discussing the Agency's current environmental education activities, and to develop a Strategic Plan for the new EPA Office of Environmental Education.

Marylouise Uhlig, of EPA's Office of Toxic Substances, is the Co-Chair of the Task Force, along with Philip Smith, of the National Governors Association. Appendix A provides a complete list of the Task Force's members.

In addition to developing this Strategic Plan, the Task Force also

- Organized a Youth Environmental Action Forum, which was held in Washington, D.C. in May, 1990;
- Completed an inventory of current Agency environmental education activities and resources; and
- Recommended several innovative strategies for raising funds to be used to support environmental education efforts.

All of these efforts have produced significant benefits which the Agency's Office of Environmental Education will build upon in establishing a program to carry-out the important mandate which is described in this Strategic Plan.

STRATEGIC PLAN

1. Introduction | The U.S. Environmental Protection Agency's mission is to protect the public from environmental hazards and to enhance the quality of our natural environment. The Agency believes that taking a leadership role in promoting more environmentally-oriented scientific and technical education is fundamental to accomplishing this mission. Education can enhance our knowledge of man's impact on the environment, and can improve our understanding of the environmental consequences of individual and collective actions. This knowledge and understanding are collectively referred to as an *environmental ethic*, because they shape the values which are expressed concretely in environmentally responsible behavior.

**Overview of
Education
Program**

The Agency is establishing an Office of Environmental Education with the mandate to foster an enhanced environmental ethic in society by improving the environmental literacy of our youth and increasing the public's awareness of environmental problems. The Office will provide national leadership in these areas, and will build upon the ongoing work of public, non-profit and private sector groups which are already pursuing these goals. The Agency's efforts are being coordinated with, and will fully support the President's National Education Priority Framework, which stresses the need to improve the overall quality of scientific and technical training in our nation's schools. The Program will emphasize four specific themes: wise use of natural resources, prevention of environmental problems, the importance of environmentally sensitive personal behavior, and the need for additional action at the community level to address environmental problems.

**Program Focus -
Education and
Public Awareness**

The Environmental Education Program will focus on education and public awareness. Education includes both formal training in scientific and technical disciplines at the K-12th grade and college levels, and informal educational activities such as experiential learning in informal settings. The Program's approach will emphasize improving our youth's literacy in the core environmental sciences, developing a greater understanding of man's impact on the environment, and increasing the number of environmental professionals.

STRATEGIC PLAN

**Strategic Plan as
Basis for Broad
Review**

The public awareness part of the Program will target the general public, with initiatives designed to promote a more informed and environmentally responsible citizenry. Central to this effort will be communicating the program's themes via an effective media strategy, and closely coordinating with public, non-profit, and private sector organizations to effectively reach and actively involve the public. The intent is to stimulate a strong, grassroots interest in the environment, and an understanding of what individuals can and must contribute to maintaining a healthy environment.

This Strategic Plan outlines the Agency's approach to establishing the Environmental Education Program, the Program's goals and objectives, and the major planned tasks and activities. Following an internal Agency review, The Plan will be circulated for review and comment by Federal, state, local and non-profit sector leaders in the field of environmental education. Once the Program has been established, the Plan will be evaluated and updated at regular intervals to reflect evolving needs and opportunities.

Legislation has been introduced in the House of Representatives and Senate which calls for establishing an Environmental Education Program and Office within EPA. This Strategic Plan is generally consistent with the proposed legislation, and it assumes that this Program will be modified appropriately, based on any subsequent Congressional mandate. For planning purposes, it is assumed that this Program would consist of approximately ten FTEs and \$5-10 million in resources.

STRATEGIC PLAN

II. Problem Statement

"To accomplish the magnitude of behavior change necessary to the task, it will be necessary to go beyond traditional environmental management methods of command and control."

- National Advisory Council for Environmental Technology Transfer

"... These problems are complex and require comprehensive and complex solutions. Education is a part, a vital part of that solution."

- Dr. Constantine Curris, President University of Northern Iowa

"We have got to get that word 'protection' out of being just part of the EPA's mission and make environmental protection everybody's mission."

- Dr. Erhard Joeres University of Wisconsin

The seriousness and complexity of our nation's environmental problems require fundamental shifts in how we approach their solution. Having concluded that the traditional "end of the pipe" strategy is not sufficient, the EPA Administrator has articulated a new approach, which emphasizes problem prevention, sustainable development, and the need for an enhanced environmental ethic among all segments of the public.

The ultimate success of this new approach will be greatly influenced by the public's understanding of the seriousness of problems like ozone depletion and solid waste disposal, and the role which each individual can play in reducing or eliminating them. The challenge is a dual one -- raising the scientific and technical literacy of our youth so that they approach environmental problems responsibly throughout their lives, and raising the level of awareness of today's adults, so that they actively support the shift to a vision of sustainable development and pollution prevention which are critical to addressing today's problems.

Enhancing the environmental literacy of our youth involves confronting a number of problems which many Federal, state and local organizations are also addressing as part of a national effort to improve our youth's scientific and technical skills. These problems include the lack of teaching material which integrates scientific and technical subjects into the teaching of other disciplines, the need to improve the teaching skills of educators in the scientific and technical subjects, and the need to provide young people with information about career opportunities in the environmental professions to motivate them to acquire more scientific and technical training.

A key challenge to broadening the public's awareness of environmental problems, and articulating the need for more environmentally sensitive personal behavior, is the problem of how to communicate information about specific changes in personal behavior which is both concrete and persuasive to a broad cross-section of the general public. Bringing about changes in professional behavior could be even more difficult, since it involves convincing public and private sector decisionmakers that they need to view problem prevention and sustainable development as economic necessities as well as environmental realities.

STRATEGIC PLAN

Finally, as we develop a strategic vision for the next several years, it is more clear than ever that we need an adequate supply of world-class scientists and engineers to develop and promote more innovative and preventative solutions to environmental problems. As the public becomes more aware of the urgency of global environmental problems, EPA and other agencies will be required to respond with high quality research, innovative analysis, and sound strategies for public involvement. Thus, as a nation we have a strong vested interest in assuring that students emerging from the education "pipeline" are math and science literate, and motivated to pursue environmental careers. The major challenge to achieving this goal involves reversing a growing shortfall for professional scientists and engineers in America that could be as much as half-a-million people by the year 2000.

III. Program Goals and Approach

In developing a strategic plan which equips the Office of Environmental Education to address the challenges discussed above, the Environmental Education Task Force consulted with numerous leaders in this field, and participated in the ongoing discussions which FCCSET is coordinating to develop a National Education Priority Framework. Based on these discussions and other fact-finding, the Task Force has structured a Program which emphasizes a leadership role in articulating specific national goals for environmental education and working with and supporting existing organizations and networks to accomplish those goals.

"Because the best resources that we have to respond to these problems are our citizens, whether at the national, state, or local level, it is critically important that our young people have a strong foundation in science and math".

*- F. Henry Habicht II
Deputy Administrator
U.S. Environmental
Protection Agency*

The Agency's Environmental Education Program will foster an enhanced environmental ethic in society by:

- Educating our youth in the environmental sciences and about man's impact on the environment;
- Training future environmental professionals; and
- Building public awareness and understanding of major environmental problems on both a national and international level.

The Program will initially focus on two areas. The first is education, where the emphasis will be on improving the basic environmental literacy of our youth, and stimulating interest in environmental careers among college and technical school students. The second area is targeted toward the general public

STRATEGIC PLAN

Fundamentally, EPA views support of better math and science education -- in all sectors -- as important to society's well-being.

EPA submission to FCCSET's Education and Human Resources Committee

A. Youth Education Activities

and involves creating a deeper understanding of the impact of personal and professional behaviors on the environment.

The educational component is structured to fully support the President's education goals in science, engineering and technology and, in particular, the goals of preparing our youth for responsible citizenship, and of being first in the world in science and mathematics achievement. The Program focuses on three specific groups: students in grades K through 12; college, university, and school of education students; and community and technical college students.

In the public awareness component of the Program, the emphasis will be on changing our thinking about environmental problems - from "an end of the pipe" approach to one which emphasizes prevention - and on articulating a vision of sustainable development, where a sound economy coexists with a healthy environment. To do this successfully, the Program must reach as many people as possible with a rich mix of information and specific ideas, to motivate environmentally responsible behavior and to inform the public about the role which it can play to make that vision a reality.

Both aspects of the Program are structured to take full advantage of the leverage offered by working with and supporting the efforts of Federal, non-profit, and private sector organizations whose goal is to promote informed, responsible environmental citizenship.

The intent of the educational program is to substantially increase the amount and quality of basic environmental education being taught, and the number of students being reached. The Program defines "environmental education" to include a mix of educational disciplines and contexts, ranging from classroom-based instruction in science and mathematics to experiential learning in outdoor settings.

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**The Program is
Consistent with
National
Education Priority
Framework**

The Program's strategic objectives and major activities are consistent with those of the President's National Education Priority Framework, as defined by the Federal Coordinating Council on Science, Engineering and Technology's (FCCSET) Committee on Education and Human Resources. The Program will closely coordinate its activities with those of the other Federal, state and local agencies which are pursuing these objectives to ensure the maximum possible benefit to the American public.

The Program has identified specific goals and activities for three major student audiences: K-12th grade; college and university; and community college and technical school students.

**1. K-12th Grade
Students**

Substantially expanding the amount of basic environmental education being provided to children in the K through 12th grade age group, is key to increasing the scientific literacy of our youth. This area of the Program will also strongly emphasize development of an environmental ethic which encourages environmentally responsible behavior, since this objective is more achievable with a youthful audience. It also reflects the finding that a major obstacle in current efforts to inform and motivate changes in adult behavior is the historic gap in the basic education of students in grades K through 12 in basic science and technology.

To address these challenges, the Program has established three broad objectives for improving the environmental literacy of K-12th grade students:

**Three Objectives
for K-12th Grade
Students**

- Encourage states to increase the amount of environmental education being provided to students in these grades;
- Ensure that topical environmental issues are part of an environmental education curriculum, and that students are also exposed to a range of experiences and opportunities for learning about environmental issues; and
- Infuse environmental education topics into all basic subjects taught in grades K through 12, where they can provide an integrating context for subjects such as math, English, government, economics, and help capture the interest and enthusiasm of our youth for scientific and mathematics subjects in general.

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These objectives reflect the Program's overall strategic approach of articulating a clear national goal -- in this case, reaching all students in grades K through 12th with training in environmental science -- and working with and supporting other organizations in a common effort to achieve this goal.

Program Tactics

Among the specific tactics which the Program will pursue to achieve its objectives for K through 12th grade students are the following:

- Working to incorporate environmental education topics in the new national testing program for grades 4, 8, 12;
- Utilizing grants and other funding mechanisms to facilitate the development of comprehensive teaching materials which will better equip teachers to teach environmental education subjects; and
- Developing an inexpensive system to distribute teaching materials, and provide training and support to teachers.

The chart on the next page provides more specific details on the key activities of this Program area.

2. College, University and School of Education Students

At the college and university level, environmental science is rarely included as a core component of liberal arts or technical degree programs. As a result, relatively few college graduates are adequately trained for, or interested in, careers in environmental professions. Further, there is little sustained effort to build upon the environmental science training which some students are now receiving in grades K through 12th.

In addition, Schools of Education have only recently begun to develop programs which emphasize improving the scientific and technical literacy of future teachers. Quality environmental education at all levels requires teachers who are proficient in the basic environmental sciences, and who are trained in how to incorporate environmental topics into all of the subjects being taught in our schools.

STRATEGIC PLAN

Overview of Strategy for K-12 Audience

<i>Objectives</i>	<i>Summary of Approach</i>	<i>Major Tasks</i>
<ul style="list-style-type: none"> • States increase the amount of environmental education being provided to students • Ensure that topical environmental issues are part of an environmental education curriculum • Infuse environmental education topics in all other core subjects (math, geography, literature, etc.) • Encourage the development of innovative environmental education programs which include both formal and informal settings • Increase the number of teachers who are able and willing to teach environmental science courses • Build public support for increasing the amount of environmental education being provided to students 	<ul style="list-style-type: none"> • Stimulate demand for environmental education curricula and teaching material by encouraging states to increase amount of environmental education • Develop teaching material, and design a mechanism which makes it easily available to teachers • Design and implement a support system for educators which makes maximum use of existing mechanisms • Enhance the visibility of environmental education 	<ul style="list-style-type: none"> • Develop strategy to encourage states to increase environmental education in formal and informal settings • Develop strategy to incorporate environmental education subjects in the new national testing program (Grade 4,8,12) • Work with Fed., state, local officials involved in programs to improve math/science teacher training (pre-service & in-service) • Showcase success stories; develop a mechanism to provide financial rewards for teachers who are leaders • Assess all currently available material from National Wildlife Foundation, Project WILD, National Geographic, etc., and categorize by grade level, subject matter, media, etc. • Use grants to fund development of a "basic literacy curriculum" in environmental ed. Use it to identify gaps in available material • Develop mechanism(s) to produce and distribute material to teachers cheaply and easily • Use grants/award programs to stimulate development of this material • Evaluate existing programs that provide this type of service to teachers at all regional, state, and local level (National Geographic's "Geographical Alliances," Project WILD, AEE's National Network of Env. Ed. centers, TVA's regional centers, etc.) • Identify what needs to be done to leverage existing channels; to enhance the amount and type of support they offer to local teachers of K-12; and to establish a mechanism for monitoring their performance in pursuit of OEE's objectives • Structure a program for staging bi-annual Youth Forums as means to periodically focus national attention on this area. Define annual awards programs for both visibility and impact on major barriers

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Objectives for College, and University Students

The Environmental Education Program has identified the following objectives for its initiatives addressing college and university students:

- Improve teacher training by adding courses in environmental education to School of Education curricula, graduation requirements, and teacher certification requirements;
- Build the environmental ethic and literacy of students, by incorporating environmental education in liberal arts curricula; and
- Motivate students to pursue environmentally-oriented careers by helping to create internship opportunities in non-profit, public sector and private sector settings.

Program Tactics

Emphasis will be given to working with federal, state and local offices to incorporate environmental education in teacher training curricula and degree requirements. In particular, the Program will actively support the FCCSET Committee's efforts to substantially upgrade the scientific and technical content of our nation's teacher training programs. These efforts are driven by the fact that it is far more cost-effective to train teachers in environmental education at this stage of their career, rather than relying on the more costly alternative of in-service training later.

The Program will also encourage ongoing efforts to develop teaching material and curricula for college-level courses in environmental education, and will work to create an efficient mechanism for sharing this material among interested universities and faculty members.

Promote Increase in Supply of Environmental Professionals

Furthermore, the Program will initiate efforts to increase the supply of college and university graduates choosing environmental professions by creating internship opportunities for students, and by developing an outreach program to educate college placement officials about career opportunities in these environmental professions. Special emphasis will be placed on developing mechanisms to reach minority students, and to encourage their participation in degree programs which equip them for environmental careers.

Additional components of the Program's strategy for reaching these students are presented in the following chart.

STRATEGIC PLAN

Overview of Strategy for College, University, and School of Education Students

<i>Objectives</i>	<i>Summary of Approach</i>	<i>Major Tasks</i>
<ul style="list-style-type: none"> • Improve teacher training by adding courses in environmental education to School of Education curricula, graduation requirements, and certification requirements • Increase supply of graduates choosing environmental careers • Continue to build literacy of students by incorporating environmental education in liberal arts curricula 	<ul style="list-style-type: none"> • Stimulate demand for environmental education courses • Stimulate development of environmentally oriented internship opportunities to expose students to possible career paths • Provide assistance in developing curricula, degree requirements, and teaching material 	<ul style="list-style-type: none"> • Create demand for courses in environmental topics by encouraging states to include it in their teacher certification requirements • Fund programs to train in-service teachers in environmental education subjects, and publicize its availability • Create internship opportunities for undergrad/grad students to reinforce message that it's a viable career path • Develop outreach program to educate placement officials about career opportunities • Work with faculty and administrators of historically black colleges to build interest in these programs • Use grants to fund development of model curricula, building on existing programs • Encourage development of a support system that is keyed to needs of college-level faculty who want to teach environmental education • Reward innovative practitioners who develop material that can be shared • Create mechanism to package teaching material and to make it easily accessible

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3. Community College and Technical School Students

Because the degree programs which are offered by most community colleges and technical schools are oriented to training students for specific professions which do not require a four year degree, these schools are potentially a very valuable resource for training many types of environmental professionals (e.g., waste reduction experts, hazardous material managers, environmental impact appraisers). In addition, these schools could provide an accessible and efficient mechanism for making worker training programs available nationwide, in response to new laws which require most industrial and semi-industrial workers in the U.S. to receive training in the hazards of the materials with which they work.

Objectives for Community College and Technical School Students

To exploit these opportunities, the Program will pursue the following goals for this category of schools:

- Promote the development of two-year degree two-year programs in environmental specialties;
- Encourage the graduates of existing environmental programs at two year schools to pursue careers in environmental professions; and
- Explore how best to create or expand two-year school training programs to provide environmentally-oriented worker training.

Program Tactics

A key tactic in the Program's efforts to achieve these objectives will be to determine where demand currently exists, and in the future will exceed the supply for trained environmental professionals. This information will help in developing a targeted program for educating administrators and faculty at community colleges about the benefits of establishing environmental degree programs, and encouraging their graduates to pursue environmental careers. Strong emphasis will be placed on reaching minority students with this message.

Promote Worker Training Programs

The Program will also work with NACETT's Environmental Education and Training Committee to explore the feasibility of encouraging community colleges and technical schools to aggressively develop environmentally-oriented worker training programs. This initiative will build upon the Committee's recent recommendation to the Administrator

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that a network of "environmental training centers" be established. By co-locating these training programs with two-year degree programs in environmental and technical professions, both objectives can be achieved more quickly and cost effectively.

The following chart presents additional details regarding the Program's strategy for community colleges and technical schools.

Overview of Strategy for Community College and Technical School Students

<i>Objectives</i>	<i>Summary of Approach</i>	<i>Major Tasks</i>
<ul style="list-style-type: none"> • Stimulate development of two year degree programs to increase the supply of environmental professionals. • Develop teaching material base to support development of curricula for entire higher education audience • Explore the feasibility of providing worker training via community colleges and technical schools 	<ul style="list-style-type: none"> • Stimulate demand for degree programs in environmental education • Develop process to assemble, evaluate, and disseminate information on curricula and teaching material • Identify the goals and content of newly mandated environmental worker training programs, and assess the cost effectiveness of broadening two-year programs in environmental professions to provide this training 	<ul style="list-style-type: none"> • Document where the demand exists for environmental professionals, what type of training is needed, and what programs already exist to train them and place them • Educate deans/placement officials re career options in this field, growth in demand, etc • Use grants to establish one or two demo projects that are likely to be successful, and offer incentives to community colleges to establish these programs • Create internships and placement programs to help students find jobs • Design a process to collect and evaluate curricula and teaching materials which are in use in successful 2 years degree programs; and to distribute it to community/technical colleges that are interested in starting programs • Define curricula for worker training programs • Identify two or three alternative approaches, including community college-based programs • Evaluate the feasibility of each alternative and define the most cost-effective approach • Recommend a strategy to implement the preferred alternative

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C. General Public Awareness Activities

This part of the Environmental Education Program has two broad goals: First, to convince the public that adequately addressing our nation's environmental problems requires a fundamental shift in how we think about environmental problems. Second, to educate the public about specific actions which we as individuals can take to have a positive impact on the environment.

Objectives

The public awareness Program is structured to support and build upon the Agency's ongoing efforts to promote a vision of sustainable development and pollution prevention, and to effectively communicate the economic realities of shrinking supplies of natural resources and growing waste disposal and clean-up costs. A key challenge will be to promote more effective communication about new technologies and production processes, so that decisionmakers have the information they need to respond to the Agency's vision of sustainable development and pollution prevention.

To motivate the general public to be more environmentally sensitive in its personal behavior requires the Program to reach the maximum number of people with suggestions about specific actions which can be taken, on a personal level, to reduce environmental problems. Many existing organizations at the Federal, state, and local levels share this goal, and would support the Program's effort. The Program is structured to capitalize on this support, and thereby leverage its limited resources, by pursuing the following tactics:

Program Tactics

- Develop a comprehensive media strategy which emphasizes reaching as much of the general public as possible with a consistent set of environmental themes and information about specific actions which can make a difference;
- Work with EPA and other Federal officials to identify opportunities to share public awareness materials with the international community;
- Work with youth groups and community-based organizations such as Nature Centers and garden clubs to more effectively promote the services which they provide, and to increase the public's access to these services;

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- Work with organizations such as the Alliance for Environmental Education to insure that its members are fully aware of the Program's public awareness messages, and are incorporating them in their own outreach activities; and
- Work in close coordination with members of the NACETT's Environmental Education and Training Committee and other non-profit and private sector organizations to formulate strategies for improving public awareness and understanding of our nation's environmental problems.

The following chart presents further detail about the Program's tactics for reaching the general public.

Overview of Strategy for Reaching General Public

<i>Objectives</i>	<i>Summary of Approach</i>	<i>Major Tasks</i>
<ul style="list-style-type: none"> • Structure an outreach program to enlist the media's support in communicating the Program's message • Develop mechanisms to build coalitions with groups and individuals • Define process for sharing materials with international audiences • Conduct public awareness program regarding two or three environmental problems to educate the public about consequences of their behavior 	<ul style="list-style-type: none"> • Define a strategy to work cooperatively with the media to convey the Program's major themes • Identify priority opportunities to develop joint-ventures with private sector, non-profit and/or public sector groups • Identify strategy for collaborating with international groups to share materials • Develop public awareness strategy keyed to two or three issues 	<ul style="list-style-type: none"> • Develop specific goals and tactics for broad media outreach program • Develop mechanism to identify and evaluate joint-venture opportunities • Identify issues with an international focus and define strategy for sharing materials; structure an approach for identifying targets of opportunity • Identify two or three environmental issues with a national focus. • Develop public awareness campaign, strategy and materials

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**V. Establish
Foundation to
Raise Funds to
Support
Program's
Goals**

An essential factor in the success of such a broadly-based and ambitious effort is the availability of sufficient resources. Both the scope of the overall program and the intensity with which each of its components can be pursued is largely dependent on the level of available resources. Thus, the EPA Environmental Education Program supports an approach similar to the one articulated in H.R. 3684 to establish an independent foundation to raise funds from the private and non-profit sectors for use in supporting an expanded environmental information and education program.

For example, as outlined in H.R. 3684, such a foundation would be a charitable, nonprofit corporation whose board would be appointed by the EPA Administrator. National environmental education policies and priorities would be set by the Administrator, via the Office of Environmental Education, and the Foundation's Board would fund activities which implement those priorities and goals.

Regardless of its exact nature, once such a foundation has been established, it would work with EPA's Office of Environmental Education to coordinate each group's efforts in order to achieve the Administrator's environmental education goals.

APPENDIX A

**LIST OF
ENVIRONMENTAL EDUCATION
TASK FORCE MEMBERS**

U.S. Environmental Protection Agency
Environmental Education Task Force

Co-chairs: Marylouise Uhlig, EPA
Philip Smith, National Governors' Association

Task Force Members: Lew Crampton, Office of Communications and
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Doug Cooper, Office of the Administrator
Kelly Sinclair, Office of Administration and
Resources Management
Gerald Yamada, Office of General Counsel
Jerry Kotas, Office of Policy, Planning and
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Walt Kovalick, Office of Solid Waste and
Emergency Response
Steve Page, Office of Air and Radiation
Jean Croft, Office of Research and Development
Mike Quigley, Office of Water
Renelle Rae, Office of Administration and
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Mildred Trainor, Office of International
Activities
Todd Koeze, Office of Congressional and
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James Marshall, Region 2
Stan Laskowski, Region 3
Vivian Jones, Region 4
Jon Grand, Region 5
Joe Winkle, Region 6
Rowena Michaels, Region 7
Nola Cooke, Region 8
Deanna Wieman, Region 9
Tom Wilson, Region 10

Core Group Members:

Jeuli Bartenstein, Office of Administration and
Resources Management

Barbara Burke, Office of Pesticides and Toxic
Substances

Kate Connors, Office of Cooperative
Environmental Management

Cathy Cowley, Office of Pesticides and
Toxic Substances

Michael O'Reilly, Office of Communications
and Public Affairs

Heather Schoen, Office of Communications
and Public Affairs

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APPENDIX B

**DETAILED TASKS BY MAJOR ACTIVITY
AND
AUDIENCE**

APPENDIX B
DETAILED TASKS BY MAJOR ACTIVITY AND AUDIENCE

Audience	Major Activity	Detailed Tasks
1. K-12th Grade Students	<ul style="list-style-type: none"> • Stimulate demand for environmental education curricula and teaching material • Develop teaching material, and design a system to make it easily available to teachers 	<ul style="list-style-type: none"> • Establish membership in group responsible for implementing national testing program. Consider using grant mechanism to fund development of testing material that's appropriate to the three grade levels and then work to incorporate it in the test. Consult with National Geographic regarding the strategy which they followed to achieve this goal. • Identify groups that are focusing on the teacher training aspect of the national education goals. Establish membership on the appropriate task forces, steering committees, etc., and then work to incorporate available teacher training materials (like Project WILD, National Geographic, etc.) into this evolving program. • Develop an awards/public awareness program re success stories. • Use grant to acquire, evaluate, and categorize the material that is currently available. Outputs should include: an inventory of material that's easily accessible by any teacher in country, and is meaningful to a teacher looking for teaching material for a specific grade level; a description of where the gaps are in currently available material (e.g., "there's nothing for K-2 grade levels"); and, where possible, a couple of reasonably comprehensive "packages" for a specific grade level. Focus should be on identifying which subjects are relevant to achieving "environmental literacy," at what grade levels that are now (or should be) taught, and whether "envir. ed" should be a new, stand-alone subject area vs. an enhancement of existing curricula in science, economics, civics, mathematics, computer science, etc. • Use this material to encourage state goals, develop new material for teaching, develop test material, etc.

APPENDIX B
DETAILED TASKS BY MAJOR ACTIVITY AND AUDIENCE

Audience	Major Activity	Detailed Tasks
<p>1. K-12th Grade Students (continued)</p>	<ul style="list-style-type: none"> • Design and implement a support system for educators which makes maximum use of existing mechanisms • Enhance the visibility of environmental education as a separate subject 	<ul style="list-style-type: none"> • In developing tactics to produce and distribute material, emphasis should be on developing a simple, direct, inexpensive mechanism for teachers to find out what's available in the way of "turn-key" teaching packages. Distribution system should be equally simple (e.g., mail order catalogues and 800 lines), and the material should be inexpensive to acquire. • Design a grant-based mechanism to stimulate ongoing development of educational material. • Define the specific areas that this "support system" would be responsible for. Describe the specific services, capabilities, etc. that are necessary to accomplish each role. Analyze the services of existing networks against this list, and identify gaps, etc. • Develop recommendations regarding what structure needs to be put in place, to what extent it would work through existing programs, what role would be played by EPA's regions, etc. • Develop an implementation plan. • Design an organizational structure to organize bi-annual forums. Should include responsibility for tracking outcomes of previous forums, and helping regions to conduct "off-year" mini-forums. • Design awards program that addresses major barriers to institutionalizing env. ed. in K-12 curricula. Work to ensure that the size of the awards is large enough to get teachers' attention. Structure process for identifying candidates, picking winners, publicizing results.

APPENDIX B
DETAILED TASKS BY MAJOR ACTIVITY AND AUDIENCE

Audience	Major Activity	Detailed Tasks
<p>2. Colleges, Universities, and Schools of Education</p>	<ul style="list-style-type: none"> • Stimulate demand for environmental education courses • Provide assistance in developing curricula, degree requirements, and teaching material 	<ul style="list-style-type: none"> • Focus on states like New York that are already close to establishing teacher certification requirements. Work with them to achieve this goal, and then use lessons learned to counsel/encourage other states. • Coordinate with NGA in their work to develop strategies for governors to follow to improve science/math education programs for teachers. • Use grant money to evaluate existing "in-service" teacher training programs and publicize ones that are effective. • Structure a comprehensive awards program that creates incentives for the higher education community to develop environmental education degree programs, teacher training programs, and environmental career path programs. • Define three or four environmental education/environmental management career paths where a strong job market already exists and develop materials to educate placement office, etc. • Use grant(s) to evaluate what barriers currently exist to developing and sharing course materials among college/university faculties. Also focus on defining alternative mechanisms for how to foster collaboration within and among college/university faculties. • Use grant to evaluate what role existing support systems (e.g., Geographic Alliances, National Network for Environmental Education) can play in furthering development of college/graduate level curricula and teaching materials.

APPENDIX B
DETAILED TASKS BY MAJOR ACTIVITY AND AUDIENCE

Target Audience	Major Activity	Detailed Tasks
3. Community Colleges and Technical Schools	<ul style="list-style-type: none"> • Stimulate demand for degree programs in environmental education • Develop process to assemble, evaluate, and disseminate information on curricula and teaching material 	<ul style="list-style-type: none"> • Fund a study of current demand for environmental management professionals, where the demand exceeds the supply, where the growth in demand is likely to occur, etc. Use the results to target areas for demo projects with local community colleges/technical schools vis-a-vis starting degree programs to train environmental professionals. Demo projects should include support to the school's career placement staff. • Develop a process for monitoring the success of these programs in attracting students and producing qualified environmental management professionals who are in demand in the job market. • Use the results of this monitoring process to target support for ongoing degree programs, and to advise schools considering starting new ones. • Design a process to collect and evaluate curricula and teaching materials which are in use in successful 2 year degree programs; and to distribute it to community/technical colleges that are interested in starting programs.
4. General Public	<ul style="list-style-type: none"> • Define strategy to motivate behavior change via more informed personnel and professional choices • Define process for reaching this audience • Develop a process to track progress and reward positive behavior 	<ul style="list-style-type: none"> • Build upon the initial survey prepared by the Clearinghouse team of the Environmental Education Task Force to identify and categorize the efforts of public, private and non-profit sector organizations who are active in this area. • Define a public awareness program and establish the necessary relationships with key groups. • Develop an internal process for working to incorporate specific behavior change messages in the speeches and public activities of senior Agency officials. • Define procedures to monitor behavior and identify examples of progress (e.g., via regions). • Evaluate options for recognizing contributions via awards program.

U.S. Environmental Protection Agency
Environmental Education Task Force

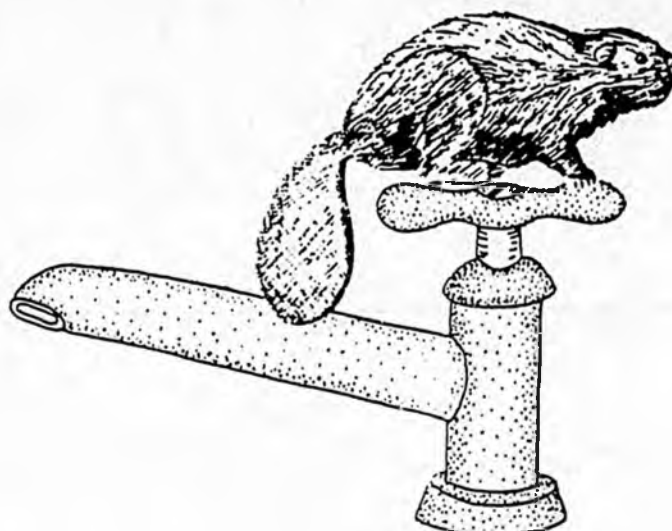
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Tom Wilson, Region 10

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SAFE DRINKING WATER FOR ALASKA



Curriculum For Grades 1 - 6



SAFE

DRINKING

WATER

GRADES 1 • 3

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SAFE DRINKING WATER. GRADES 1-3

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SAFE DRINKING WATER. GRADES 4-6

Introduction
Teacher Resource List
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Lesson III: Water-Borne Diseases
Lesson IV: Water Treatment
Lesson V: Water Plant Visit

Safe Drinking Water

Introduction:

The next five lessons teach two concepts:

1. Water travels in complete cycles
2. Drinking water is susceptible to contamination.

The lessons emphasize an overall familiarity with the water cycle rather than memorizing specific stages of the cycle.

The first two lessons introduce the idea that water is a limited resource which is continually reused and explores the origin of drinking water including how that supply is dependent on the water cycle. These units establish a basic understanding of the importance of pure, unpolluted water. Vocabulary can be kept to a minimum. The teacher may wish to substitute basic synonyms for the stages of the water cycle -- clouds for evaporation and vapor, rain for precipitation, etc. The reading is for oral reading by the teacher and lends itself to a show-and-tell presentation using a water cycle transparency.

Lesson three ties the problems of water pollution in with the water cycle and drinking water concepts. Introduced as pollution-caused health problems, are micro-organisms. Lessons four and five introduce treatment methods for handling the water pollution problem. Chlorination is introduced in the classroom as a method to purify water, and a trip to the local water treatment facility provides a concrete reference for the concepts of water pollution and safe drinking water.

Flexibility is a prime goal in the use of these lessons. The lessons may be taught in any order depending on the needs of the students and the availability of resources.

Objective: Students will be able to color a picture depicting the water cycle and indicate in written or oral form how water is reusable.

Materials:

- Small pot
- Hot plate
- 8" x 10" or larger sheet of glass, metal (anything with a hard, non porous surface)
- 2 pot holders
- Crayons
- 1 student response sheet: "Color the Water Cycle" (pg. 12)
- 1 reading material, "The Water Cycle" (pp. 8-11)
- Glass of water
- Village water cycle poster



Introduction: This unit will establish that water is reusable. The term "water cycle" is generally used with children when referring to this concept. The reading material which accompanies this unit is designed to present that concept to young children. Depending on the age and experiences of the group you are working with, the information will have to be tailored to meet their needs.

Vocabulary Preparation:

cycle	vapor	surface
huddle	moist	condensation
moisture	evaporation	droplets

Instructional Activities:

(lead-off question)

1. Pre-heat a pot of water to near boiling on the hot plate.
2. Ask, what is a cycle (answers will refer to motorcycle or bicycle, use the idea of a wheel going around and around to reinforce concepts of a cycle in nature). "Today, we're going to learn about the "water cycle".
3. Show a world map/globe. Ask students, "What does the blue on the map mean?"
4. Ask, "When rain falls on us, where does it come from?"
5. Ask, "Where do the clouds come from?"
6. Tell the students that they will see how rain is formed.

(follow-up questions)

7. Place the pot of hot water on the hot plate until the water begins to boil.
8. With the pot holders, put the piece of nonporous material (glass or plastic makes viewing the condensation easier) over the pot to allow the steam to collect.
9. As the droplets form, grow heavy, and fall, ask, "How many ways did we see the water? Was there a time when we could not see the water?"
10. Review and read material in "The Water Cycle", pg. 8-11 adapting to student level of understanding in reference to the demonstration.
11. "After seeing our experiment, can you tell which part is like the rain? Which part is like a river? Which part is like the sun?"
12. "If the "rainwater" was left in the cup for a long time, what would happen to it? Why?"
13. Ask, "Can you make new water?" (No, all the earth's water is part of a water cycle, reused in one form or other repeatedly).
14. Show a glass of drinking water and ask, "Where does your water come from?" Lead the students through a possible cycle of the water based on the demonstration.
15. Read and share pg. 13.
16. Exhale close to the chalkboard so that moisture from your breath makes a dark, wet spot. Trace the spot with chalk and ask why the spot is darker than the rest of the chalkboard? Where did the moisture come from? (inside the lungs*) Fan the spot to make the molecules move faster and watch the spot disappear.
17. Introduce the word evaporation. Write it on the board and clap out the syllables as children say it. Discuss the root word vapor. Vapor is water that has been heated to form a gas we can't see.

What are some ways you can make water evaporate or jump into the air? (heating, boiling).
18. Hand out the "Color the Water Cycle", pg. 12, response sheets and crayons and ask the students to color the parts of the water cycle.

(student response)

* Moist lung tissue lets gases of air dissolve to pass in and out of our bodies.

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**Additional
Activities:**

1. Using the village water cycle poster, tell a story about a drop of water -- where it has been, who has used it and for what, what shapes it has taken. This could be done orally, through a drawing sequence, or in written form.
2. Be a water detective. Play "I Spy" on drawing paper: show as many forms of water (rain, dew, cloud, ice), uses for water (drinking, washing, transportation, cooking), and sources of water (ground, stream, air, tap, well) as the student/detective can identify. This can be shown in list or drawing form.
3. (Grades K-1) Create a choreographed water cycle, using children and simple props to act out rivers, oceans, clouds, raindrops and the progression of these through the water cycle.
4. Follow a small stream to its source and see where it originates. Ask students to point out plants, insects, and perhaps larger animals which depend on the stream for living space, food, protection, reproduction. You might explain these needs according to the level of understanding of your group. Where does this water come from? Who might use it further along?
5. Write a short poem (haiku style or other) about rain, dewdrops, fog, snow.
6. Have student relate personal experiences with one of the forms of water i.e. A Day in the Snow, Lost in the Fog, A Boat Trip, Ice Fishing, etc.
7. Have the students write or tell why: "I like 'water' because...or 'fog' or 'snow' or 'ice' etc.
8. Have students bring in magazine photos illustrating the different stages of the water cycle. Make a bulletin board display of the photos.
9. "Peter's Magical Water Journey" Have high school students/guest speakers do narrative using pictures previously colored by the students.

**Suggested
Speakers**

The Water Cycle
(grades 1-3)
Page 1

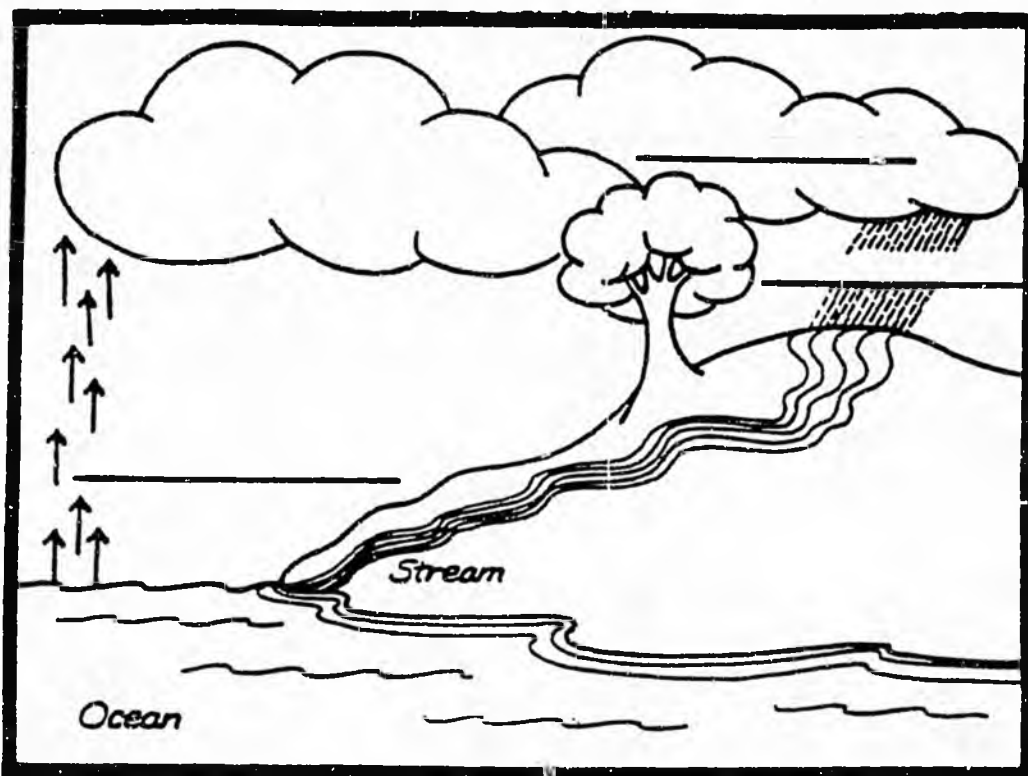
Have you ever noticed on maps of the world all the water areas covering the earth - oceans, lakes, rivers and streams? Water covers most of the earth. It appears in many places in many forms in a regular cycle.

To understand this cycle, look at the earth and see how much of it is water. The sun shines on the rather flat water and heats it. As the water grows hotter, some is bumped off into the air. These tiny bits of water in the air become like a small, warm, moist cloud. (This process is known as evaporation.)

Water as a vapor cannot be seen. When we see steam rising from a pan of hot water on a stove, we have actually seen water changed before our eyes from a liquid to a vapor and then back to a liquid again in the form of tiny little droplets. But we haven't seen the vapor. For as soon as the vapor has risen from the boiling water into the cooler air, the bits of water slow down and begin to huddle close together. The cooler air changes the vapor back into tiny little droplets. (This is called condensation.) We can change the tiny little steam droplets to larger droplets by suddenly placing a cold metal pan in the path of the steam and holding it there for a while.

The Water Cycle
(grades 1-3)
Page 2

The vapor from the oceans (or from other water surfaces such as rivers, lakes etc.) is warmed by the sun. As warm air always rises, the vapor rises, higher and higher, until it begins to cool in the high cooler air. The vapor then starts to change back into tiny droplets of moisture much as it did in the case of the hot water pan on the stove. But the droplets of moisture rising from the ocean cover a great area and are carried around by wind and air.



As time goes on, a cloud is formed. As the cloud is carried into colder areas, the tiny little droplets, in turn, group together - sometimes in enormous amount to form a single raindrop. With rain, the oceans are filled and the cycle is completed.

The Water Cycle
(grades 1-3)
Page 3

A cloud is a mass of tiny droplets which are too light-weight to fall through the air. When, by grouping together, the droplets reach a size large and heavy enough to fall without evaporating again before they hit the earth, they may fall as raindrops. In very cold upper air, the vapor closes together and becomes ice crystals, which fall as snowflakes.

At sometime, raindrops leave their cloud and fall. In falling, they may take a shape as long and thin as a hot dog or as round and flat as a pancake. They may even be shaped like a dumbbell. Of course, not all the drops fall back into the ocean, for the clouds may have been carried many miles away by wind and air. Where the raindrops fall on the land, they may run together and flow down mountainsides as streams. The streams become rivers that carve deeper and deeper river beds on their way to sea.

The world's water stays on the move. Two weeks from now there will still be water in the sky, but hardly any of it will be the same water that's there now. The water that's there now will have rained down, and freshly evaporated water will have replaced it.

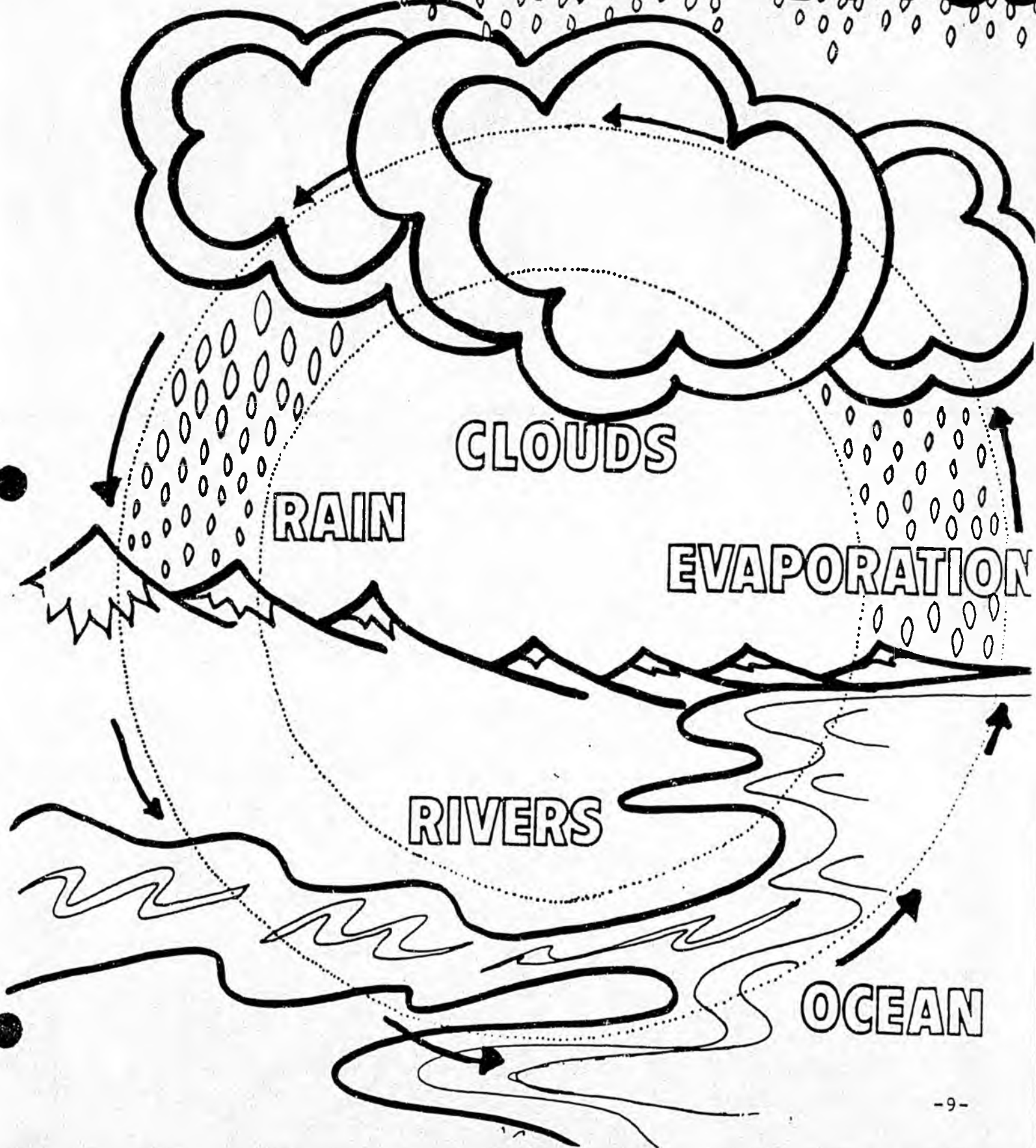
The amount of water in the world stays the same. Almost all the water in our present world is the same water that has always been here.

The Water Cycle
(grades 1-3)
Page 4

Who knows where the water in your next glass of water you drink will have been before? Some of it may have flowed through the deepest ocean or some may have been drunk by a dinosaur. Imagine drinking the same water a dinosaur did - a four billion-year-old glass of water. That's the magic of the water cycle.

COLOR the

WATER CYCLE



Water

We see water in lakes and rivers, pools and ponds, puddles and oceans. We need water to cook, wash, drink and swim. We use pipes to bring water to our faucets.



Sometimes water freezes in the sky and falls to earth in tiny flakes. Then we call it snow.



When water gets hot enough, it turns into a mist called vapor. The vapor that comes from boiling water is called steam.

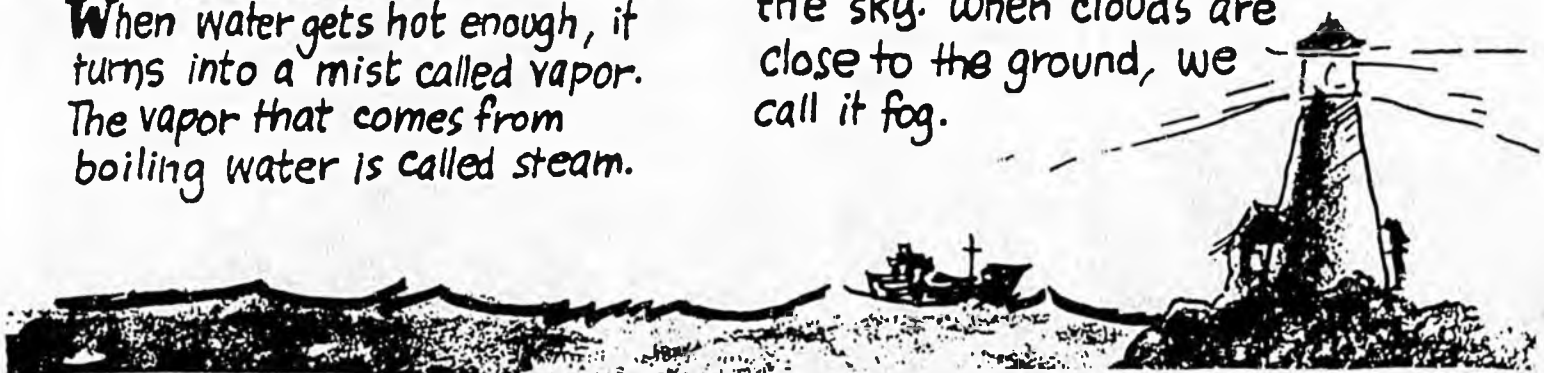
Water falls from the sky as a liquid. We call it rain.



Water can get so cold that it freezes after it falls to earth. This frozen water is called ice.



Water vapor forms clouds in the sky. When clouds are close to the ground, we call it fog.



Objective:

Students will be able to answer questions in written or oral form following a media presentation on the subject of safe drinking water, to the satisfaction of the teacher.



Materials:

- 3 Transparency Masters (pp. 17-19)
- 2 Line drawings - #4, #5 (pp. 20-21).
- The following list of films and books are obtainable from the Alaska State Library system in Juneau or Anchorage. These suggested materials are designed for primary and lower elementary grade children. Each one presents a perspective on safe drinking water.
- Safe Drinking Water poster

Introduction:

This lesson should extend the concept of water cycle to the water used for drinking. Students should understand that the water they consume has a specific origin which is referred to as a water supply and that supply is dependent on the water cycle.

Water systems in Alaska vary greatly from region to region. Become familiar with the water system in your community. Refer to the community water system(s) in the course of the lesson. This series of lessons will culminate with a suggested trip to the local water treatment facility and/or water supply. The students should be prepared to apply this new information to a "real life" situation in their community.

Instructional Activities:

1. Ask, "how can water get polluted? (trash, honey buckets or human waste, boat discharge, gas, animal waste, decaying fish, etc.)."
2. Show transparencies IIA and IIB or hand out xerox copies illustrating unhealthy water source environments. Ask the students to identify the source of pollution in each picture. For IIA, ask how the rubbish might have gotten into this water supply. For IIB, ask in what ways boats can pollute water sources. Ask for a show of hands of those who would drink from the water source shown in each transparency.

3. Use drinking water poster to discuss various uses of water in a village. Explain to the group that they will now view a film showing how good water is important to people and must be from a clean, safe place. They should watch to learn where drinking water comes from and how it gets to their homes.
4. Screen the selected film. (If a film is not available, choose the appropriate line drawing pg. 20 to explain where water comes from. Emphasize that water is in a use cycle and must come from a point where it may have other users.)
5. Not all communities in Alaska are fortunate enough to have water piped into each home, nor do all communities have convenient sources of water. This shows why water pollution, even seemingly far from human populations, may eventually cause problems for safe drinking water. Picture on pg. 21 could be used to depict how water is distributed to individual houses through a system of underground pipes.
6. Discuss with the group the sources of water used in the community in which you live (river, stream, dam, well, ice cutting, purification). Emphasize that none of the water sources are any better or worse than another.
7. Possible questions for discussion. Ask, "Do you know where your water comes from? What would happen if it did not rain this year? What would the water be like if someone dumped garbage in the water supply?"
8. Show transparency IIC or hand out xerox copies illustrating an unhealthy water source environment. Ask the students to identify the pollution which threatens the safeness of this water supply. (It is considered unhealthy because of the decaying fish and animal contamination.) Discuss how the problem illustrated was created and what can be done about it. (There is a need to purify the water in some way. Ask the students if they can think of ways to purify drinking water.)

(student
response)

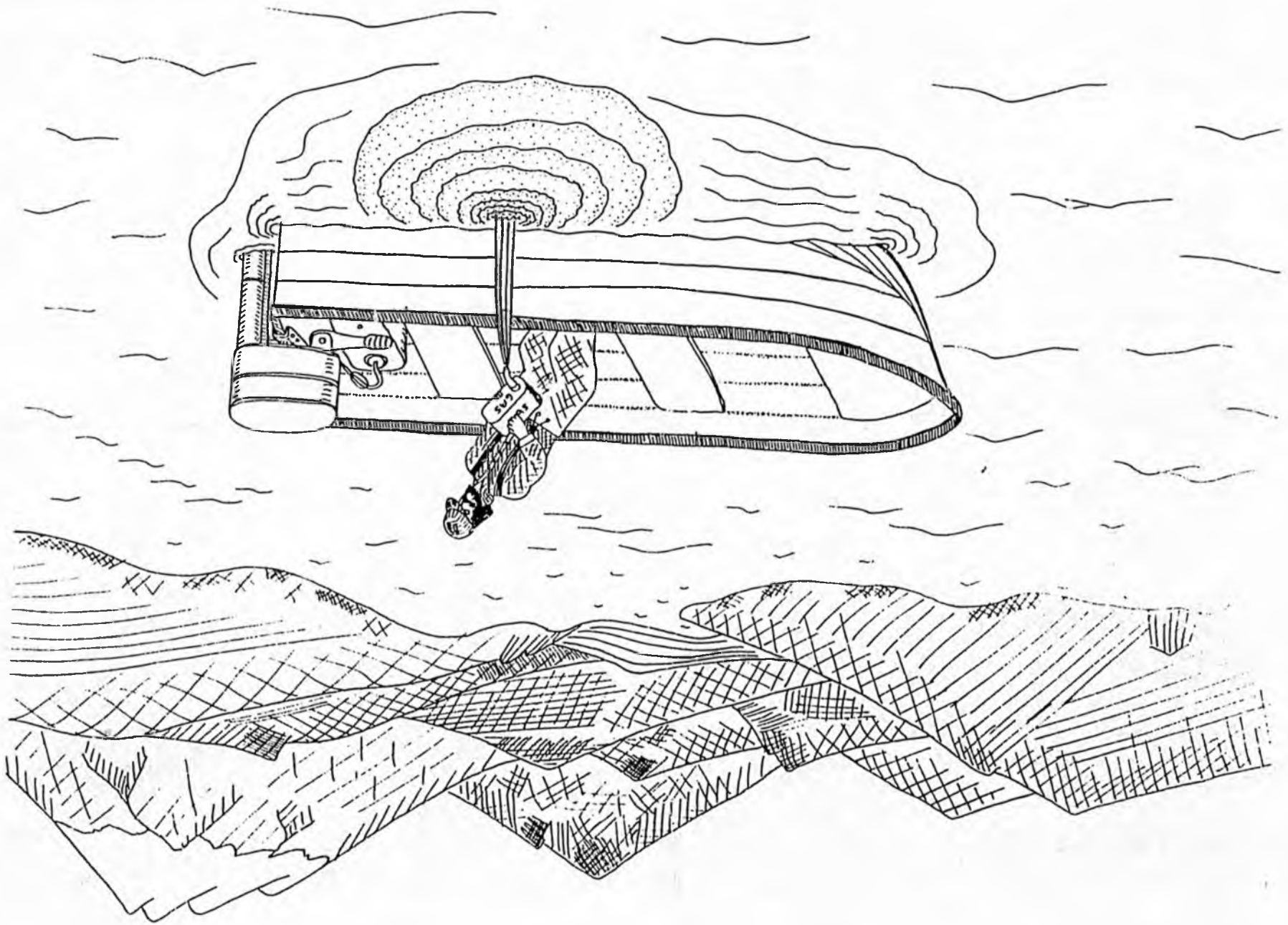
**Additional
Activities:**

1. Write a story about the life-giving qualities of water (begin with a title such as "Crashed in the Arctic").
2. Make a drawing of an imaginative way to get water (Fish Power Water Pump). The drawing need not be practical or even possible. Discuss the schemes with emphasis on the difficulty of really making a safe, usable water supply.
3. Play "Howmuchisa". Have some standard size volume units available -- teaspoon, tablespoon, ounce, pint, liter, quart, gallon. Give students some odd-shaped containers of liquid to determine how much is actually contained in them by using the standard measurer. How much is in a glass of water, a can of pop, an ice cube, a snowball, etc.?
4. Write a song about drinking water.
5. Make posters on how you can help a river from getting polluted.

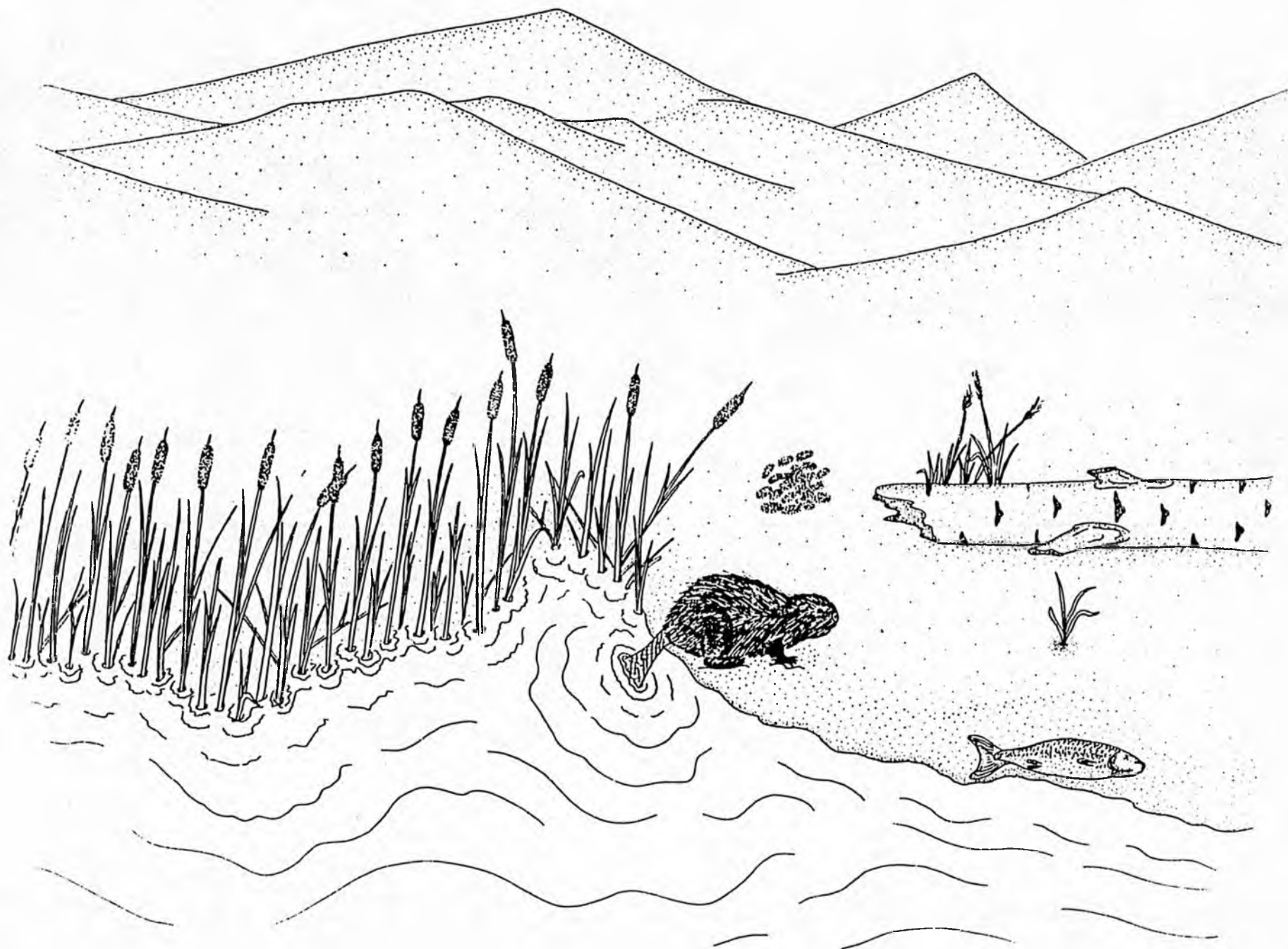
**Suggested
Speakers:**



17



19



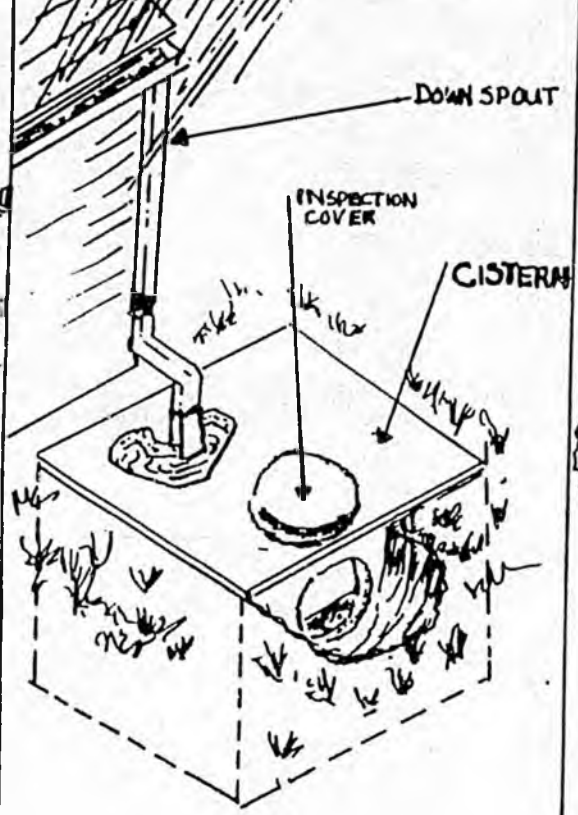
SPRING



SEEP AREA

CISTERN

(rain water collection)



DOWN SPOUT

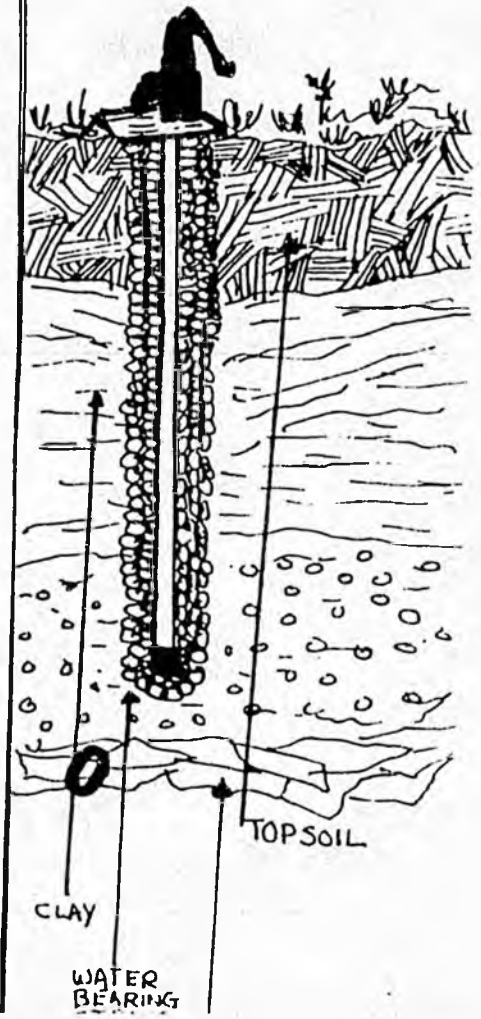
INSPECTION COVER

CISTERN

POND or STREAM



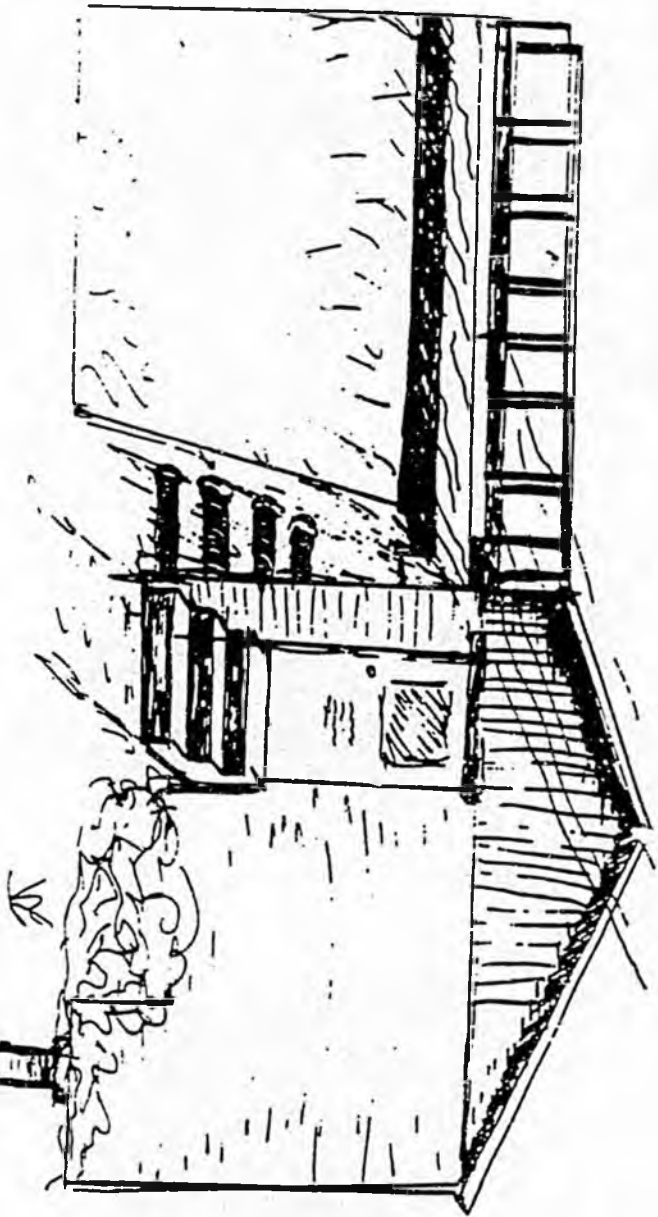
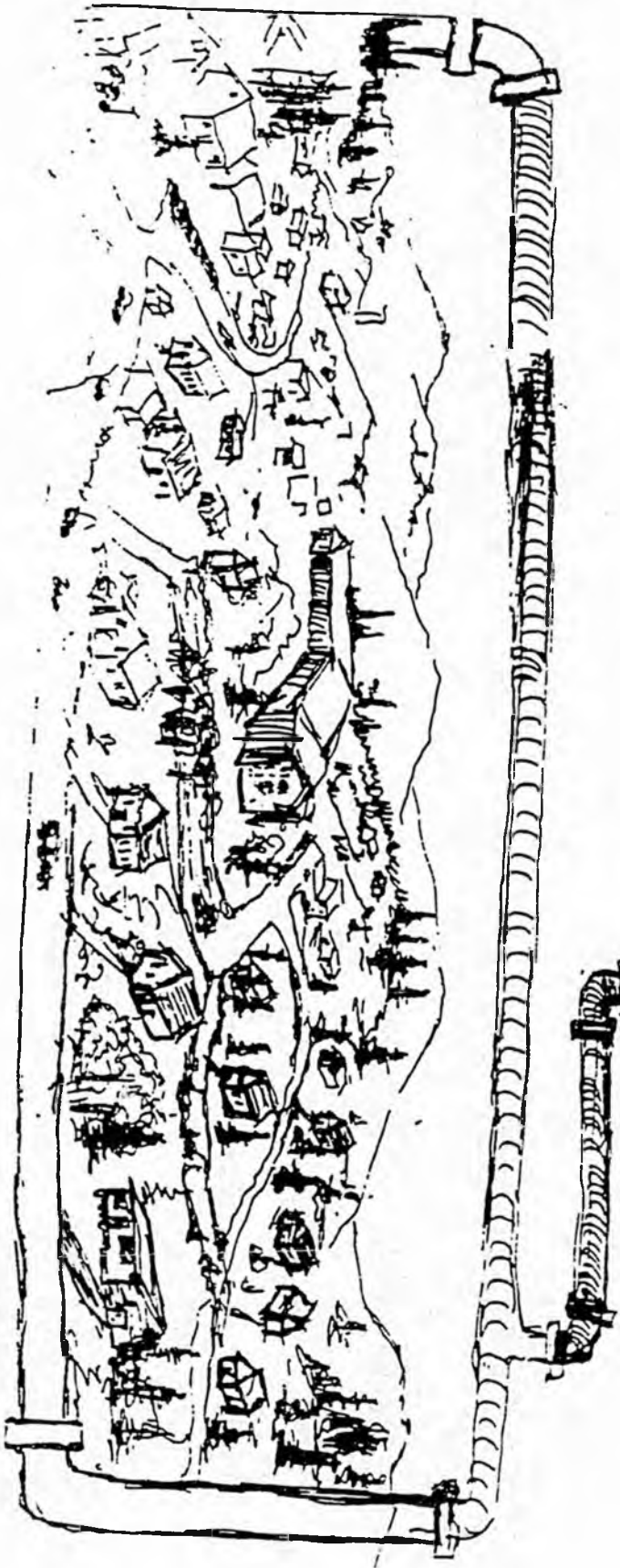
WELL



TOP SOIL

CLAY

WATER BEARING



Objective:

Students will be able to explain in written or oral form, to the teacher's satisfaction, how small organisms can enter their bodies from polluted water sources.



Materials:

- Six small, peeled potatoes boiled until soft
- Four-six sterilized pint jars with lids (heat in oven @ 400° about one hour to sterilize)
- Quantity of contaminated (standing) water
- (Optional) other bacterial sources - handkerchief, unwashed hands, dirty dish scrapings.
- One student response sheet:
"Do these plants and animals live in your glass of water?" (pg. 25)
- Four transparency masters:
I, II, III, IV (pg. 26-29)

Introduction:

This lesson provides a concrete reference to the student's growing concept of pollution. Three categories of micro-organisms are responsible for several health problems. Some of the diseases which these micro-organisms can create are typhoid, cholera, dysentery and diarrhea. The children are helped to understand and identify reasons why pollutants are dangerous and why water treatment facilities are needed.

Seeing is believing. An activity which enables children to observe bacteria can improve their understanding of these organisms and their environment. Activities involving the microscope can meet this need; however, these instruments are not often available to the elementary school teacher. A good alternative is the culturing of bacteria in colonies large enough to be seen without artificial aid.

**Vocabulary
Preparation:**

micro-organisms: super small plants and animals that you cannot see. Includes algae, bacteria, protozoa.

microscope: an instrument we use to make micro-organisms look larger so you can see them.

germs: commonly used term to describe those micro-organisms that can make you sick.

**Instructional
Activities:**

1. Discuss the concept of illness. Why do we get sick? Lead into the area of "germs" as disease agents. What are germs? (Any micro-organism that can make you sick.) Can we see them?
2. Tell the students that we can see germs two ways:
 - a. With the help of a microscope which makes them appear larger.
 - b. By making them grow in number - a crowd of germs can be seen.
3. Draw a very small dot on the blackboard. Say, "Pretend this is a micro-organism. It's very small and hard to see." Now, draw a dot approximately 1000 times larger than the micro-organism. "This is how the same micro-organism looks under a microscope." The microscope allows you to see these very small plants and animals."
4. The bacteria culture demonstration can be handled in one of two ways:
 - a. Prepare the cultures several days in advance (minimum of three). Explain what you have done and have the students compare the resulting growth now and in a day or so.
 - b. Prepare the cultures with the children and follow the growth for several days.

In either case, one potato should be left uncontaminated for comparison. The others should be rubbed with several samples of contaminated water, standing water from outside, water used for hand washing (no soap), saliva, etc. Put lids on all jars, label and place in a warm location not in direct sunlight. You might allow one contaminated jar

to be exposed to sunlight (for use in Lesson 4). Do not let the children come into contact with the jar contents. Keep the lids in place throughout the experiment, and when it is completed dispose of the contents carefully.

5. Explain that if you take a drop of water from a pond and look at it, it doesn't look like much. It's tiny and doesn't have any color. But if you look at the same drop of water under a microscope you may see strange one-celled and multi-celled creatures we call micro-organisms. Tell the students that rivers and lakes that are crystal clear may be polluted. The water might have micro-organisms in it that may make us sick.
6. Discuss the possible results of this type of growth in people. Why do we not always become ill immediately after contact with germs? (they must grow in number, some people don't get sick as easy as others). Why do we not know immediately when we have run into a germ? (they are very small and cannot be seen).
7. Ask the students if they would like to see some of the micro-organisms close up. Show transparencies produced from line drawings of micro-organisms or have them color xerox copies.
8. Hand out response sheets ("Do These Plants and Animals Live In Your glass of Water?") Ask students to color in the drawings of the tiny life forms.

**Additional
Activities:**

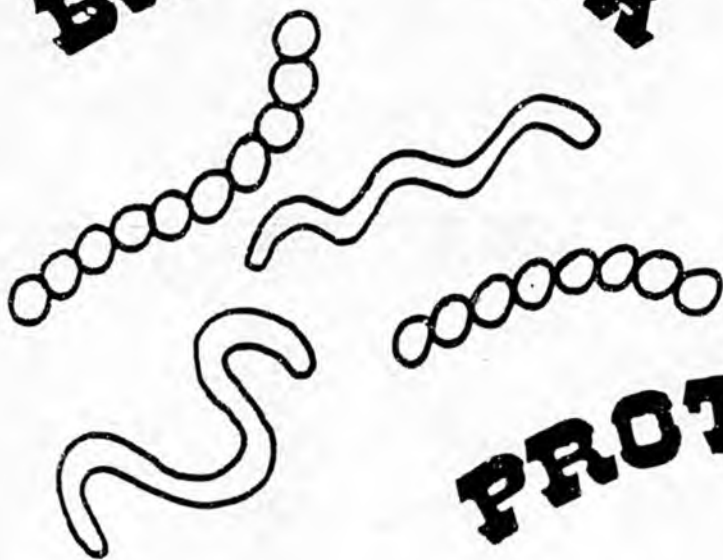
Draw "The Ugliest Germ". Name the micro-organism, tell where he is found and how to stay away from him.

**Suggested
Speakers:**

Activity 5: Health and/educator or Sanitarian. Have them talk about some illnesses you can get from water, the source of those germs, and any illnesses that may have happened in communities like theirs.

DO THESE PLANTS AND ANIMALS LIVE IN YOUR GLASS OF WATER?

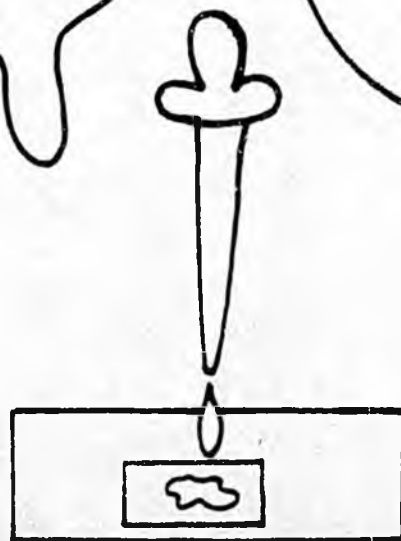
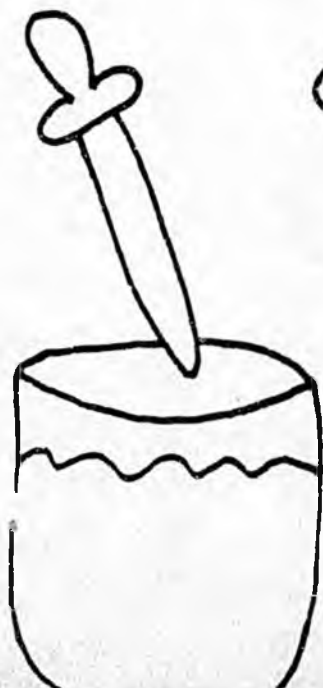
BACTERIA



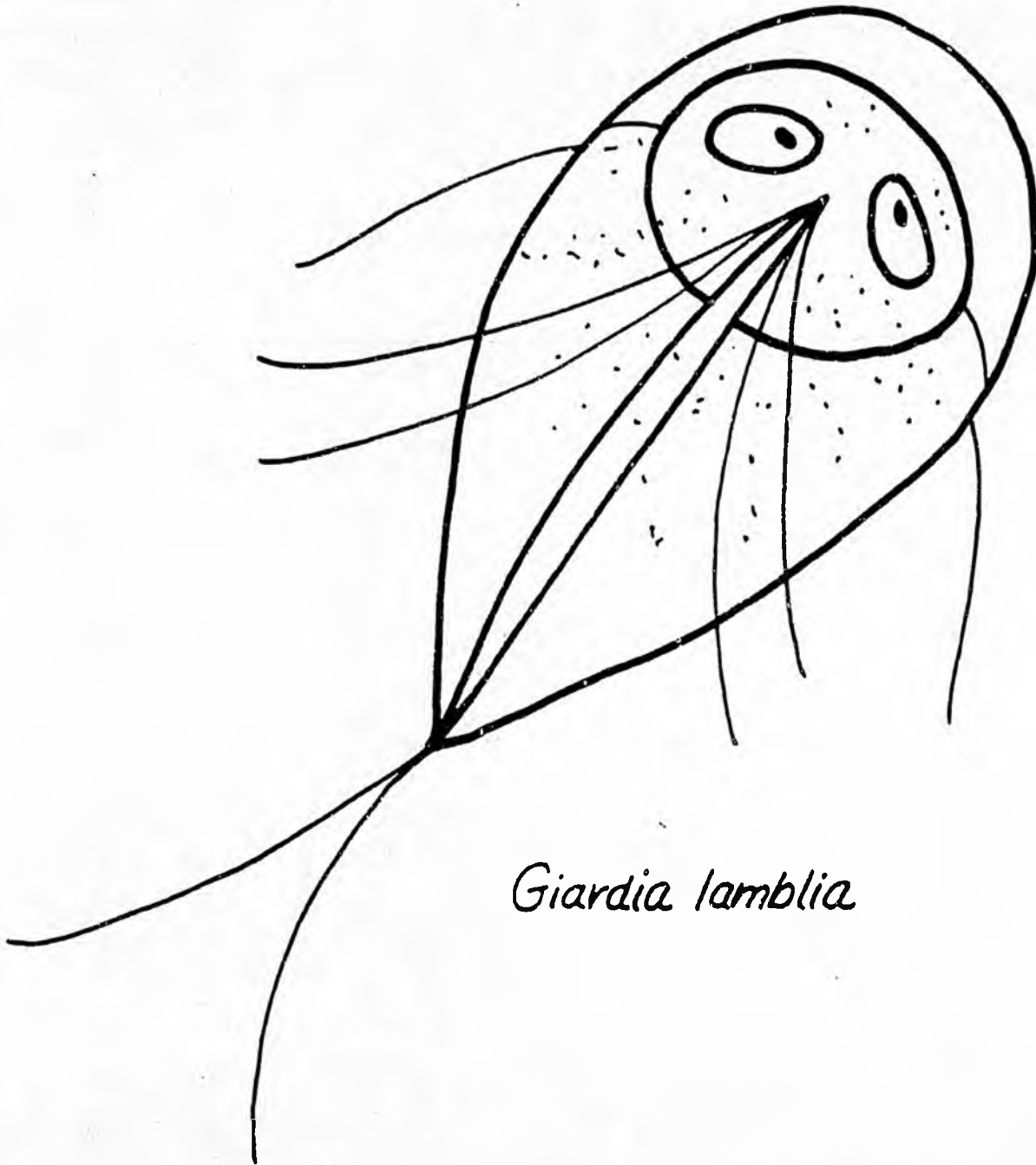
ALGAE



PROTOZOA



Protozoa *

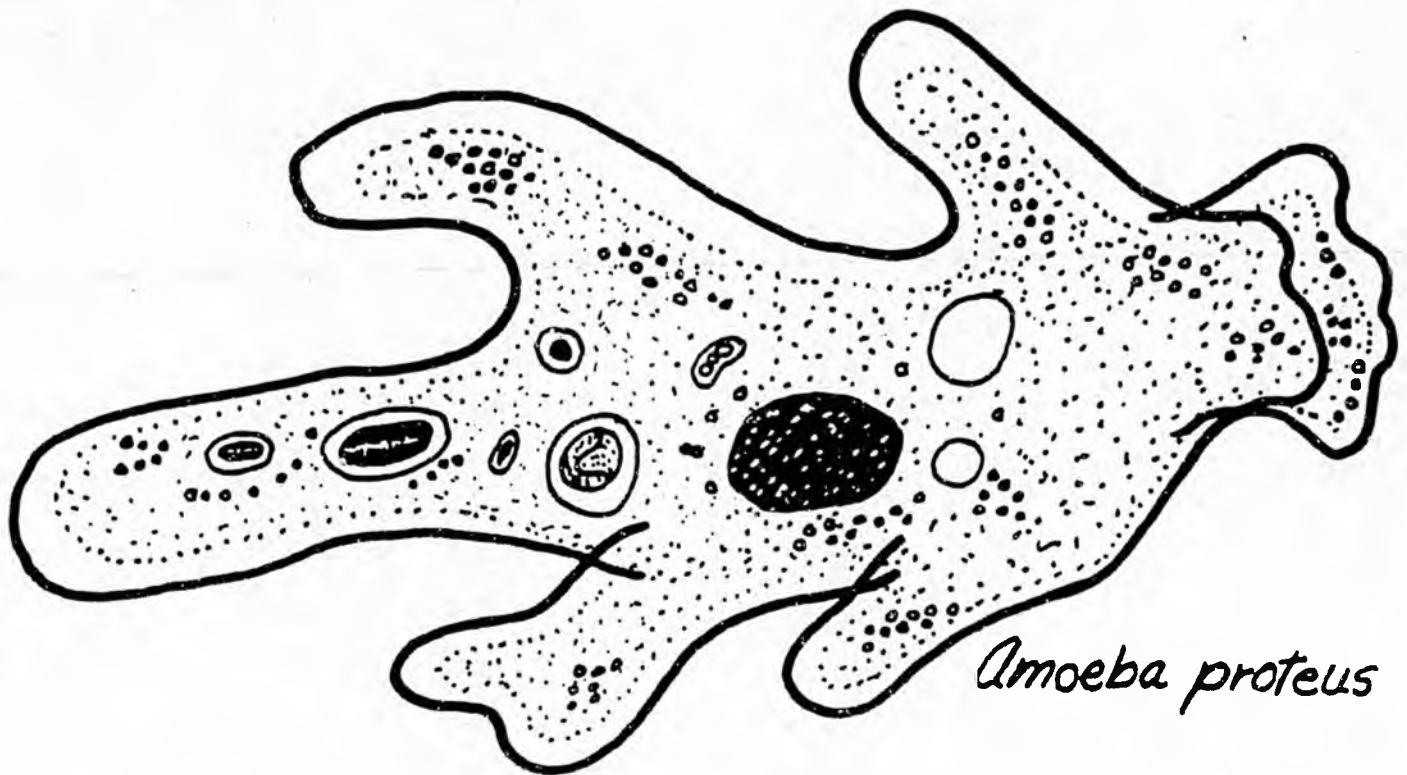


Giardia lamblia

I

(* This drawing is 10,000 times larger than the actual protozoan).

Protozoa*

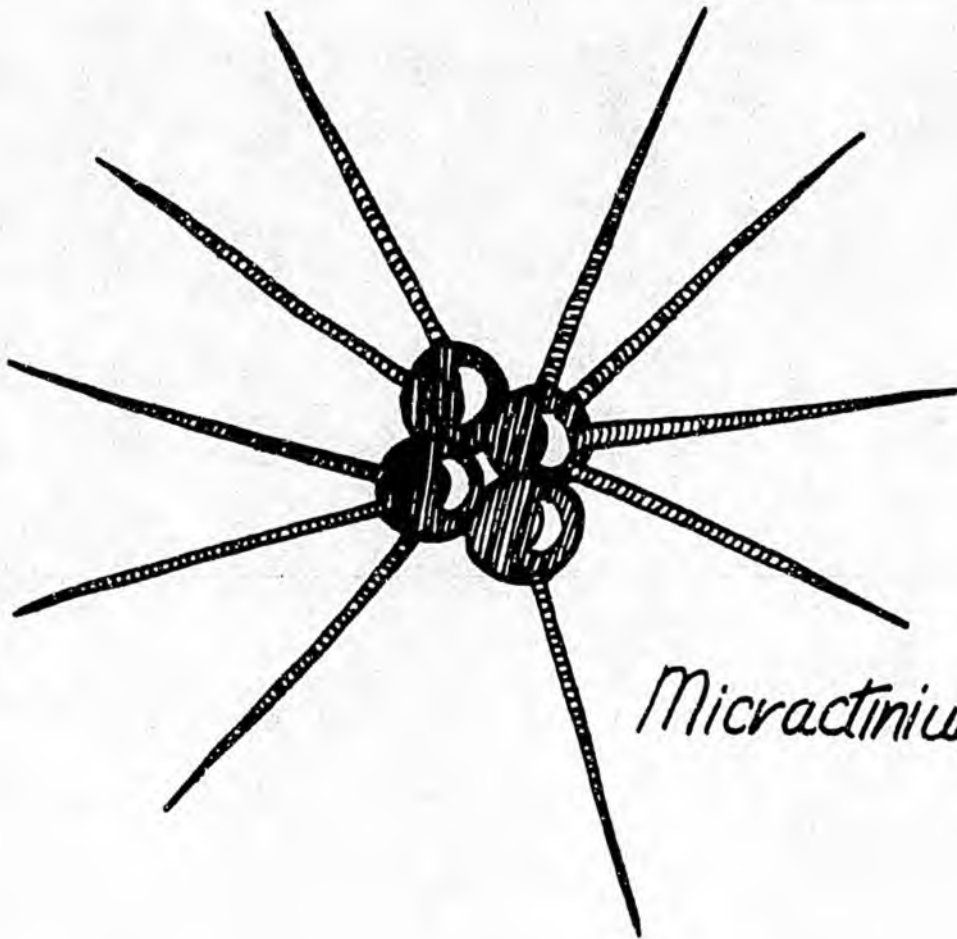


Amoeba proteus

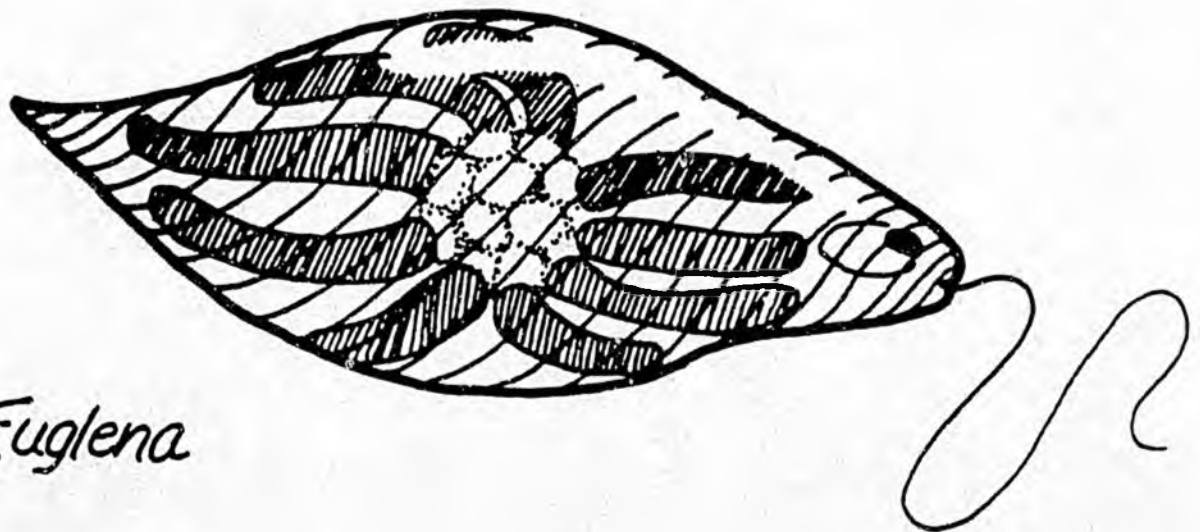
(* This drawing is 10,000 times larger than the actual protozoan).

II

Algae*



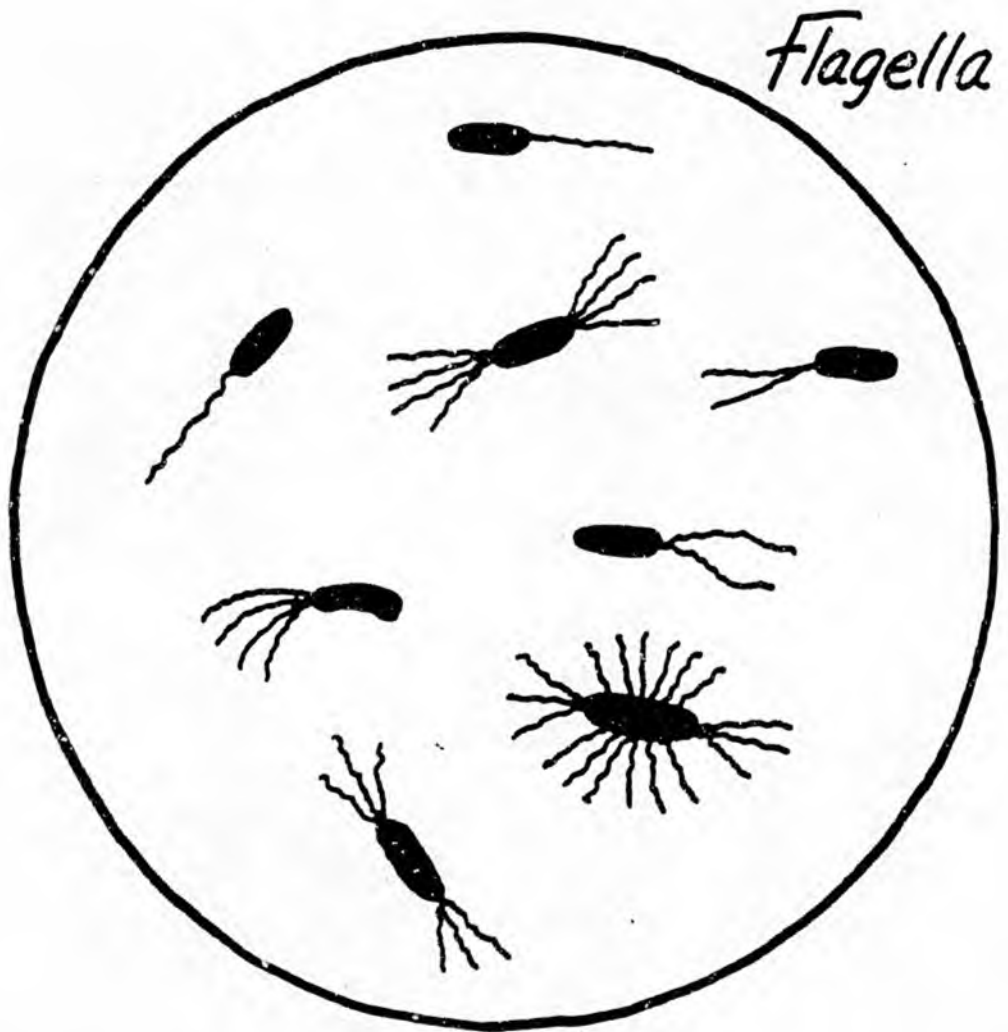
Micractinium



Euglena

(* This drawing is 1,000 times larger than the actual algae).

Bacteria*



(* This drawing is 10,000 times larger than the actual bacteria).

Objective:

Students will be able to describe at least one way in which water can be made safe for drinking following a demonstration of how chlorination protects drinking water.

Materials:

- Warm water
- Two clean glasses
- Packet of dried yeast
- Sugar syrup (Karo, etc.)
- Laundry bleach (liquid-Chlorox, etc.) see note below*
- Stirring rod
- One student response sheet: "Find the Polluters-Color Them Brown" (pg.33)

**Introduction:**

If the water supply which your community is using is being treated, then chlorine is probably being added in that treatment. Chlorine has been used to destroy disease-causing micro-organisms in town water supply systems since 1897. It works by oxidizing (burning up by combining with oxygen) the organic matter in the water. This makes the water safer and changes the color, taste and odor.

The experiment will show the effects of chlorine on micro-organisms. It will take approximately two hours to show clear results. The experiment can be started easily during a convenient point in the morning and then set aside for examination later in the day. This simple experiment will give the children a concrete reference for further learning about water treatment.

***IMPORTANT:** Do not allow the student to make an association between the chlorine used in the demonstration and chlorine bleach or its container. A possible result could be a child believing the bleach in itself is a good thing to drink - with disastrous consequences. Put the chlorine bleach in a vial marked with the poison (ECCH) symbols and warn the students that only when used in very small amounts can the chlorine kill germs without hurting people.

Vocabulary

Preparation:

chlorine: kills disease causing micro-organisms and makes water taste and smell better.

Instructional

Activities:

(review)

1. Ask the children how they would suggest getting rid of the micro-organisms (super-small plants and animals) which they saw in the previous lesson. Why did the sample left in the sunlight in Lesson III not multiply as greatly as the others? (There will likely be some imaginative responses - burn them, poison them, use a ray gun, etc. - which will lead into the demonstration.)

(new activity)

2. Tell the class there is a way to kill the micro-organisms which we've seen in the last lesson. Why is it important to kill the micro-organisms in water? (Some micro-organisms i.e. "germs" might make you sick). Say that in this experiment we are going to grow an organism which cannot hurt us. Yeast is a different type of micro-organism and is not associated with illnesses from polluted water sources. (Make this distinction so that the students do not confuse the yeast which makes bread with organisms that cause illness).
3. If continuity of time is required prepare ahead: 1/2 teaspoon of dried yeast poured into 1/2 glass of warm water. Allow a half hour for the yeast to multiply. Separate the mixture into two clean glasses.
4. Show the students that the yeast is growing like the micro-organisms of the earlier demonstration -only much faster, before our eyes.

To one glass, add five drops of the bleach. To each glass, add one teaspoon of syrup and stir gently. Mark one "chlorine treated". Set aside for later examination. (A period of at least an hour should be allowed for the chlorine to take effect.)

5. To begin the afternoon period, ask the students how a water supply becomes polluted. Make a list of pollution sources on the chalkboard. Help the student recognize any identifiable threats to their water source.
6. Pass out the student response sheet. Allow the

students to find the sources of pollution themselves and color them brown.

7. Show the class the results of the experiment. (The glass to which the chlorine was added should show no activity while the glass free of chlorine should show activity caused by the growing yeast.)

(student response)

8. Ask the students to explain how the chlorine affected the yeast growth. (It killed the yeast growth).

Chlorine is used to kill micro-organisms that are harmful in our drinking water. Chlorine also takes out some of the bad taste and smells water may have.

Additional Activities

1. Using the "Polluters" worksheet as a starting point have the class develop a list of pollution sources. Which can be prevented by people being more careful?

Suggested Speakers

FINND THE POLLUTERS



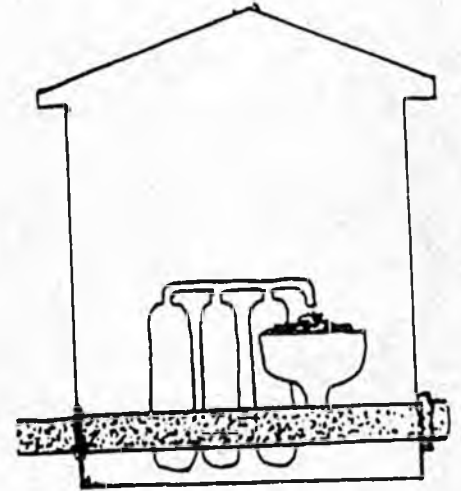
COLOR THEM BROWN

Objective:

Students will demonstrate a basic understanding of water treatment by completing a worksheet based on a class visit to a water facility.

Materials:

- Poster of water distribution cross section
- Visiting arrangements to local water treatment facility.
- 1. Water distribution cross section (pg. _____) 2) "Water Treatment" worksheet (pg.38)
- Scissors, crayons
- Drinking Water poster



Vocabulary

Preparation:

chlorine - kills disease causing micro-organisms "germs" and makes water taste and smell better.

fluoride - added to water to prevent tooth decay (cavities).

Introduction:

This lesson provides a setting to create a concrete reference for all of the concepts of water pollution which have been introduced. The children should be prepared before you visit the water treatment facility by reviewing these concepts:

- water cycle (all water is reused)
- pollution sources
- micro-organisms (water-borne contaminants)
- treatment

The Village Water Cycle & Treatment posters can be used to provide a focus for that review.

A site visit to a conventional filtration/chlorination/fluoridation plant should be no problem in the larger communities.

Smaller communities may have a simple pumping station and storage facility without elaborate treatment. Point out that if the water is clean and unpolluted to begin with, the important thing is to keep it clean enroute to the users' homes. This is especially true of villages which distribute water by tank truck or block ice.

In some villages, the school water system itself will be the best example of good water treatment.

A look at the school's waster water treatment system (gray/black water, bio-pure, or whatever) will reinforce the concept of the water cycle and the need for care and/or treatment of potable water.

Prior to the actual visit, talk to the plant operator to determine what the children will see and what the guide will emphasize on the tour. Follow water from the source through the treatment plant to water that is safe to drink. Ensure that the presentation will be within the groups's level of understanding and attention span, and consistent with the lesson objective.

**Instructional
Activities:**

1. Using the Village Water Cycle poster, review the concepts of water cycle, pollution and micro-organisms. The class may demonstrate an understanding of how these concept affect their lives through the water which they drink.

Fluoride may also be used in drinking water to prevent tooth decay (cavities). Fluoride also helps keep your teeth health and strong.

2. Use water distribution cross section poster to explain local water treatment facility.
(pg. ____)

Water that you drink from the water plant is treated to make it clear and healthy. These are the steps water goes through before you drink it.

1. Water comes from a well that was drilled on an island in the Noatak River.
2. River water is filtered through the gravel in the river.
3. The pump inside the well pushes the Noatak river water through a pipe to the pumphouse.
4. In the pumphouse, chlorine and fluoride are added to the water.
5. Water is then stored in the water tank.
6. Water from the tank fills your water bucket when you turn the valve.

The water treatment plant operator has a very important job. He sees that the water you drink is healthy by adding chlorine to kill "germs", and fluoride to keep your teeth from getting cavities. When you visit the water treatment plant let the operator know that you appreciate his work.

3. Take a field trip to observe a water treatment facility.
4. Hand out water distribution cross section. Color all water and/or follow the flow of water with finger from the river to the well, plant and user.

Ask: "What would happen if we don't have clean water? Why do we add chlorine to the water? Why do we add fluoride to the water?"

**Additional
Activities**

1. Play "The Clean Machine". The class creates a skit based on a town with dirty water where the people help make it clean. Each child contributes a cleanup or preventive act to add to the story line - each doing something to clean up the water.
2. A "Thank You" note(s) or drawing(s) to the water plant person.
3. Write a story about a drop of water traveling from the source (well, river, etc.) through the treatment plant and into your home.
4. Pass out the "Water Treatment" worksheets and discuss what a water treatment facility does to make the water safe for drinking. Mention that it is in the treatment plant that the water is made safer by adding heat and chlorine and/or fluoride, or by being filtered.

Ask the students to cut out the micro-organisms and glue them onto the worksheet in a spot appropriate to show their effect on water (before the "chlorine" stage), then color the picture. Display the pictures on a wall.

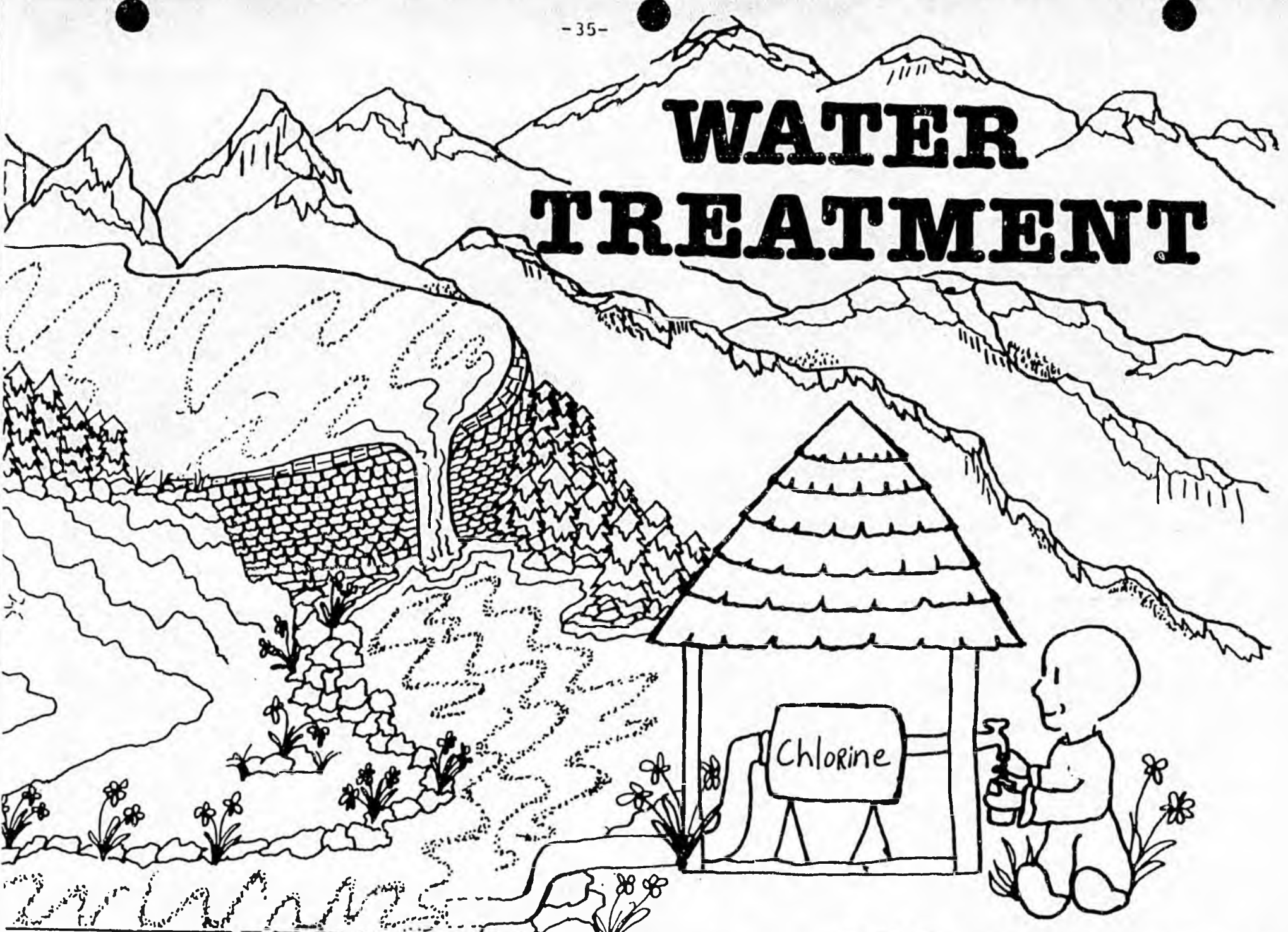
**Suggested
Speakers**

Plant operator to show flow of water and explain treatment.

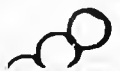
**Culminating
Activity**

1. Have students make posters on the theme "Where My Drinking Water Comes From" or "Safe Drinking Water, Its Many Uses in the Village".
2. Following a visit to the water treatment plant award students with their Junior Plant Operator certificate.

WATER TREATMENT



organism:





SAFE

DRINKING

WATER

GRADES 4·6

Safe Drinking Water

Introduction:

The following set of five instructional units has been developed to teach upper elementary aged children about the possible health hazards of drinking water from polluted sources. Students of this age very likely have heard the term pollution and may even have developed a concept of water pollution. These lessons are intended to provide both a background in the relationship of pollutants to health and a concern for the quality of drinking water.

The first unit uses a review of the Water Cycle to establish the idea that water is a limited resource which is continually recycled. Explored is the origin of drinking water, including how that supply is dependent on the water cycle. The second unit follows up with a mediated introduction to water. Provided is an overview, to help the students understand the major aspects of water pollution and its effect on human life. In the third unit microorganisms are introduced as a real source of pollution caused health problems in Alaska. Unprotected and untreated surface water, vulnerable to unpredictable contamination by man or animals, is recognized as a major part of the problem. Unit four demonstrates chlorination as a water purifier by showing the effect of chlorine on microorganisms. The fifth unit, a reinforcement activity, is a field trip to the local water treatment facility to provide a concrete reference for the concepts of water pollution and safe drinking water.

Flexibility was a prime concern in the development of these lessons. Each teacher, keeping in mind the special needs of his/her class and the particular resources of the area, should feel free to adapt the materials and/or sequence of these lessons.

Objective:

Students will view a demonstration of the water cycle and demonstrate their understanding of the concept by answering a series of questions.

Materials:

- Small pot
- Hot plate
- 8" x 10" or larger sheet of glass, metal (a hard non-porous surface, glass or acrylic make viewing easier)
- 2 pot holders
- 1 student reading material, "The Water Cycle" (pp. _____)
- 1 student response sheet, "Water Cycle Questions" (pg. _____)
- Nature's Water Cycle (pg. _____).



Introduction:

Assess the class as to their understanding of the water cycle and its components - evaporation, condensation, precipitation. Many may understand that water is a limited resource which we must care for by conservation measures. If so, the demonstration might provide a good review. The students, as reinforcement, might be given a writing assignment using the above key words. The intent of this unit is to establish where water comes from as well as where we stand in the cycle as users.

Vocabulary

Preparation:

molecules
evaporation

vapor
atmosphere

condensation

Instructional
Activities:

1. Ask the class these survey and motivation questions to assess what they already know and to generate interest in the lesson:
 - A. Where does water come from?
 - B. How can we make more water?
 - C. Where does the water you use at home come from?
2. Tell the students you are about to make it rain to demonstrate that rain in one part of a cycle of water use. While preparing the demonstration you might ask what a cycle is (answers will refer to motorcycle or bicycle - use the idea of a wheel going round and round to reinforce concepts of a cycle in nature).

3. Pre-heat a pot of water to near boiling on the hot plate. (demonstration goes faster if you begin with hot water).
4. Have a student hold the flat piece of non-porous material over the pot to allow the water vapor to condense and collect. As the droplets form, grow heavy, and fall, ask whether new water has been made.
5. Using this visual model, discuss the water cycle. Emphasize that we, as water users, are part of this cycle. Ask: Which part is like the rain? Which part is like a river? Which part is like the sun?
6. Preview "The Water Cycle" reading by asking how small is the smallest piece of something - water, air. Lead into the concept of the molecule as the smallest unit of a substance. Emphasize that a molecule is very small indeed - too small to be seen by even a microscope.
7. Pass out "The Water Cycle" handouts (pg. 6-10). This may be employed in a variety of ways, including:
 - A. as an individual or group reading;
 - B. as a guided reading using "Water Cycle Questions" as a guide sheet;
 - C. as an information sheet for the teacher to use in preparation for class lecture/demonstration.
8. Hand out "Water Cycle Questions" for a review. (pg. 145)

**Additional
Activities:**

1. Tell a story about a drop of water -- where it has been, who has used it and for what, what shapes it has taken. This could be done orally, through a drawing sequence, or in written form.
2. Follow a small stream to its source and see where it originates. Ask students to point out plants, insects and perhaps larger animals which depend on the stream for living space, food, protection, reproduction. Where does this water come from? Who might use it further along?
3. Write a short poem (haiku style or other) about rain, dew drops, fog, snow, hail.

**Suggested
Speakers**

The Water Cycle
(grades 4-6)
Page 1

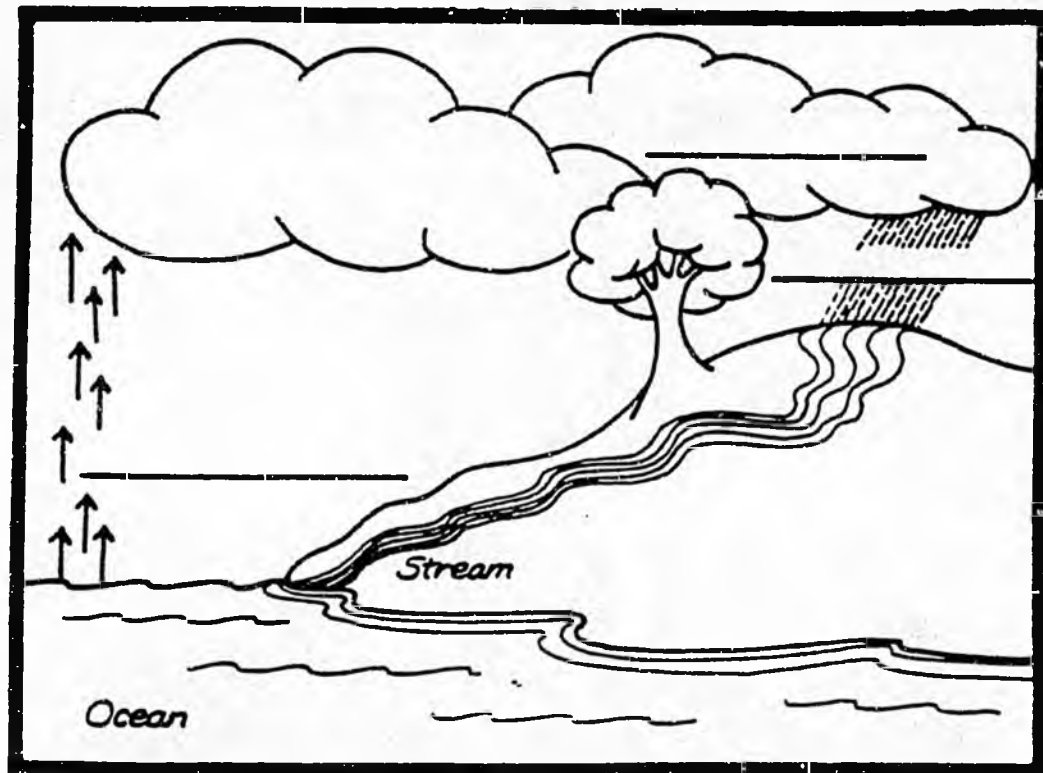
Have you ever noticed on maps of the world all the water areas covering the earth - oceans, lakes, rivers and streams? Water covers most of the earth. It appears in many places in many forms in a regular cycle.

To understand this cycle, let us imagine the oceans rolling in their great basins between the continents. The sun shines on the rather flat water surface and heats it. As the water grows hotter, some is bumped off into the air. These tiny bits of water in the air become like a small, warm, moist cloud. (This process is known as evaporation.)

Water as a vapor cannot be seen. When we see steam rising from a pan of hot water on a stove, we have actually seen water changed before our eyes from a liquid to a vapor and then back to a liquid again in the form of tiny little droplets. But we haven't seen the vapor. For as soon as the vapor has risen from the boiling water into the cooler air, the bits of water slow down and begin to huddle close together. The cooler air changes the vapor back into tiny little droplets. (This is called condensation.) We can change the tiny little steam droplets to larger droplets by suddenly placing a cold metal pan in the path of the steam and holding it there for a while.

The Water Cycle
(grades 4-6)
Page 2

The vapor from the oceans (or from other water surfaces such as rivers, lakes etc.) is warmed by the sun. As warm air always rises, the vapor rises, higher and higher, until it begins to cool in the high cooler air. The vapor then starts to change back into tiny droplets of moisture much as it did in the case of the hot water pan on the stove. But the droplets of moisture rising from the ocean cover a great area and are carried around by wind and air currents.



Eventually, a cloud is formed. As the cloud is carried into colder areas, the tiny little droplets, in turn, group together - sometimes in enormous amount to form a single raindrop. With rain, the oceans are filled and the cycle is completed.