EDUCATING
YOUNG PEOPLE
about
Water

A guide to goals and resources

with an emphasis on nonformal and school enrichment settings

Elaine Andrews and the Cooperative Extension National Review Team

Sponsored by the United States Department of Agriculture, Cooperative Extension Water Quality Initiative Team

Sponsored by the United States Department of Agriculture, Cooperative State Research Extension and Education Service under the direction of Gregory Crosby, National Program Leader for youth science education, and the Cooperative Extension Water Quality Initiative Team, Andrew J. Weber, Chair.

The USDA Extension Service project to review youth water education needs was developed in support of youth and community water quality education goals of the National 4-H Environmental Stewardship Program and the USDA Cooperative Extension National Water Quality Initiative Team.

NATIONAL REVIEW TEAM—1992 and 1995 versions

*Janet Ady, U. S. Department of Interior–Fish and Wildlife Service

Julia Batten, American Water Works Association

*Pat Bonner, U.S. EPA-Office of Water

*Valerie Chase, Baltimore National Aquarium

*Mare Cromwell, Project GREEN

Jerry Culen, Southern Illinois University, Touch of Nature Center

*William Dickinson, U. S. EPA liaison to the Cooperative Extension Service

Barry Fox, Virginia State University Cooperative Extension

*Pamela Godsey, United States Department of Agriculture–Forest Service

*DeLynn Hay, University of Nebraska Cooperative Extension

Mary Lou Scocia, U. S. EPA-Office of Water

Lynn Hodges, Tennessee Valley Authority

Libby Hopkins, U. S. Department of Interior–Fish and Wildlife, Massachusetts office

Eric Jorgensen, University of California, Cooperative Extension

Kim Knox, American Water Works Association

*Tom Leverman, USDA–Soil Conservation Service

Anne Lyon, Tennessee Valley Authority

*Bob Pfeiffer, America's Clean Water Foundation

Gordon Stuart, USDA–Forest Service

*Steve Vandas, United States Geologic Survey

*served1991–94

Project director

Elaine Andrews
Environmental education specialist
University of Wisconsin–Extension
Environmental Resources Center

Project research

Kelly J. Warren—1995 version

Karen Poulin—1992 version

University of Wisconsin–Extension
Environmental Resources Center

Nonformal environmental education consultant

Stan Nichols, University of Wisconsin–Extension
Environmental Resources Center

Project support staff

Lynn B. Entine, editor (1992)

Rebecca Lee, designer (1992)

Monica Burow, Environmental Resources Center office manager

Phyllis Perk, program assistant

Sheila Voss, program assistant

December, 1992

Revised March, 1995

Additional copies of this publication are available from

ERIC Clearinghouse for Science, Mathematics and Environmental Education
1929 Kenny Road
Columbus, OH 43210-0180
614/292-6717

Other publications in this series and also available at ERIC include:

Educating Young People About Water: A Guide to Program Planning and Evaluation

Educating Young People About Water: A Guide to Unique Program Strategies

Contents

Introduction to the guide

Water quality is a critical environmental issue that has received deserved attention from educators in recent years. There are now a variety of educational materials for young people that can be used both in school and in after-school settings.

However, educators and youth leaders often do not have enough training to develop a water education program. They need help in including multiple objectives and information on curriculum activities for specific programs.

The 1992 Water Curriculum Needs Assessment Project addressed this problem. We summarized information about water curricula, provided guidance for federal investments in water curriculum development, and created a network among national groups and agencies which promote youth water education. This assessment project set the stage for the resources in this book.

Who should use this guide?

This guide is for professionals who design and develop water quality training programs and curricula, and for coordinators of water education programs. It will help you select water curricula, education support materials and bibliographies. Coordinators can use it to make initial program decisions or to find complementary materials for a program that is already in place.

HOW TO USE THIS GUIDE

Quick overview

For a quick survey of water curricula useful in a local setting, start at the end of this book with the Water Curriculum Summary Chart beginning on page 48. The Water Curriculum Summary Chart summarizes each curriculum by topic or category.

Understanding subtopics

To understand the subtopics noted in the summary more clearly, see the detailed topic listings on pages. 6 and 11.

Specific curricula

You can learn more about any particular curriculum by finding its brief entry in the annotated "Guide to Reviewed Curricula" on page 17. They are listed alphabetically by title. For details about water topics, environmental education goals, and curriculum format choices in each curriculum, you will need to refer to a computer database developed for the project. (See box on page 3.)

Designing a local program

For help in designing or evaluating a local water education program, you may find the following segments of this book useful:

- *Water Education Goals for Youth*
- *Key Water Quality Education Topics and Major Subtopics*
- *Critical Environmental Thinking Skills*
- *Instructional Format Choices for Youth Water Curricula*
- *Lists of Sources of Curricula Chosen for Review*
- *Unique Support Materials for Youth Water Education*

Also, see the other resources in this series:

- *Educating Young People About Water: A Guide to Program Planning and Evaluation*
- *Educating Young People About Water: A Guide to Unique Program Strategies*

Help us find what's missing

We reviewed many bibliographies and other resources to develop this guide. However, not every curriculum makes it to a regional or national bibliography. We may have missed high quality regional materials as well as curriculum resources that appeared since our study.

We are still collecting water education curricula with activities for youth. If you have a copy of a curriculum that is not reviewed here and it covers topics listed in "Key Water Quality Education Topics" and subtopics we want to know about it.

Please send a copy of the curriculum or a description and ordering information to:

Elaine Andrews
University of Wisconsin–Madison
Environmental Resources Center
216 Agriculture Hall
1450 Linden Dr.
Madison, WI 53706
Fax: 608/262-2031

Thank you for your help.

RETRIEVING YOUTH WATER CURRICULUM INFORMATION ELECTRONICALLY

All curricula reviewed in this guide are summarized beginning on page 17 and in the summary chart starting on page 48. For a more detailed listing of topics included in individual youth water curriculum, refer to the "Almanac" database provided by Purdue University. To get a user's guide to "Almanac," send an electronic mail message to this Internet address:

almanac@ecn.purdue.edu

Type the following message:

send guide

Requesting information via electronic mail

To get a catalog that lists the titles of the youth water curriculum reviewed for this project, send an electronic mail message to this Internet address:

almanac@ecn.purdue.edu

Type the following message:

send youth-water-curriculum catalog

You'll receive the catalog as an electronic mail message soon afterwards. You may request any or all catalog items via electronic mail. Be sure to type your requests exactly as you see them here.

Requesting one or more summaries

To get a summary listed in the catalog, send an electronic mail message to this Internet address:

almanac@ecn.purdue.edu

Type your request. For example, to request summary number 5, enter (abbreviate "youth water curriculum" to "ywc" and "summary" or "sum"):

send ywc sum5

To request several summaries, put each request on a separate line in your message:

send ywc sum6

send ywc sum45

If you send several requests in one message, the requested files will arrive in one message. If you want to receive each request in a separate message, turn on the "separate" option. For example:

set separate on

send ywc sum6

send ywc sum45

You will receive three electronic mail messages. The first will confirm your "separate" option request, while the remaining messages will each contain one of your requested summaries.

Accessing curriculum summaries on the Internet

You can review on screen each curriculum summary in the Almanac database via the Internet. To reach the database:

telnet to:
hermes.ecn.purdue.edu

login: *cerf*

password: *purdue*

Type your internet address

Select *National Water Quality* from the CEMS menu at the Cooperative Extension Reference File System screen

Select SEARCH

Type: *youth water curriculum*

You will see a listing of all the curricula reviewed for this project as of January 1, 1995. Select a curriculum to view the title, author, state of origin, summary and cost. You are given the option to view (V=view) the checklist that corresponds with the checksheets on pages 6 and 11–12 of this guide book. You can also order a hard copy from the publisher or download the curriculum information to your computer.

What is the Internet?

The Internet is a rapidly growing, international computer network. Many institutions, both for-profit and non-profit, now offer services and products to their clients via the Internet.

To access the youth water curriculum summaries via the Internet, you need an electronic mail account on a computer attached to the Internet. All U.S. land grant universities provide computing facilities with electronic mail systems which can interact with the Internet.

Commercial services such as CompuServe and MCIMail also support Internet electronic mail. Ask your computer center's staff for local instructions on how to send and receive Internet electronic mail.

If you don't have access to the Internet, contact your local county or state Extension youth development agent and ask their help in retrieving the youth water curriculum catalog or summaries that you want.

USDA/Cooperative Extension Service

Water curriculum needs assessment project

Background

In 1988 state Cooperative Extension directors and administrators named water quality their highest national priority. These leaders head major county-based outreach programs at all 50 state land grant universities. Cooperative Extension programs offer education to people of all ages in nonformal settings.

Water education became a focus for Cooperative Extension nationally. Leaders recognized that while people of all ages need to understand water quality issues, there were bonuses in working with young people. Young people could also learn about leadership, identify career opportunities, and improve their science knowledge.

The Cooperative Extension National Water Quality Initiative Team soon began to support curriculum development. In 1991, wanting to maximize their investment by targeting the greatest needs, the team began the assessment project and set up a review group of experts from private and federal organizations.

The plan was to guide Cooperative Extension policy and summarize water curricula for national, state, and regional water education leaders. Nonformal education needs were central to the project because that is the type of education Cooperative Extension generally provides.

Review team

Water education is not new. Many government and private organizations have been involved in it for years. To benefit from their experience, we drew members of the National Review Team from these institutions. They are listed in the front of this book.

Team members supplied copies of water quality education materials for young people, provided references, and recommended other resources. They also helped identify appropriate water education goals and key topics, and offered strategies on how to address gaps and needs that we found. Their recommendations are found in Assessing National Water Quality Education Needs for the Nonformal Youth Audience, available from USDA Cooperative Extension, Washington, D.C.

Project goals

This study is unique because it begins with national water quality needs and issues rather than specific science or local resource education objectives. From these national resource policy issues we developed national goals and objectives for water quality education.

Water education materials are so many and varied it could take years to do a thorough assessment. To quickly meet educators' immediate needs for resources, we developed a short-term, initial project. The objective was to review and classify a selection of available curricula as a basis for understanding what was missing and needed. The results from the six-month study provided a strong beginning for future work.

The 1995 edition of *Educating Young People About Water* provides additional materials and resources.

The specific objectives of this study were to:

1) Use national water quality issues to identify key water quality topics and learning goals for youth in a nonformal setting such as 4-H.
2) Categorize a selection of water quality curricula according to the identified goals.
3) Classify relevant curriculum materials, delivery styles, and model programs in an easily understandable and accessible format.
4) Determine the strengths and weaknesses of available curricula, establish objectives for 4-H and youth water quality education, and provide direction for Cooperative Extension investment in curriculum development.

National water education needs

To determine national water education needs, we reviewed a number of federal and state Extension reports and national plans of work. We also reviewed reports from the U.S. Department of Agriculture, the EPA, the Great Lakes National Program Office, and the U.S. Geological Survey. Members of numerous federal agencies contributed to our National Review Team (see team list at beginning of book).

We sought the perspective of private organizations through a report by the Freshwater Foundation. Members of private organizations also served on the Review Team.

This process produced four critical national water resource issues that nonformal education could address, and a list of nine key water quality education topics.

Critical water quality issues[1]

1) Interaction of human activities and water quality.
2) Use and disposal of agricultural, industrial, and household chemicals.
3) State and local water problems such as drought-induced shortages, declining water tables, increased pumping costs, and increased production and treatment costs.
4) Protection for community water resource quality.

[1]Adapted from: *Extension Review.* Vol. 59, No. 3, Fall 1988. Water quality issue

Key water quality education topics and major subtopics

A wide variety of water education material has been available for the last ten years. It has not been easy for the educator, however, to choose the topics that help society meet its water quality goals or to find materials that teach those topics and concepts.

The National Review Team identified the nine key topics in the box below. Discussion also produced a set of important subtopics. These add detail that the educator can use and that we used in reviewing curricula. They are listed on the following page.

In reviewing curricula for this book, we looked only at whether the topics were present in the activities and information. We did not evaluate the quality of the activity or its relevance to the particular topic.

If you want to find activities about a specific topic, check the summary chart beginning on page 48. There we indicate which topics are present in each curriculum. A computer database has a detailed listing of topics included in each curriculum. (See page 3 for instructions on how to use it.)

KEY WATER QUALITY EDUCATION TOPICS

1. The science of water
2. Water related ecosystems
3. Drinking water supply: quantity and quality
4. Water use
5. Sources of water pollution/contamination
6. Water quality: risk assessment and reduction
7. Management and protection strategies for specific uses
8. Government and citizenship issues
9. Water-related careers

Water quality education topics and major subtopics

As you select or develop activities and curriculum materials, consider these topics. This list will also help you to understand the curriculum summary chart and details provided by the electronic database, which lists subtopics.

Science of water

- ☐ Properties
- ☐ Importance to living things
- ☐ Hydrologic cycle
- ☐ Geology / hydrology dynamics
  - ☐ surface water
  - ☐ groundwater
  - ☐ regional supply

Water related ecosystems

- ☐ Types of ecosystems
  - ☐ lakes
  - ☐ wetlands
  - ☐ estuaries
  - ☐ rivers
  - ☐ watersheds
  - ☐ ephemeral systems (intermittent)
  - ☐ ponds
  - ☐ oceans
  - ☐ streams
  - ☐ riparian
- ☐ Major regional resource (insert name)

  _____
- ☐ Ecological concepts

Drinking water supply: quantity & quality

- ☐ Delivery
  - ☐ community / public
  - ☐ private
  - ☐ treatment of drinking water
    - ☐ public drinking water
    - ☐ home treatment
- ☐ Water quality control
  - ☐ well concerns
  - ☐ testing
    - ☐ public
    - ☐ private
- ☐ Lifestyle impacts / conservation

Water use

- ☐ Use of water by many groups
  - ☐ agricultural
  - ☐ commercial
  - ☐ domestic
  - ☐ industrial
  - ☐ municipal
  - ☐ power production
  - ☐ recreation
- ☐ Conservation by user groups
- ☐ Issues / conflicts between user groups

Sources of water pollution/contamination

- ☐ Point source
  - ☐ agricultural sources
  - ☐ public and / or private wastewater
  - ☐ industrial and business hazardous wastes
  - ☐ energy production wastes
- ☐ Nonpoint source
  - ☐ atmospheric deposition
  - ☐ agricultural
  - ☐ forestry
  - ☐ mining
  - ☐ urban

Water quality: risk assessment & reduction

- ☐ Curriculum addresses the concept of how risk decisions are made
- ☐ Impact of water quality on health
- ☐ Impact of water quality on human food sources
- ☐ Impact of water quality on plant and animal communities
- ☐ Understanding and reducing risks for specific contaminants
  - ☐ bacteria
  - ☐ nitrates
  - ☐ pesticides
  - ☐ sediments
  - ☐ salinity
  - ☐ other chemicals
- ☐ Water quality indicators

Management & protection strategies for specific uses

- ☐ Agricultural management practices
- ☐ Chemical spills and emergencies
- ☐ Chemical / fuel storage
- ☐ Development issues / pressures
- ☐ Natural disasters
- ☐ Recreational use
- ☐ Solid waste management decisions
- ☐ Wastewater treatment
- ☐ Wildlife habitat / land stewardship management
- ☐ Zoning strategies
  - ☐ shorelands / floodplains
  - ☐ wetlands
  - ☐ wellhead / groundwater recharge areas

Government & citizenship issues

- ☐ Policy issues
  - ☐ water quality
  - ☐ water quantity
- ☐ Role of local government in developing protection strategies
- ☐ Citizen involvement and participation
- ☐ Legislation, regulation, incentives / disincentives

Water-related careers

- ☐ Technical:_____
- ☐ Professional:_____

Water quality education topics and major subtopics was developed by Elaine Andrews and Karen Poulin, University of Wisconsin Cooperative Extension, Environmental Resources Center, 1992.

Water education goals for youth

Young people and their families have an important role in protecting and enhancing the nation's water quality. To do so, they need opportunities to develop and apply two key understandings: water is vital to natural processes and human activities; and, it is critical to the health of all living things.

The sample education goals which follow (grouped by key water education topic) are designed to help develop this understanding. They are a product of the curriculum review and deliberations by the National Review Team.

The goals are intended for nonformal education—learning that takes place outside school. In this setting the water education experience is based on the youth's personal or community life. While the formal school setting is probably a better place to teach the underlying science principles, nonformal activities offer a range of important experiences and skills:

- *Learning by doing*
- *Applying investigation skills*
- *Evaluating alternative solutions to problems*
- *Applying what is learned in real life situations*

These activities also contribute to a youth's general understanding of science, ecology, and human interaction with water systems.

Programs based on these goals can stand alone. They can also complement school programs or support a school enrichment activity. To determine how to fit goals to the age and developmental level of their youth audience, educators should refer to the chart Science / Process Content and Developmental Stages[2] which follows the goals.

1. Science of water

Youth will:

- Explore observable physical and chemical properties of water and relate how those properties work together in the hydrologic cycle.
- Identify where and in what conditions water is stored on the earth, recognize local water storage formations, explain the hydrology of any local formations, and recognize their interconnections. (For example, youth should be able to describe sources of water for a local estuary and identify characteristics that make an estuary a unique water storage area.)
- Practice using observation, measurement, data recording, prediction, and inference skills in studying the science of water. (Refer to the Science Process / Content chart for more detail on science skills.)

2. Water related ecosystems

Youth will:

- Investigate and evaluate the environmental characteristics of a given water ecosystem, describe the plants and animals that inhabit the ecosystem, and research the importance of that ecosystem to those all living things.
- Identify sites in their community where the "natural" clean water cycle, including dissipation, biodegradation and filtration, is functioning.
- Locate areas in their community where natural or human influences have changed a local water ecosystem for better or worse and document those changes. (Change can include anything from beaver dams or floods to pollution discharges or improvement from pollution prevention techniques.)
- Practice using observation, measurement, data recording, prediction, and inference skills in studying a water related ecosystem

3. Drinking water supply quantity and quality

Youth will:

- Trace the path that water travels in order to serve humans in the local community. Steps include water's origin in surface and ground sources, movement to home wells or public storage facilities, to home treatment systems or public treatment plants, to home and industry uses, and eventually to its return into the natural environment.
- Acquire and apply the skills needed to investigate the relationship between drinking water quality and human health and explain why private and public drinking water supplies must be tested for quality.
- View residential or public drinking water facilities and explain how treatment techniques help meet regulatory standards applied to water before its use.
- Demonstrate their awareness of personal water use habits and provide leadership to involve their families and community in water conservation efforts.

4. Water use

Youth will:

- Identify water related products and recreation experiences that are part of their lives.
- Experience the aesthetic impact of a water resource on their lives.
- Analyze how local water use decisions affect human lifestyles, quality of life, and standard of living.

[2] Prepared by the Science Curriculum Framework and Criteria Committee under the direction of the California State Board of Education, Curriculum Development and Supplemental Materials Commission and adopted by the California State Board of Education.

- Summarize the evolution of a local use of water, and interpret the impact of that evolution on the environment. Investigation of the local water use should identify any local doctrines of water ownership that apply to water use in their area and local use conflicts caused by changes in water demand. (Water uses which could be considered include: the historical increase in an urban population, evolution of commercial fishing or textiles industry, or use of water in food production processes over time.)

5. Sources of water pollution and contamination

Youth will:

- Identify categories and sources of information about human actions which affect water quality in their community, giving special attention to those which provide major sources of pollution.
- View residential or public wastewater treatment facilities and explain how treatment techniques help meet regulatory standards applied to water after its use.
- List local environmental factors which affect the potential of pollution sources to contaminate groundwater and predict land uses appropriate to protecting those factors. (Environmental factors might include soil types, geologic formations, proximity of water sources, height of water table, potential for flooding, climate factors, etc.)
- Demonstrate their awareness of products used in home life which can contribute to water pollution if managed inappropriately and provide leadership to involve their families and community in efforts to protect water from contamination by those products.

6. Water quality: risk assessment and reduction

Risk assessment is used here in its broadest definition, rather than as the scientific assessment process used to develop pollutant regulations.

Youth will:

- Meet with representatives of regulatory agencies to learn about likely causes and effects (on humans, fish and wildlife) of pollutants found in their community.
- Investigate how people measure water quality changes over time and summarize what those measurements have indicated about local water quality. Understanding the change should include knowing how human behavior affects degradation, as well as historical improvement of local water quality.
- Assess the relative environmental quality of a local body of water based on water quality parameters and the diversity of living organisms.

7. Management and protection strategies for specific uses

Youth will:

- Identify local and regional agencies which monitor and control pollution caused by humans and observe the strategies and equipment they use to identify water quality problems and sources in their community.
- Identify local and regional agencies which monitor and control natural disasters; interview professionals from these agencies to learn how to prepare for and prevent natural disasters related to water.
- Demonstrate their understanding of best management practices which minimize the risk of water contamination from crop protection chemicals, by making farm visits and through farm management simulations.
- Evaluate the effects of different kinds of land use on water habitats then describe and evaluate lifestyle change and community planning options that could minimize damaging effects.

8. Government and citizenship issues

Youth will:

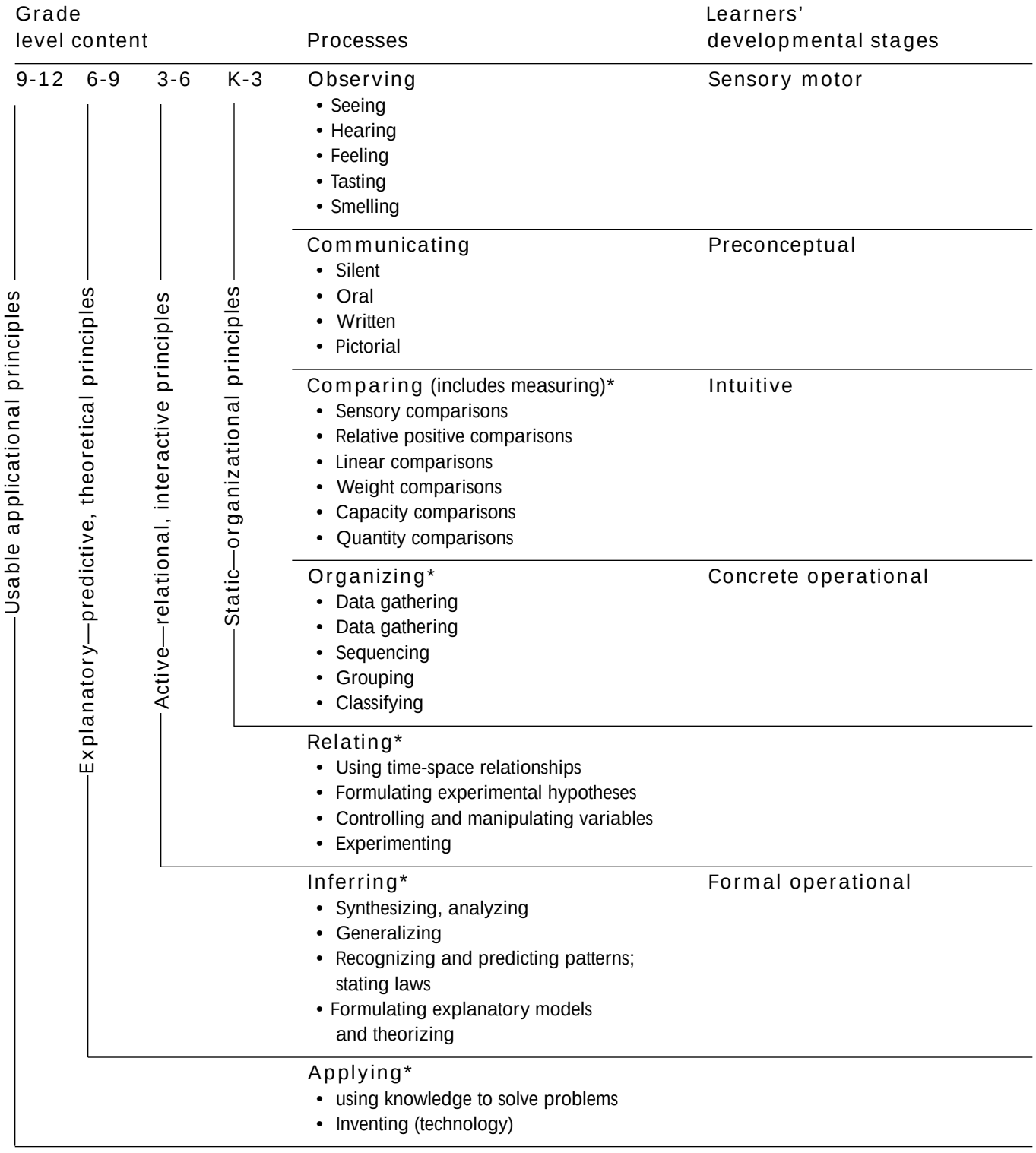
- Identify steps that they can personally take to prevent water pollution.
- Identify appropriate questions and sources of information for evaluating a local water issue.
- Practice using observation, measurement, data recording, prediction, inference, classification and problem solving skills to enhance their understanding of the science, community values, and policies of a local water issue.
- Develop their own ideas about solutions to a local water issue by studying the science, community values, and policies that relate to that issue.
- Demonstrate that they understand how, when, and where to communicate what they have learned about any positive or negative impacts of changing local conditions on the water resource.
- Practice skills that enable them to act in direct response to what they have learned about water.

9. Water-related careers

Youth will:

- Identify and describe several careers related to the water resource and explain what they would need to do to prepare themselves for at least one.
- Investigate the working conditions and salary level for two different water resource careers.

Science process/content and developmental stages



*These processes include the application of appropriate mathematical concepts and skills in interpreting data and solving problems.

Prepared by the Science Curriculum Framework and Criteria Committee under the direction of the California State Board of Education, Curriculum Development and Supplemental Materials Commission and adopted by the California State Board of Education.

Environmental thinking skills, instructional format choices and academic disciplines

Environmental education

In addition to learning about water, young people also need broader environmental problem solving skills, general science literacy, and awareness of water career options. The best way to learn these is through action and experience.

Because each person's choices and actions affect the environment, it is particularly important for young people to learn to think critically about and solve environmental problems. The Review Team based its choice of environmental education goals on the international effort to identify environmental education needs[3] and on two taxonomies of environmental education objectives.[4, 5] We also used Gardella's inventory forms to help verify the environmental education goals we selected.[6]

Environmental education goals adapted for use here include:

- *Ecological foundations*
- *Conceptual awareness of environmental issues and skills*
- *Investigation skills*
- *Evaluation skills*
- *Environmental action skills*

Many skills listed for these areas also describe science literacy skills.[7]

Instructional format choices

Learning through experience is both vital to critical environmental thinking skills and easier to achieve in nonformal education. Furthermore, nonformal educators serve a diverse audience. We reviewed curricula for their attention to these needs.

Curriculum Development for Issues Programming,[8] helped us develop a checklist for the instructional formats of curricula by offering a philosophical frame of reference. This document stresses experiential learning and is one of the few available that provides guidance on appropriate strategies for nonformal education. We also adapted ideas about practical strategies for experiential learning and environmental education from materials by the Minnesota Department of Education[9] and Cornell Cooperative Extension.[10]

The following aspects of the instructional formats are important for teaching about water:

- *Applicable to diverse audiences (including gender, socioeconomic class and ethnic group)*
- *Clear, accessible education goals and instructions*
- *Student materials are varied and available*
- *Uses indoor and outdoor / community environments*
- *Types of activities are varied*

Other disciplines

Academic disciplines other than science are relevant to understanding water's importance in our lives. For this reason, we noted whether social studies, math, language arts, and arts activities were present as we reviewed the curricula. When these disciplines are addressed, they are noted in the summary chart.

Curriculum review for these topics

We searched the reviewed materials for environmental education thinking skills. We noted them in the curriculum summary chart (on page 48) only if an environmental education topic or subtopic was present. We did not evaluate the quality of the activity or whether it was relevant to a particular audience.

Packaging styles, whether activities are designed for indoor or field use, and the disciplines addressed are also summarized in the chart. However, for a thorough assessment, we recommend you review the electronic database described on page 3 for more information.

---

[3]Tbilisi Intergovernmental Conference on Environmental Education. 1978. "Toward an Action Plan: A Report on the Tbilisi Conference on Environmental Education."A paper developed by the FICE Subcommittee on Environmental Education. Washington, D.C., U.S. Government Printing Office, Stock No. 017-080-01828-1.

[4]Hungerford, Harold, R. B. Peyton and R. J. Wilke. 1980. "Goals for Curriculum Development in Environmental Education," Journal of Environmental Education, 11(3):42-47.

[5]Roth, Charles. 1990. Definition and Clarification of Environmental Literacy, a working paper, ASTM Environmental Literacy Project, 1916 Race St., Philadelphia, PA, 19103-1187.

[6]Gardella, Ronald. 1986."Environmental Education Curriculum Inventory Forms A and B." Northern Kentucky University, Highland Heights, Kentucky, 41076.

[7]Project 2061, American Association for the Advancement of Science. 1989. "Science for All Americans, Summary."American Association for the Advancement of Science, 1333 H Street, N.W., Washington, D.C. 20005.

[8]Cantrell, Joy. 1991. Curriculum Development For Issues Programming,, U.S.DA Cooperative Extension. Draft.

[9]Minnesota Department of Education. 1991. Model Learner Outcomes for Environmental Education.

[10]Cornell Cooperative Extension Service. 1989. Water Wise.

Environmental education goals for youth water curricula

As you select or develop activities and curriculum materials for water education, consider these environmental education skills. This list will also help you better understand the curriculum summary chart and details provided by the electronic database.

Ecological foundations (materials focus on...)

- ☐ Individuals and populations
- ☐ Interactions and interdependence
- ☐ Environmental influences and limiting factors
- ☐ Biogeochemical cycling
- ☐ Community and ecosystems concepts
- ☐ Homeostasis (balance of nature)
- ☐ Succession
- ☐ Humans as ecosystem component
- ☐ Ecological implications of human activity

Conceptual awareness: issues & values (materials encourage recognizing...)

- ☐ Ecological impact of human culture on environment
- ☐ Ecological impact of individuals on environment
- ☐ Ecological and cultural implications of environmental issues
- ☐ Alternative solutions
- ☐ Cultural implications of alternative solutions
- ☐ Investigation as prerequisite to decision-making
- ☐ Role of human values and need for personal values clarification in decision making
- ☐ Need for responsible citizen action in environmental issue remediation

Investigation skills (materials provide opportunities to...)

- ☐ Shape questions
- ☐ Formulate hypotheses
- ☐ Make observations and measurements
  - ☐ natural science settings
  - ☐ social science settings
- ☐ Perform tests
- ☐ Analyze results with respect to:
  - ☐ ecological implications
  - ☐ cultural implications

Evaluation skills (materials provide opportunities to...)

- ☐ Identify alternative solutions
- ☐ Identify values associated with alternative solutions
- ☐ Evaluate alternative solutions with respect to cultural and ecological implications
- ☐ Identify and clarify personal values and positions as they relate to issues and solutions
- ☐ Change personal values and positions given new information

Environmental action skills (materials guide development of...)

- ☐ Skills to work towards ends consistent with individual values
  - ☐ community problem solving
  - ☐ consumerism
  - ☐ ecomanagement
  - ☐ education
  - ☐ legal action
  - ☐ persuasion
  - ☐ political action
- ☐ Decision-making regarding environmental action strategies
- ☐ Opportunities to apply environmental action skills
- ☐ Evaluate influence of actions taken to effect balance between quality of life and quality of environment

Environmental education goals for youth water curricula developed by Elaine Andrews and Karen Poulin, University of Wisconsin Cooperative Extension, Environmental Resources Center, 1992.

Instructional format choices for youth water curricula

The instructional format choices below will help you select curriculum materials most appropriate to your youth group.They will also help you better understand the information in the summary chart. Please note that the organization of this list does not correspond exactly with that found in the electronic database.

Grade level(s) _____

Applicability to diverse audiences (materials are relevant to diversity with respect to...)

- ☐ Gender
  - ☐ examples
  - ☐ illustrations
  - ☐ language
- ☐ Socioeconomic class
  - ☐ examples
  - ☐ illustrations
  - ☐ vocabulary
- ☐ Geographic region
  - ☐ national audience
  - ☐ regional audience:

    _____
- ☐ Ethnicity
  - ☐ examples
  - ☐ illustrations
  - ☐ language:_____
- ☐ Special learning needs:

  _____

Instructional environment

- ☐ Indoor
  - ☐ classroom
  - ☐ home
  - ☐ laboratory
- ☐ Field
  - ☐ community facility / agency
  - ☐ natural site
  - ☐ neighborhood

Instructional materials for instructors

- ☐ Content
  - ☐ answer keys
  - ☐ background information
  - ☐ further study suggestions
  - ☐ glossary
  - ☐ lesson plan / teacher script
  - ☐ resource list
  - ☐ stated goals & objectives
- ☐ Presentation style
  - ☐ booklet: # pages_____
  - ☐ computer software
  - ☐ videotape
- ☐ Quality of printed materials
  - ☐ clearly organized
  - ☐ typed

Instructional materials for students

- ☐ Content
  - ☐ activity instructions
  - ☐ worksheets
  - ☐ tests
  - ☐ text
  - ☐ game materials
- ☐ Presentation style
  - ☐ booklet: # pages___
  - ☐ comic book
  - ☐ magazine or newspaper
  - ☐ teacher-made photocopies
  - ☐ other:

    _____
- ☐ Quality of printed materials
  - ☐ age-appropriate visual layout
  - ☐ clearly organized

Lesson type(s)

- ☐ Seatwork
  - ☐ audio / visual material
  - ☐ computer software
  - ☐ demonstration / observation
  - ☐ discussion / debate
  - ☐ individual work
  - ☐ instructor / guest lecture
  - ☐ letter writing / essays
  - ☐ reading text
  - ☐ team work
  - ☐ worksheet
  - ☐ special equipment needed:

    _____(list)
- ☐ Activities
  - ☐ artwork / models
  - ☐ community project
  - ☐ drama
  - ☐ fairs and festivals
  - ☐ field observation / measures
  - ☐ games / puzzles
  - ☐ home project / observations
  - ☐ individual work
  - ☐ laboratory experiment
  - ☐ student presentations
  - ☐ team work
  - ☐ special equipment needed:

    _____(list)

Subject area(s)

- ☐ Art
- ☐ Language arts
- ☐ Math
- ☐ Science
- ☐ Social studies

Instructional format choices for youth water curricula developed by Elaine Andrews and Karen Poulin, University of Wisconsin Cooperative Extension, Environmental Resources Center, 1992.

Curriculum review: choice and process

There is a tremendous volume of material supporting youth water education. The first step was to develop a process for choosing those we would review.[11]

A curriculum was included if it:

- *Addressed one or more of our general or specific goals*
- *Presented a planned education experience*
- *Improved representation of: regional water concerns, varied water topics or environmental education goals.*

There were some materials which repeated much of another curriculum. We did not review these, but they are listed among supporting materials.

In reviewing materials, we looked for whether the water topics, environmental education goals, and preferred formats were present. We did not review particular activities for their quality. The Youth Water Curriculum Summary is intended to show overall strengths and gaps in the body of available curricula.

The summary will also help instructors find curricula to meet their particular needs. One curriculum may have an outstanding selection of water science activities, for example, but little relating to water careers. A leader or instructor searching for water career activities would need to search further.

Another curriculum's activities may cover a broad overview of water topics but involve few environmental education skills. That curriculum may be fine for a science classroom, but may not be suitable for a school enrichment program.

Sources of curricula chosen for review

The curricula we selected to review are listed alphabetically by title in the curriculum summary chart. They are also listed separately in two categories: state / regional materials (including state Cooperative Extension materials), and national materials. Unique materials which were not reviewed are listed separately.

State and regional curricula come from 33 states and Canada. They include materials developed by Cooperative Extension 4-H programs, state agencies, and regional agencies or groups. All regions are represented by at least one state. Many state-based curricula have a regional scope. They may adequately serve a nearby state which is not represented here or does not have its own materials.

National materials were prepared by national organizations or businesses or were designed to be used anywhere in the country. Such groups as American Water Works Association, Water Environment Federation, National Wildlife Federation, Project Wild, and the LaMotte Company, were among those producing these materials.

Unique programs, or program support materials which did not meet curriculum review criteria, were not reviewed in detail. Promising materials are listed as an additional reference. They may help provide a needed support piece, or form the basis for an innovative water education program.

[11]For details on the selection process and inclusion criteria see: Andrews, E. 1992. *Assessing National Water QUality Education for the Nonformal Youth Audience,* USDA, Cooperative Extension.

How to use curricula to create a youth water education program

Members of the National Review Team have a number of suggestions for professionals who create youth water education programs or experiences. The suggestions are based on the members' considerable experience in the area and not on a separate study of what makes nonformal water education effective.

A successful water education program should:

- *Publicize available materials to appropriate educators*
- *Train the educators*
- *Package a selection of materials to meet local needs*
- *Meet environmental education goals with creative programming strategies*
- *Empower youth through communicating that improvement is possible*
- *Create opportunities to learn environmental stewardship, not just human stewardship*

Publicity and training

In general, water curricula are available but not well known. Most water topics are addressed in at least one curriculum, but you might have to spend considerable time searching for activities on each particular topic or skill. Instructors need help in identifying which water topics to emphasize and how to find suitable materials.

Instructors, be they volunteer leaders, 4-H agents or teachers, need time to learn about the materials. Most materials require some understanding of water science. Instructors also must be willing to read a lot of material before they choose a specific activity.

Home and community settings are excellent sites for studying water and many activities can be carried out there. Unfortunately, it is not easy for a home or community leader to adapt curricula for this use.

You will get the best results if leaders have training. It should focus not only on content, but also on the process of leadership and instruction.

Packaging materials

An ideal water education package might be based on one well-rounded curriculum, but complemented by several support pieces. The basic curriculum should offer a variety of activities, topics and levels.

Complementary pieces could include two types of resources:

1) materials specific to a regional water resource; and
2) drinking water quality materials (which are generally missing from most water education packages).

To introduce water-related careers, risk assessment or other concerns, you may have to develop supplementary materials locally.

As you choose materials, be sensitive to gender equity. Keep the socioeconomic and ethnic characteristics of your audience in mind. And consider any special learning needs.

Meeting environmental education goals

While school materials provide opportunities to learn ecological principles and practice investigation skills, the available curricula do not show young people how to apply what they have learned to their personal life decisions. You will need to find ways to bridge this gap.

Many curricula suggest home or school environmental actions, but few help young people take those actions.

Most curricula do not help young people ask their own questions about the impact on the environment of what they do at home or in the community. For example, youth should be encouraged to ask and investigate questions about their own lives such as: "Does being on a soccer team have anything to do with water quantity or quality?" or "Does playing with squirt guns have anything to do with water quantity or quality?"

It will take creative programming to address these and other needs for experiential education.

Empowerment and stewardship

As you design your water education experience, the National Review Team recommends that you think about two philosophical perspectives. First, the experience should encourage a sense of hope and empowerment to affect the future of our water quality. Second, it should encourage youth to understand that water is fundamental to the total living community, not just the human community.

One way to develop a sense of empowerment is to help young people appreciate their place in the historical context. They can visualize how their community has managed water quality in the past, what changes have already been made to improve future management, and what other changes may still be necessary to protect water quality. This should help them understand how human actions can improve environmental quality, not just cause damage.

The holistic perspective, which includes questions about implications for plants, animals and their ecosystems, can be enhanced by ensuring that youth go beyond the question of "What does this mean to me?" When they are done, they should be curious enough to ask "What does this mean to the future of our society and the earth?"

Choosing curricula for the nonformal setting

The nonformal or out-of-school setting offers excellent opportunities for young people to learn about water through real experience and action projects. There are many such nonformal settings: after school clubs, summer camp, nature center visits, church youth groups, and organized youth programs like Boy and Girl Scouts and 4-H.

Unfortunately, with few exceptions, most water curricula and support materials are not designed for nonformal settings. Some can be used with minimal preparation and modification. A few may be good models: they take the youth group through most of the nine water topics listed in this guide in a way that is appropriate to the nonformal setting.

To help you decide whether a particular curriculum can be used in the nonformal setting, refer to the questions listed here. These questions were suggested by practitioners of nonformal education who reviewed and discussed the curricula we selected. They have not been formally evaluated.

QUESTIONS TO ASK ABOUT CURRICULA FOR THE NONFORMAL SETTING

Does the format:

- *Provide instructions in a brief form?*
- *Allow easy separation of instructions from the activity?*
- *Provide appropriate packaging to ensure that instruction materials are portable and long wearing?*

Are concepts taught through a hands-on activity?

Does the activity provide a "hook" or appeal to a "teachable moment"?

Does the activity relate to the "world" of the youth who will do the activity?

- *Is it appropriate to the interests, age, sophistication, gender, culture, socioeconomic status, and learning needs of the youth?*

Can activities be provided independent of each other—can they stand alone?

Is the time required for the activity appropriate to the attention span of the age group and the time available in the nonformal setting?

Does the activity produce a product or result that enables the youth to communicate the concept that is learned?

Is the activity fun? Is there a reward, tangible or intangible, for the learner?

Does the activity have a good probability of changing or influencing behavior?

Are materials easily available to most people?

- *Are special required resources packaged with the materials?*
- *Do the materials assume ownership of special equipment such as a video cassette recorder, tape recorder, or computer?*

Are the instructional methods easy to understand, organize and carry out?

Can they be conducted without any special training or knowledge on the part of the leader?

Is the language used to describe the activity "user friendly," without educational jargon?

Does the activity actually work?

Is the purpose for any support items, such as charts, graphs, or illustrations, self explanatory and clearly related to the activity?

Is the activity appropriate to the setting where the activity will be used? The best use of a computer-based learning program would be in a setting with few distractions and the opportunity to spend time with the materials.

Suggested curricula for nonformal education

To help you narrow your search for curriculum materials to adapt to the nonformal setting, we offer a few examples. The list is not exclusive and we have not tested the materials. See the curriculum summary chart for details about what topics each curriculum includes.

Easily adapted

Aquatic Wild

Be Water Wise

Connections to the Sea

From Ridges to Rivers

Hands-On Save Our Streams

Local Watershed Problem Studies

Our Great Lakes Connection

Pond and Stream Safari

The Story of Drinking Water

Water Resources Education. Critical Issue: Water. You Can Make a Difference!

Water Riches, Indiana version

Water Magic

Water Wizards

Adaptable with some effort

4-H Sportfishing Aquatic Resources Education Program

Groundwater: A Vital Resource

The Groundwater Adventure

Instructor's Guide to Water Education Activities

Stop, Look, and Learn

Surface Water

Teaching Aquifer Protection

Water Wise

Water Worlds

Unique resources

The following provide an easily transferred model of a regional or statewide nonformal education program:

Nebraska Groundwater Foundation: Groundwater Festival and Children's Groundwater Festival Outreach packet

Some NatureScope activities are ideal for self-learning. Others provide an excellent basis for designing a nature center or summer camp experience.

Ranger Rick's NatureScope, "Wading Into Wetlands" and "Diving Into Oceans"

Unique resources or program support materials—not reviewed

These materials were either designed for the nonformal setting or could be adapted with minimal effort. We provide information on how to get these materials starting on page 36.

The Changing Chesapeake

Fishing for Fun and Learning

Fishing…Get in the Habitat

Friends—Special Water Edition, A Magazine for Young Readers From Georgia 4-H Clubs

My Wetland Coloring Book

Project Earthcare

Responsible Angling. The Oregon Angler Education Manual

Ranger Rick's NatureScope. Pollution: Problems and Solutions

Water Can Be Fun! How to Create a Successful Science Fair

Water Fun for You

Designing your water education experience

To assist youth leaders with program design and project ideas, see two other publications in this series, *Educating Young People About Water: A Guide to Program Planning and Evaluation, and Educating Young People About Water: A Guide to Unique Program Strategies.* Both guides, along with this document, will be available in fall 1995 at the ERIC Clearinghouse for Science, Mathematics and Environmental Education, 1729 Kenny Rd., Columbus, OH 43210. For ordering information, call 614/292-6717.

A guide to reviewed curricula

This section is a brief annotated bibliography of each curriculum reviewed for the project. In addition to finding quality curricula, we tried to represent current water education themes such as watersheds, wetlands, groundwater and oceans. We attempted to provide a geographical representation of states' water issues and their efforts to educate youth. In reviewing these curricula, we looked only for the presence or absence of specific water topics, environmental goals, or instructional format options. However, the process gave us an overview of each set of materials.

To find a curriculum about any particular topic or skill:

1. Scan the Water Curriculum Summary Chart starting on page 48 under the appropriate subject category.
2. Check related information such as age range or regional ecosystem addressed to eliminate inappropriate ones.
3. Review the annotated entry listed in this guide starting on page 17. Curricula are listed alphabetically.

For further details about subtopics, environmental goals, etc., access the computer database for the individual checksheets as explained on page 3. Use the curriculum's identification number (001, for example).

Curricula summaries

Some of these materials are no longer available to order, but are listed here because of their quality. These resources may be available in local libraries. The number above each title refers to the curriculum identification number in the electronic database described on page 3.

081

Active Watershed Education Curriculum Guide, It's AWEsome! (formerly, The Pawcatuck Watershed Curriculum) 1993

Cost: $40 plus $5 shipping / handling

Southern Rhode Island Conservation District
Depot Bldg., 5 Mechanic Street
Hope Valley, RI 02832
401 / 539-7767

This guide takes a thematic approach to teaching about watersheds. Authors address several components of watersheds, including wetland ecology, soils, point and non-point source pollution, and cultural and historical land uses. Text includes pre- and post-tests for students. Curriculum is well-organized and provides thorough background information for educators. Also includes an appendix that provides suggestions on how to adapt the program activities to other watersheds.

068

An Activity Guide for Teachers: Everglades National Park 1991

Cost: $14.95 plus shipping and handling

Everglades National Park
4001 State Road 9336
Homestead, FL 33034
305 / 242-7700

This unit-based, multi-resource guide provides 4th to 6th grade teachers with the tools to teach about the varied Everglades ecosystem. The curriculum addresses many of South Florida's water issues—human population growth, water diversion from the Everglades, water quantity regulated to the Everglades, overharvesting of fish and shrimp, and disruption of the estuarian food chain. The five appendices include background information, supplemental classroom materials, songs, vocabulary, bibliography, and resource lists.

069

Adopt-A-Stream 1993

Cost: $15 plus shipping

Friends of Environmental Education Society of Alberta (FEESA)
10150 100th Street, 9th floor
Edmonton, Alberta T5J 0P6
403 / 421-1497

Written for grades 7–10, this curriculum emphasizes land use within a watershed. Activities encourage youth to apply observational skills when monitoring a stream and rely less on quantitative results from test equipment. Includes a detailed section on how to manage and promote a stream project. Provides thorough background information for teachers and students. Packet includes the curriculum notebook plus an angler education program guide, aquatic plant guide, and macroinvertebrate guide and poster.

001

The Adventures of Wally, the Water Molecule 1991

Cost: not available

Chem Kids
25658 Ericson Dr.
Moreno Valley, CA 92553

A resource to aid in teaching about water chemistry. Materials are designed to provide active learning opportunities for grades K–3. An accompanying video assists instructors in learning to use active learning strategies. Some concepts and vocabulary contained in the learning activities may be too abstract for young children; e.g, volume, mass and density.

002
Always a River: Supplemental Environmental Education Curriculum on the Ohio River & Water

Cost: free

EPA Office of Research and Development
26 West Martin Luther King Drive
Cincinnati, OH 45268
513 / 569-7562

This curriculum includes four primary objectives: 1) to demonstrate that the Ohio River is part of a total ecosystem; 2) to introduce the science of water and its importance to living things; 3) to explore human use and environmental impacts of human activity; and 4) to examine the influence of the river on historical and modern culture. The "Careers on the River" activity is unique—authors suggest holding a "career day." Includes appendices on making aquaria, guidelines for interviewing people, and field ethics.

097
Aquatic Environmental Education: School Enrichment 1992

Cost: cost of printing

Langston University, Cooperative Extension Program
P.O. Box 730
Langston, Oklahoma 73050
405 / 466-3836

Primarily a guide rather than a curriculum. These materials support a university Extension program. In addition to the curriculum guide, the program includes videos, an aquarium stocked with fish, and 12 facts sheets to support a fish culture project. The program strategy offers a unique opportunity to connect youth with actual experience with a natural resource professional. Video content was not reviewed. Materials can be used independent of videos, but will require teachers to develop their own activities.

003
Aquatic Wild 1992 (updated yearly)

Cost: free; available only to those attending a workshop

Project Wild
P.O. Box 18060
Boulder, CO 80308-2390
303 / 444-2390

Activities in this guide emphasize water habitats that support wildlife. Authors summarize each activity with student age, subjects, skills, duration, group size, setting, conceptual framework reference, and key vocabulary. The background section addresses the main concepts. Materials include suggestions for aquatic extensions of existing Project Wild instructional activities. Exceptional appendix materials including:

- *Extensions to existing Project WILD activities*
- *Use of outdoors as a classroom*
- *Maximizing use of local resources*

004
Be Water Wise 1988

Cost: Instructor's Guide, $3; Activity Guide, $1.25 (includes shipping). Make checks payable to Virginia Tech.

Virginia Water Resources Research Center
617 N. Main St., VA Tech
Blacksburg, VA 24060-0444
703 / 231-8036

Written for grades 7-8, this curriculum helps users understand that water plays a critical role in our daily lives; why water should be used wisely; and the importance of conserving water. Designed for flexibility either as a school supplement or as a resource for other groups interested in water conservation.

005
Caring for Our Lakes: A Curriculum on the Yahara Watershed 1990

Cost: free (one copy only)

University of Wisconsin–Madison
Water Resources Management
Institute for Environmental Studies
550 N. Park Street, 15 Science Hall
Madison, WI 53706
608 / 263-3064

A local resource that demonstrates how a curriculum can be designed to further educational goals about a local water resource—lakes. Includes aspects that are applicable to any community with small lakes in its watershed. Goals for students to achieve include: understanding lakes as part of a larger ecosystem; ability to identify problems and issues concerning the Yahara lakes; familiarity with geography of the watershed; and recognition of human activities related to lake problems.

053
Captain Hydro 1992

Cost: Student Handbook
50¢, 1-150 copies
43¢, 151-1500 copies
(plus shipping)

Cost: Teacher's Guide
$2, 1-150 copies
$1.75, 151-1500 copies
(plus shipping)

Innovative Communications
Publications Information
PO Box 24055
Oakland, CA 94623
510 / 944-0923

Designed as a comic book for middle school students, Captain Hydro covers the water cycle—natural and built, water use, and water conservation and management. *The Further Adventures of Captain Hydro,* for grades 8–10, concentrates on world history and geography. Field experiences are provided as "homework." Two simulation exercises in Captain Hydro help develop community problem solving skills.

006
Children's Festival Outreach Packet 1992

Cost: $12 (includes shipping except for Nebraska residents)

Nebraska Groundwater Foundation
P.O. Box 22558
Lincoln, NE 68542-2558
402 / 434-2740

These materials help prepare 4th–6th graders for the annual Nebraska Children's Groundwater Festival. Activities were adapted from other curricula and put into a framework suitable for Nebraska water education needs. Includes activities which emphasize the effects of human activity on water resources, both above and below ground. Packet includes: "groundwater basics," an instructional packet and 2 video supplements which provide additional activities. Viewing video tapes is not an essential precursor to the supplemental activities.

072
Clean Water, Streams and Fish: A Holistic View of Watersheds Elementary and Secondary Editions

Publication date not provided

Cost: $15 each (includes shipping)

Washington State Office of Environmental Education
17011 Meridian Avenue, North, Room 16
Seattle, WA 98133
206 / 542-7671

Both curricula are written to help elementary (grades 6–9) and secondary (grades 9–12) youth understand watersheds, the effects of human activities within watersheds, and how to minimize those effects. Week-long, interdisciplinary lesson plans focus on fish life cycles and habitat, stream dynamics, natural and human activities. Youth are then exposed to various controversies and issues that occur in the Pacific Northwest such as private and commercial fishing, Indian Treaty Rights, development and logging. The "Solutions" unit suggests ways to address problems within the watershed.

067
Coastal Issues: A Wave of Concern 1991

Cost: $15

Sea Grant Extension Program
University of New Hampshire
Kingman Farm
Durham, New Hampshire 03824
603 / 749-1565

Activities written for high school students focus on decision-making skills as they relate to coastal development, recreation, tourism, and aesthetic concerns. Case studies represent real coastal community issues.

044
The Comprehensive Water Education Book, Grades K–6 (formerly Water Education)

1985 reviewed, revised in 1994

Cost: $8.75 includes shipping

International Office for Water Education
UMC 82
Utah Water Research Laboratory
Logan, UT 84322
1-800 / 922-4693

Activities for school setting seek to develop water literacy through active learning. Activities stress comprehension of water concepts, attitudes about water issues, and skills to solve water issue problems. Concepts / vocabulary may be difficult for some K–6 graders (e.g., porosity, saturation, volume, density).

064
Connections to the Sea, a 4-H Guide to Marine Education 1990

Cost: $2 plus shipping

University of Maine Cooperative Extension
Room 105
5741 Libby Hall
Orono, ME 04469-5741
207 / 581-3185
1 / 800 / 287-0274

Materials focus on ocean ecology, hydrology, and pollution sources through student field investigations. Unique activities cover mapping and map reading, and sensory awareness in the ocean environment. An extensive "related activities" section includes activities for the visual arts, sea food, impact of the ocean on people's lives, environmental issues, and plant collections. Also includes a small field guide to Maine Atlantic organisms. Materials do not specify an age, but appear to be designed for middle school through high school youth.

068
Creek Watchers: Exploring the Worlds of Creeks and Streams 1993

Cost: $5 plus shipping

CASEC California Aquatic Science Education Consortium
Graduate School of Education
University of California
Santa Barbara, CA 93106
805 / 893-2739

Creek Watchers aims to encourage youth groups and leaders to explore creek and stream ecosystems. Youth get hands-on experience with activities in stream habitat, inhabitants, and the effects of surrounding land use. Activities are designed to help youth apply basic science concepts such as observing, comparing, inferring, and analyzing. Students receive "Task Cards" and "Lab Notebook" sheets to record their findings. Authors provide ideas for stream action projects and list local California resources to contact for those projects. This curriculum is one in a series of five by the California Aquatic Science Education Consortium (CASEC).

007
Decision-Making: The Chesapeake Bay 1985

Cost: $14.95 (includes shipping)

Maryland Sea Grant
Univ. of Maryland
0112 Skinner Hall
College Park, MD 20742
301 / 405-6376

This curriculum centers on students' ability to identify and analyze conflicting interests and public policies concerning the Chesapeake Bay. Youth determine their resulting decisions based on people and their environment. Instructional time can range from 15 class sessions to an entire semester. Through the 5 educational components (introduction, videotape, simulation, reference source and application), educators may choose to use the materials independently or incorporate into existing instructional units. Instructor training is required.

008
Discover Wetlands 1988

Cost: $11.50 (includes shipping)

Washington State Dept. of Ecology
Wetlands Section
Mail Stop PV-11
Olympia, WA 98504
206 / 438-7538

These materials were developed to enhance the ability of the Washington State Department of Ecology in preserving and managing wetlands in Washington. Activities cover typical wetland topics such as definition and functions, field studies, and human effects. The materials were designed as a unit or integrated into existing curricula. Materials are activity-based and applicable to other regions of the country. Authors prompt the idea that both action and inaction affect the outcome of environmental issues.

073
EARTH: The Water Planet 1992

Cost: $16.50.

National Science Teachers Association
1742 Connecticut Ave. NW
Washington, DC 20009
202 / 328-5800

A collection of water activities to encourage problem-solving and critical thinking skills for middle elementary students. Activities focus on the earth science aspect of water, but highlights water issues throughout. Primarily indoors science activities. A "Guide to Activity" and detailed background "Readings" sections provided for each module. The overall curriculum theme is equity and scientific literacy for everyone.

065
Florida 4-H Marine Science Program 1990

Cost: Copies no longer available; duplication permitted.

University of Florida
Rolfs Hall
Gainesville, FL 32611
904 / 392-3261

Curriculum objectives center on how to teach youth to use simple field gear to understand the relationships between ecosystem components. Materials include a leader's guide, member's guide, project guide and project record book. Leader and member guides provide instructions for conducting and evaluating field guides to 6 marine ecosystems. The member's guide provides background material on organisms found in ocean ecosystems. The project guide and record book complement the curriculum and are meant to be used while visiting an oceanarium. Authors do not specify a target audience, but seem designed for 6th grade and older. Activities are dependent on leader direction.

074
Freshwater Guardians: Defending Our Precious Supply 1991

Cost: $5 plus shipping

California Aquatic Science Education Consortium (CASEC)
Graduate School of Education
University of California
Santa Barbara, CA 93106
805 / 893-2739

Developed for 10–15 year olds, this CASEC guide is one of five in a series. Activities help youth understand the sources and effects of freshwater pollution. "Task Cards" and "Lab Notebook" sheets are provided for students to record their results. The overall activity objective is that students learn science by doing. Students are encouraged to make predictions and explore alternative perpectives to problems, issues and questions.

075
From Ridges to Rivers: Watershed Explorations. 1993

Curriculum available to workshop participants only

4-H Watershed Project
San Luis Obispo County
4-H Youth Development Program
2156 Sierra Way, Suite C
San Luis Obispo, CA 93401
805 / 781-5944

Written for youth, ages 9–12, this curriculum begins with the watershed concept by helping students develop a "sense of place" within their watershed. The activities then quickly move to a close-up view of soils. Activities provide the opportunity for youth to discover the role that soils play in capturing and storing water within a watershed. The curriculum is designed around the learning cycle. The activities are sequential and primarily written for indoors with some adaptability to the outdoors. Activities are often taught by 4-H teen leaders.

009
Gee-Wow! Adventures in Water Education 1991

Cost: booklet, $12 (includes shipping); videotape, $39.95 plus $3.99 shipping

Ecology Center
417 Detroit St.
Ann Arbor, MI 48104
313/761-3186

Developed as part of the Groundwater Education in Michigan (GEM) Program, this curriculum assists in teaching to groundwater, pollution prevention, and general water concepts. Lessons may be taught as a unit or used separately to supplement other classroom activities. Includes 28 activities and a video, *It's Found Underground: Groundwater Our Buried Treasure*; also an index cross-referenced by title, grade, subject area and activity type.

010
The Great Lakes in My World Publication date not listed

Cost: $5 plus $2 shipping

Lake Michigan Federation
59 E. Van Buren, Suite 2215
Chicago, IL 60605
312/939-0838

Activities are designed to increase awareness and appreciation for the Great Lakes using an interdiscplinary approach. Activities cover cultural issues, current management concerns, and natural processes. Manual includes a listing that indexes Great Lakes material to the appropriate grade and subject area.

011
The Groundwater Adventure 1989

Cost: student workbook, $1.25; teacher's guide, $9; shipping for set $3.65

Water Environment Federation
Public Education Dept.
601 Wythe St.
Alexandria, VA 22314-1994
703/684-2400

This curriculum is part of the Water Environment Federation's package designed to educate the public about important water quality issues. Topic materials are provided in a "building block" approach to allow flexibility in fitting the materials into an existing school curriculum. Each set includes a video and student activity guide. Activities in this set address ways to clean up groundwater contamination in more detail than other curricula.

012
Groundwater: A Vital Resource 1986

Cost: free (one copy only)

Tennessee Valley Authority
Office of Natural Resources and Economic Development
Environmental/Energy Education Program
Knoxville, TN 37902
Chattanooga Publications, Carol Davis 615/751-7338

A series of 23 activities on four topics: the water cycle, water distribution in soils, water quality, and community impacts on groundwater. Each topic includes activities for a range of ages. Strong technical/science orientation. Limited integration with daily life of the youth.

013
Groundwater Education Program, Parts 1,2 & 3 1984

Cost: free

East Michigan Environmental Action Council
21220 W. Fourteen Mile Rd.
Birmingham, MI 48010
615/632-2101

These materials are designed to enhance groundwater quality through action-oriented groundwater programs at the local level. Developed as an in-school science unit, with the help of a 4-H extension specialist. Contents of this kit are comprehensive, including for each of the 3 parts: a teacher's guide; booklet with information and suggested activities; an Arlegan County 4-H Resources catalog; equipment needed for classroom activities; additional resources including other curricula; fact sheets; and informational tests. Materials need to be adapted for younger end of suggested grade range.

014
Groundwater Protection Curriculum Guide (and "Groundwater—the Hidden Resource" videotape) 1989

Cost: video on a loan basis; allowed to copy

Missouri Dept. of Natural Resources
Technical Assistance Program
P.O. Box 176
Jefferson City, MO 65102
314/751-3131

Information, video, and activity ideas designed to familiarize students with the source of their drinking water, the management of waste water, how groundwater becomes polluted, and how groundwater pollution can be prevented. Information materials provide in-depth background about Missouri hydrogeology.

015
Groundwater Resources and Educational Activities for Teaching (GREAT) 1989

Cost: groundwater models, 1 box / $15, or 1 model free with inservice. PUBLICATION NO LONGER AVAILABLE.

Conservation Education Center
R.R. 1, Box 53
Guthrie Center, IA 50115
515 / 747-8383

Material is arranged in six units with the first one covering the basics of groundwater and hydrogeology in Iowa. The other five units cover Iowa's groundwater issues in priority as agreed upon by Iowa groundwater interest groups. These include fertilizers and pesticides, abandoned waste sites and landfills, leaking underground storage tanks and hazardous materials management, point source groundwater pollution, and land-applied wastes and sewage treatment. Curriculum should be accompanied by a set of six groundwater posters and a one-foot plexiglass groundwater model.

016
Groundwater Study Guide—Department of Natural Resources 1991

Cost: $10 plus tax

Wisconsin Agency Document Sales
Box 7840
202 S Thornton Ave
Madison, WI 53707
608 / 266-3358

Resource packet and activity ideas. Activities focus on the water cycle and hydrogeology, groundwater contamination, water and waste water treatment, water conservation and groundwater use rights. Written materials may be challenging for 6th graders, the younger end of suggested grade range.

083
Hands-On Save Our Streams. The Save Our Streams Teachers' Manual for Grades 1–12. 1994

Izaak Walton League of America
Save Our Streams Program
707 Conservation Lane
Gaithersburg, MD 20878
1 / 800 / BUG-IWLA

Written for grades 1–12, the manual uses a watershed concept to teach about land use effects on stream quality. Highlights include human activities such as agriculture, mining, commerical / industrial, forestry, and construction. Activities are written for the entire 1st–12th grade audience and left to the educator to adapt to the appropriate age. Combines the SOS monitoring program techniques into field activities. Appendices include SOS Stream Survey forms, sampling instructions and a useful Volunteer Water Monitoring Bibliography.

092
Healthy Environment—Healthy Me: Exploring Water Pollution Issues, 4th Grade 1991

Cost: $29 includes shipping

Resource Center of Environmental and Occupational Health Sciences Institute
Public Education and Risk Communcation Division
681 Frelinghuysen Rd.,
P.O. Box 1179
Piscataway, New Jersey 08855-1179
908 / 932-0110

Part of a series of environmental and occupational health curricula designed to supplement school curricula in grades K-6. The series provides a different topic for each grade. This topic is presented in 15, 45-to 60- minute units. Many units focus on wastewater treatment. Describes how water becomes polluted and how to prevent pollution, but does not emphasize how drinking water is treated before use.

017
A Hidden Treasure. Instructional Materials for Groundwater Resource Protection 1992

Cost: $7 includes shipping and handling

National FFA Organization
District Services
5632 Mt. Vernon Memorial Hwy
Alexandria, VA 22309
703 / 360-3600

Designed as a supplement for the school curriculum, these materials focus on the relationship between agriculture and groundwater. Includes unique sections on "Best Management Practices," groundwater protection in urban settings, managing underground storage tanks and water testing. Students design management plan for proper lawn care. Covers both rural and urban issues.

018
Instructor's Guide to Water Education Activities 1986

Cost: 1 free copy

Commonwealth of Pennsylvania
Dept. of Environmental Resources
Water Conservation / Technical Assistance Program
P.O.Box 8761
Harrisburg, PA 19105-8761
717 / 541-7800

Intended as a general water curriculum. Materials and activities integrate water science concepts with water use applications and impacts.

076
Investigating Groundwater: The Fruitvale Story 1991

Cost: $19.95 for curriculum only; $150 (includes shipping) for complete chemistry test kit and curriculum

Chemical Education for Public Understanding
Lawrence Hall of Science
University of California
Berkeley, CA 94720
510/642-8718 for list of distributors

Designed for middle to high school youth, this module closely resembles steps taken in a real water contamination situation, e.g., identify the problem, research, community involvement, decision-making and action. Requires the use of a chemistry kit. Activities build on each other; this curriculum represents one module.

019
Investigating Streams and Rivers 1992

Cost: $7.50 plus $3 shipping

Global Rivers Education Network
721 E. Huron Street
Ann Arbor, MI 48104
313/761-8142

Unique in that activities provide a mechanism for learning some fundamentals of political action; e.g., making contacts, group concerns about problem/issue of process, interview and phone skills, developing action plans. Excellent guidance in developing, implementing and evaluating action plan. Activities can be complemented by participation in the Global Rivers Environmental Education Network (GREEN)-sponsored computer conferences. Materials contain suggestions for using computer network to enhance student understanding. Manual includes user evaluation/feedback form. Recommended for use with Field Manual for Water Quality Monitoring by Mark K. Mitchell and Wm. B. Stapp. However, only activities 4 and 5 require use of manual.

077
Kids In Creeks: A Creek Exploration and Restoration Program 1993

Cost: Curriculum and videos available to workshop participants

San Francisco Estuary Institute
180 Richmond Field Station
1301 South 46th Street, #180
Richmond, CA 94804
510/231-9539

This program guide, created for grades 3–12 in the San Francisco Bay area, provides teachers with the relevant information to conduct a creek study program. Many options and details have already been explored by authors; e.g., a pre-arranged list of organizations willing to participate in the program, materials in the lending library, and list of creeks in the region that may be easily accessed by classes. There are "Action Projects" at the end of each activity for students to further get involved in their community.

066
Kids Network—What's in Our Water? 1992

Cost: kit for 30 students, $375; tuition and telecommunications, $115.

National Geographic Society
Educational Services
PO Box 98018
Washington, D.C. 20090-8018
202/857-7759 for information
800/368-2728 for ordering

Recommended for grades 4–6, this curriculum represents a telecommunications-based science education, with an emphasis on watershed studies. A unique section highlights how geographical and cultural qualities can influence water use. Unit support materials include access to Hot Line staff and a "unit scientist," a professional who communicates to the class via electronic mail. Provides background for students understanding risk decisions using an activity which evaluates the context and concentration of pollutants. Planned sessions require a minimum 15 hours of class time during a six-week scheduled communications calendar. Curriculum package includes Teacher's Guide, Kid's Handbook, Software Manual, and software for Apple IIGS. Computer and modem are required.

020
Living in Water: An Aquatic Science Curriculum 1987

Cost: $10 (includes shipping)

National Aquarium in Baltimore
Dept. of Education and Interpretation
Pier 3, 501 E. Pratt St.
Baltimore, MD 21202
410/576-3870

Activities focus on a scientific study of water, aquatic environments and the plants and animals that live in water. The curriculum covers both marine and freshwater habitats. The emphasis of the materials is on process rather than content. Unique aspects include answer keys that are provided in language students would likely use, and activities which teach students about describing something they can't see by measuring it and correlating their data. Many appendix materials are provided to facilitate ease of teacher preparation/presentation (over 100 pages).

021
Local Watershed Problem Studies—Elementary School Curriculum 1982

Cost: $7.75 (includes shipping)

University of Wisconsin
Water Resources Center
1975 Willow Dr.
Madison, WI 53706
608/262-3577

A collection of lessons written by teachers with a variety of backgrounds. Lessons vary in degree of detail. Focus is on interface between land use and water pollution. Includes instructions on how to build water testing equipment. Provides many stories and folklore examples to enhance student enjoyment of a particular topic and to support language arts education goals. The appendix includes suggestions for citizen and government action in controlling non-point source pollution in urban areas and rural areas, and a discussion on role of values in environmental education.

022
Local Watershed Problem Studies—Middle and High School 1982

Cost: $16.65 (includes shipping)

University of Wisconsin–Madison
Water Resources Center
1975 Willow Dr.
Madison, WI 53706
608 / 262-3577

Similar to the elementary level program, but contains unique attitude survey form. Though developed for Wisconsin, simulation activities could be adapted for other locales. Lessons typically take from several days to several weeks of class meetings. Some units are not directly related to water issues.

023
Los Marineros 1994

(English and Spanish version available)

Cost: $30 (includes shipping) for English edition; $50 for English and Spanish edition (includes shipping)

National Oceanic and Atmospheric Administration
Under Secretary for Oceans and Atmosphere, Rm. 5128
14th & Constitution
Washington, D.C. 20230
202 / 482-3436
Publication information
805 / 682-4711

While providing basic education about marine science, activities focus on the local resource, the Santa Barbara Channel. Units include physical characteristics of the channel, flora and fauna, human history, and marine policy. Materials were developed for a program predominantly reaching low-income minority students who have limited access to special programs. Activities are designed to increase self-esteem and career awareness. Materials include an interesting "invitation" activity that encourages development of group identity and arouses student excitement. Activities provide a good interface between school and nonformal settings. Appendices include suggestions for marine careers, marine educational resources, teaching sheltered English, and starting a marine education program. Provides extensive material on marine flora and fauna.

078
Mapping Fish Habitats. Teacher's Guide. Grades 6–10 1992

Cost: $10 (plus shipping)

Great Explorations in Math and Science (GEMS)
Lawrence Hall of Science
University of California
Berkley, CA 94720
510 / 642-7771

Written for grades 6–10, students design an aquarium to draw conclusions using basic scientific concepts: predicting, observing, recording, experimenting, analyzing and interpreting. Students also learn fundamental ecological concepts such as ecosystem, habitat, home range, and territory. Through daily observations and experiments, students draw conclusions about fish in their natural environment. Experiments include changing one component of fish habitat and mapping the fish's behavior based on the change.

067
My World, My Water and Me! A Teachers Guide to Water Pollution Control

Publication date not available

Cost: free

Association of Environmental Authority
2333 Whitehorse-Mercerville Rd,#4
Mercerville , NJ 08619

Curriculum emphasizes how water gets polluted and the impacts of pollutants on living things. It uses the arts extensively to convey human uses and impacts. Materials use a unique strategy to tie all the activity concepts together; students write a story, in sections, as the unit proceeds. The students provide details and adventures for each step. Teachers will need to select activities most relevant to the aspects of the water pollution story they wish to emphasize.

024
Naturescope: Diving Into Oceans 1989

Cost: $7.95 + $3.25 for shipping

National Wildlife Federation
1400 16th Street NW
Washington, DC 20036-2266
1 / 800-822-9919

Instruction in these materials provides a unique layout that, in several cases, may be used independently by the student. Activity descriptions are clearly explained and illustrated. Topics include the physical ocean, life in the ocean, life along the coastline, and human impacts. Each topic includes an activity for primary, intermediate, and advanced age ranges. Activities are not dependent on each other. Materials include some beautiful drawings of sea life. Excellent supplementary resource list.

025
Naturescope: Wading Into Wetlands 1989

Cost: $7.95 + $3.25 for shipping

National Wildlife Federation
1400 16th Street NW
Washington, DC 20036-2266
1-800-822-9919

Instruction in these materials provides a unique layout that, in several cases, could be used independently by the student. Activity explanations are clearly explained and illustrated. Topics include: what makes a wetland, saltwater wetlands, freshwater wetlands, wetlands and people. Each topic includes an activity for primary, intermediate, and advanced age ranges. Activities are not dependent on each other. Excellent supplementary resource list.

026
North Dakota State University Extension Service—Water Activities Packet 1988

Cost: 35 cents per fact sheet

ND State Univ. Extension Service
Fargo, ND 58105
701/231-8118

Activities are presented in a fact sheet format listing background information and related activities on single water topics. Units include *Water is Important, Water Conservation, What is Water?* Instructor materials provide more information about the topic and further studies ideas. Activities are provided as illustrations or examples of discussion topics.

027
Our Great Lakes Connection 1985

Cost: 1 copy free

UW–Extension Environmental Resources Center
216 Agriculture Hall
1450 Linden Dr.
UW-Madison
Madison, WI 53706
608/262-0020

These materials were designed to enable the teacher to integrate activities about the Great Lakes into a regular classroom program. Ideas for the activities were provided by teachers and Great Lakes specialists. Materials emphasize use and development of a variety of learning skills. Activities focus on the historical/cultural role of Great Lakes in people's lives. History, geography and economics form the basis of the content, but materials include some emphasis on pollution impacts and lake effects on weather and climate.

028
Our Groundwater 1992 (draft form)

Cost: check on availability

University of Vermont Extension Service
802/656-3024

One of 3 packets designed as a supplement to the classroom. The others are "Our Surface Water" and "The Water Around Us." Uses demonstrations to convey four main ideas about groundwater.

029
Our Surface Water 1992 (draft form)

Cost: Check on availability

University of Vermont Extension Service
802/656-3258

One of 3 packets designed as a supplement to the classroom. The others are "Our Groundwater" and "The Water Around Us." Provides directions for a pond and a stream field trip and instructions on how to conduct a water quality survey.

080
Paddle-to-the-Sea: Supplemental Curriculum Activities for Use with Holling Clancy Holling's *Paddle-to-the-Sea* 1991

Cost: $10

Ohio Sea Grant College Program
Ohio State University
1314 Kinnear Rd.
Columbus, OH 43212-1194
614/292-8949

Developed for use in grades 3–6, this interdisciplinary curriculum is designed to reinforce the concepts introduced in the story Paddle-to-the-Sea. Activities center around topics pertinent to the Great Lakes region such as surrounding land use, historical uses of the lakes, and Great Lakes ecology. Most activities are pencil/paper and seat work-oriented.

082
Plastic Eliminators: Protecting California Shorelines 1993

Cost: $5 plus shipping

California Aquatic Science Education Consortium (CASEC)
Graduate School of Education
Santa Barbara, CA 93106
805/893-2739

Designed for 10 to 15- year-olds, this activity guide aims to increase awareness of plastic marine debris. The first portion of the guide focuses on awareness, while the remaining activities deal with taking action in the youth's community. Activities culminate into an Adopt-A-Beach and Cleanup, but after youth have learned how plastics can affect marine animal life and how to reduce plastic consumption.

030
Project Water Works 1990

Cost: $25 plus shipping

American Water Works Association
6666 W. Quincy Ave.
Denver, CO 80235
303/794-7711 or 800/926-7337

Requires classroom setting and computer. Extensive preparation by instructor needed. Emphasis on water science and water management. Water management section of software emphasizes importance of values in decision-making, yet identifies "right and wrong" answers to simulated water management scenarios.

093
Project W.U.L.P. (Wetland Understanding Leading to Protection) 1994

Cost:

Outdoor Skills Center
P.O. Box 84
Plymouth, WI 53073
414 / 893-5210

This multidisciplinary wetland unit is designed for middle school-aged students. Activities are sequential, beginning with general knowledge of wetland functions and human impacts, then proceeding to comprehensive, well thought out field activities. Some activities are specific to Wisconsin wetlands. Authors attempt to pull together a complete wetland unit taught entirely in the classroom or in the classroom accompanied by field experiences. Unit includes an extensive, multimedia wetland resource list.

094
River Cutters 1992

Cost: $10 plus shipping

GEMS-Lawrence Hall of Science
University of California
Berkely, CA 94720
510 / 642-7771

Written for grades 6–9, River Cutters is an earth science unit in the GEMS series that addresses today's river issues. For a broad understanding of water issues, educators may want to integrate this unit with other water curricula. Authors simulate geological time using a diatomaceous earth model throughout the unit. Materials for the model are easily created in the classroom or at home. Activities include investigations of potential impact of toxic waste dumps and dams or rivers.

079
Sea Sampler: Aquatic Activities for the Field and Classroom 1986

Cost: $4.24 includes shipping

South Carolina Sea Grant Consortium
287 Meeting Street
Charleston, SC 29401
803 / 727-2078

Elementary—grades K–6. Addresses a variety of science and ecological concepts such as salt water characteristics, osmosis, food web, niche and communities. Includes 7 field and 14 classroom activities. Detailed background information is not provided for teacher or student, but resources to find the information are listed.

Secondary—grades 7–12 (separate edition). Similar activities as the elementary edition addressing similar topics relating to coastal / salt water living. This curriculum deals with more integrated skills and concepts, e.g.,taxonomy, food web / energy flow.

031
A Sense of Water, elementary edition 1984

Cost: $10 plus $4 shipping

Southern Arizona Water Resources Association
48 N. Tuscon Blvd, Suite 106
Tuscon, AZ 85716
602 / 881-3939

Materials provide a set of short activities which can be integrated into a variety of disciplines and grade levels. Activities are organized according to sections, including dependency of life on water; the science of water including water ecology; climate; water distribution and use; pollution potential of water; and the role of water in culture. Each lesson is indexed by chapter reference, grade, subject, length of activity, concept, key vocabulary and credits. Includes suggestions for evaluation, subject and topic index. A unique perspective includes activities which address the concept that water of varying degrees of contamination may still have uses.

032
Sensing the Sea—(K–1) & (2–3) (two booklets) 1978

Cost: $2 per copy

Marine Education Center
VA Institute of Marine Science
Gloucester Point, VA 23062
804 / 642-7000

Activities center around set-up and care of saltwater aquarium. Focuses on process skills of investigation, especially observation and hypothesis. Unique aspects include questioning skills—mostly through the teacher proposing divergent questions and students suggesting possible solutions, rather than the "correct" answer. Book 2 teaches difference between observation and inference.

033
4-H Sportfishing Aquatic Resources Education Program (SAREP)

1989 (reviewed); revised in 1994

Cost: $13 includes shipping. Leaders manual is provided free at training sessions.

Cornell CES
Cornell University Media Services
Ithaca, NY
607 / 255-2814

These activities are designed to help "hook" kids with a broader message about aquatic resources and the need to respect and conserve them. They were intended as the basis for 4-H club meetings and activities. Activities published individually in 20 separate booklets include almost everything about fishing from "how to fish" in a variety of settings to "minimizing your intake of fish contaminants." Note explicit commitment to affective learning. Binder contains all supplemental materials listed in Activity Booklets. Introductory chapters include teaching and leadership tips.

034
Stop, Look and Learn About Our Natural World Vol. 1, Grades K–2 (Water Conservation section reviewed) 1991

Cost: $30 per 3-volume set plus shipping costs. First 3-volume set is free.

Nebraska Natural Resources Commission
Stop, Look and Learn
Box 94876
Lincoln, NE 68509
402 / 471-2081

The water-related sections were reviewed: Unit 2 of Volume 1 (27 of 216 pages). Other units cover soil, plant, tree, and wildlife conservation. Materials were developed with a resource conservation orientation. Some K-2 students may need assistance in reading worksheet instructions. Many activities combine content and study skills. Includes guide that references activities according to subject area, skill, page number and topic.

035
Stop, Look and Learn About Our Natural World Vol. 2, Grades 3–4 (Water Conservation section reviewed) 1991

Cost: $30 per 3-volume set + shipping. First 3-volume set is free.

Nebraska Natural Resources Commission
Stop, Look and Learn
Box 94876
Lincoln, NE 68509
402 / 471-2081

Only the material in the water conservation unit (49 pages) was reviewed. Other units in this 244-page booklet include soil, plant, tree and wildlife conservation. Materials were developed with a resource conservation orientation. Worksheet language may be too advanced to be read independently by some 3rd and 4th graders. Additionally, some 3rd and 4th graders may not have the math skills to complete or understand computations included in the materials. Many activities combine content and study skills. Includes guide that references activities according to subject area, skill, page number, and topic.

036
Stop, Look and Learn About Our Natural World Vol. 3, Grades 5–6. (Water conservation section only reviewed) 1991

Cost: $30 per 3-volume set plus shipping. First 3-volume set is free.

Nebraska Natural Resources Commission
Stop, Look and Learn
Box 94876
Lincoln, NE 68509
402 / 471-2081

Reviewed unit on water conservation. Forty-four of book's 215 pages devoted specifically to water conservation. See comments about Volumes 1 and 2.

037
The Story of Drinking Water

1992 (accompanying comic book, 1990)

Cost: Teacher's guide, $7 plus shipping; comic, 28¢

American Water Works Assoc.
6666 W. Quincy Ave.
Denver, CO 80235
303 / 347-6206

This comic book comes in a multilingual (English, Spanish and French) format about a variety of water issues. The Teacher's Guide includes 19 activities for hands-on experiences with topics mentioned in the comic book. Intended for classroom application. Excellent focus on plight of third world countries' water supply.

038
The Stream Scene: Watersheds, Wildlife and People 1990

Cost: $15 (includes shipping)

Oregon Dept. of Fish and Wildlife
P.O. Box 59
Portland, OR 97207
503 / 229-5403

One of few curriculum focusing on riparian areas and intermittent streams. One of few that studies the effect of stream flow (water quantity) on plant communities. Takes a unique approach to populations using mathematical orientation. Includes appendices on making field equipment; a description of the salmon-trout enhancement program; general stream survey terms; water resource agencies. Includes science background for instructors and activities for students on any particular topic. Without modification, material will likely be too advanced for middle school students.

084
Stream Study and Water Quality Assessment Curriculum 1991

Cost: Free

New Hampshire Fish and Game Department, 2 Hazen Drive
Concord, NH 03301
603 / 271-3211

Designed for grades 5–8, this curriculum focuses on stream ecology (physical, biological and chemical monitoring). Also addresses urban sources of water pollution and watershed concepts. An "Outline of Advanced Concepts and Activities for Stream Ecology and Monitoring" is included, although the material provided in this guide may not be sufficient for educator to carry out. Instructor may have to refer to the supplemental sources for detailed background information. The supplemental materials available: Interpreting Results of Water Quality Tests in Streams and Rivers. Frank Mitchell and Jeffery Schloss; and A Study Guide to New England's Freshwater Wetlands.

039
Surface Water 1988

Cost: teacher's guide, $9; student guide, $1.25 plus $3.75 for both guides. *Surface Water* video, $15 or $49 for package.

Water Environment Federation
601 Wythe St.
Alexandria, VA 22314-1994
703 / 684-2400

Teacher's Guide provides background information and activities to complement the student video. Student Guide provides additional information about the water cycle, sources of water pollution, wastewater treatment, and citizen action. Materials address the concept of natural pollution, which is rather unique.

040
The Tapwater Tour 1989

Cost: $41.95 plus shipping

LaMotte Co.
P.O.Box 329
Chestertown, MD 21620
1/800/344-3100

Activities enable students to test tap water and evaluate the water quality. Highly directive teacher materials, script provided.

085
Teacher's Guide to World Resources, Chapter Reprints: Oceans and Coasts

1994

Cost: $6.95 for set of 8

World Resources Institute
Publications
P.O. Box 4852 Hampden Station
Baltimore, MD 21211
1/800/822-0504

Oceans and Coasts encourages high school students to explore the sources and effects of marine pollution, and steps taken to minimize the impacts of human activity. Subtopics include the role of oceans, pollution and fisheries. The unit format encourages teachers and students to engage in thoughtful discussion of oceans. Students receive fact sheets, maps, graphs and articles. Enrichment activities suggest that students map ocean pollution, examine aquaculture, investigate bioremediation and examine land use issues. To get the most out of this unit, students and teachers may require backgrounds in ocean ecology. Others in the series include: Watershed Pollution (see 086); Biodiversity; Sustainable Development; Natural Resource Economics; Population, Poverty, and Land Degradation; Energy, Atmosphere, and Climate; and Citizen Action.

086
Teacher's Guide to World Resources, Chapter Reprints: Watershed Pollution 1994

Cost: $6.95 for set of 8

World Resources Institute
Publications
P.O. Box 4852 Hampden Station
Baltimore, MD 21211
800/822-0504

In the Watershed Pollution guide, activities focus on natural and human events that occur in watersheds. The guide presents perspectives on water use from developing and developed countries, and on water pollution and watershed dynamics. Authors included a chart for ideas referencing lesson plans and enrichment activities across geopgraphy, math, science, civics, government and history. Authors suggest how to integrate global environmental education into high school curricula through the national Goals 2000: Draft National Performance Standards. This guide is part of a series that contains a lesson plan, student handouts, overheads, and student enrichment activities. Other units include: Oceans and Coasts (085); Biodiversity; Sustainable Development; Natural Resource Economics; Population, Poverty, and Land Degradation; Energy, Atmosphere, and Climate; and Citizen Action.

041
Teaching Aquifer Protection: ("TAP notebook")
A curriculum supplement 1990

Cost: $20 for out-of-state; $15 for in-state. Includes shipping for both.

Clemson University
Bulletin Room, #82
P & A Building
Clemson, SC 29634
803/656-3261

Provides activities designed to supplement curriculum. Focuses on water quality protection and water conservation. Learning objectives are referenced to state basic science skills for easy interface with school curriculum. Written for South Carolina audience, but more broadly applicable.

087
Through the Looking Glass Teacher's Guide 1991

Cost: $10

University of New Hampshire
and University of Maine Sea Grant
Advisory Program
Kingman Farm, University of New Hampshire
Durham, NH 03824

Curriculum focuses on marine awareness for elementary and high school students through a field trip to the Nature Center at Odiorne State Park, Rye, NH. Pre- and post-field trip activities complement and expand the concepts experienced during the trip. Strong emphasis to incorporate activities into the standard curriculum. Little to no background provided for teachers or students on follow-up activities; only suggestions to integrate marine awareness into the curriculum.

042
The Water Around Us (4-H)
1990

Cost: $1.50 plus $1 shipping

CTR Publications
Morrill Hall
University of Vermont
Burlington, VT 05405-0106
802/656-3024, Ext. 6

One of 3 packets designed as a supplement to the classroom. The others are "Our Groundwater" and "The Water Around Us." Provides directions for demonstrations and activities about the water cycle and water conservation.

043
Water Conservation In-School Curriculum 1990

Cost: $25 (includes shipping)

Univ. of Nevada CES
Carson City, NV
702/887-2252

Water education activities designed for easy integration into class activities. Binder separates materials by grade. Each unit contains lists of activities and materials needed, separated by day. When conducting activities, the teacher borrows box of equipment from the Cooperative Extension office. Goals and objectives not stated for each activity specifically, but for the unit overall. Many of same concepts presented at each grade level (especially grades 1 and 2). Grade 4 examines climate effects—not usual part of most water curriculum. Grade 5 curriculum emphasizes soil and erosion. Includes suggestion for activities for science fairs and an environmental education packet from the Garden Club of America. Reading level and concepts may be too advanced for suggested grade levels.

096
Water Highways; Water Trade-offs

Cost: 1 sample, free;
a kit of 35 copies, $40

Metropolitan Water District
Public Affairs Education Programs
P.O. Box 54153
Los Angeles, CA 90054-0153
213/250-6926

These materials were reviewed as a group; however, they stand independently. Educators may find that specific titles fill a need not provided by other more general curricula. To gain a complete sense of water issues in relationship to the ecosystem, all 4 guides are necessary. All provide students with real problems as a basis for learning about water. "Trade-offs" presents a unique cost-benefit study. All guides include separate student booklets, videos, maps, transparencies, and pre- and post-tests. Two other guides, Water Politics (095) and Water Quality (049), were reviewed separately.

089
Water Inspectors: Examining H_20 1991

Cost: $5 (includes shipping)

California Aquatic Science
Education Consortium (CASEC)
Graduate School of Education
University of California
Santa Barabara, CA 93106
805/893-2739

One of five CASEC guides written for 10–15– year-olds. This activity booklet focuses on the physical characteristics of water; e.g., salinity, temperature, taste, hardness and clarity. Activities are designed to engage students in scientific testing methods, including making predictions and manipulating variables one at a time to determine which variables cause changes.

047
Water in Your Hands 1991

Cost: Teachers' guide—50¢;
comic book—50¢;
a complete set of guides—$5.50 includes shipping. Available in both English and Spanish

Soil and Water Conservation Society
7515 NE Ankeny Road
Ankeny, IA 50021-9764
1/800/THE-SOIL

Curriculum consists of a comic-book style story about water with 4 accompanying activities. Relies on learning cycle strategy: exploration, concept development, and application. Suggests unique educational strategy of using journals for notes, reflections, and sharing them as parts of activities. Includes resource list for both students and teachers.

048
Water Magic/Splash! Activity Book, K-3

1991, Water Magic; 1990, Splash

Cost: activity book, $5.50;
comic, 28¢

American Water Works Assoc.
6666 W. Quincy Ave.
Denver, CO 80235
303/347-6206

Water Magic can be used separately or as a complement to *Splash! Activity Book.* The 23 activities cover a range of water science, water issues and water topics in our culture. Activities are varied and age appropriate. Most are appropriate for both the classroom and nonformal settings. Some activities do not relate well to stated objective. Illustrations and activity about groundwater may lead to a misunderstanding of groundwater and aquifer concepts.

095
Water Politics: A Water Education Program for High Schools 1994

Cost: $

Metropolitan Water District of Southern California
Education Programs
P.O. Box 54153, Los Angeles, CA 90054
213/217-6739

Designed for grades 9–12, curriculum emphasizes water use and water conflict issues. Covers such issues as conflicts among urban, agricultural and environmental interests; water conservation vs. developing new supplies, including the public participation component. uses case studies on water rights, canal building, landfill development, protecting reservoir quality, risks and water quality; water transfer, and the affect of the media on public opinion, use of the Colorado River, and saving endangered species. Some case studies seem biased in favor of development and do not present the ecological impact of decisions on either side. Sways students and teachers towards certain conclusions. Includes a map of California aquaducts, "California Water Resources," and the California Water Story, a video. Teacher background materials are excellent.

063

Water Precious Water—Book A 1988

Cost: $14.95 plus 10% shipping cost

AIMS Education Foundation
PO Box 8120
Fresno, California 93747
209/255-4094

One of several publications from *Activities to Integrate Math and Science* (AIMS) in the grades 2–6 series. Limited duplication rights are granted with purchase of materials. Math activities often rely on an understanding of multiplication, division and percentages. Some activities are provided in both a low math (visual) and high math (multiplication/division) format. Water activities are related to other curriculum areas through "curriculum coordinates" which provide suggested activities for language arts, social studies and the arts. Predicting, measuring, calculating, estimating and collecting data and analysis skills are emphasized.

049

Water Quality: A Water Education Program 1990

Cost: 1 sample, free; a kit with 35 copies, $40

Metropolitan Water District of Southern California
P.O. Box 54153
Los Angeles, CA 90054-0153
310/376-0611

Focuses on water quality as it applies to a public water supply system. Includes text plus two activities.

050

Water Resource Education, Critical Issue: Water You Can Make A Difference (K-3)

publication date not listed

Cost: $12 plus $1 shipping

Cornell Cooperative Extension of Nassau county
1425 Old Country Rd., Bldg. J
Plainview, NY 11803
516/454-0900

Binder contains K–3 kit and materials for grades 4–6. It is not immediately clear which materials are for teachers and which for students. K–3 activities cover the significance of water, the water cycle, information about the New York water supply, and hazardous household products. Materials for grades 4–6 include importance of water, the water cycle, water supply, water contamination, and water conservation.

051

Water Resource Education, Water Resources: Youth Education Curricula (K–6) (7–9) 1992

Cost: $12 plus $1 shipping for each

Cornell Cooperative Extension of Nassau County
1425 Old Country Rd., Bldg. J
Plainview, NY 11803
516/454-0900

See notes for K–3 version. This set contains some materials first developed for WET (North Dakota). The curriculum correlates with NY state syllabus—elementary science level III, Ecosystems. Reading level may be too advanced for 4th–6th graders.

052

Water Riches 1993

AVAILABLE TO NEBRASKA RESIDENTS ONLY

Cost: Instructor's manual with video—$70 includes shipping.

Cooperative Extension Service
University of Nebraska-Lincoln
Institute of Agriculture and Natural Resources
Lincoln, NE 68583-0771
402/472-2824

Nebraska's curriculum is reviewed since the Nebraska materials pioneered this approach. Unique approach includes videos that introduce each of 5 units and an accompanying "newspaper" with more information and activities for youth. Teacher packet provides guidance on how to use the material. Other unusual aspects include suggestions for review activities and activities to teach interviewing skills. Incorporates study skills. Indiana and Missouri also have a Water Riches curriculum

Indiana version:

Cost: instructor's kit with video, $70; gameboard, $10; tabloids, 1-5 units bundled in 500 each.

Media Distribution Center
301 S. 2nd St.
Lafayette, IN 47901-1232
317/494-6794

Missouri version:

Cost: teacher's guide, $3.50 plus $1 shipping; tabloid, $1.50/set of 5 + $1 shipping

University of Missouri–Columbia
Columbia, MO 65211
314/882-2792

088

Water Sourcebook: A Series of Classroom Activities for Grades 3-5 1994

Cost: not available

Water Environment Federation
601 Wythe Street
Alexandria, VA 22314-1944
205/271-7938

Written by Tennessee Valley Authority, this curriculum set serves as a supplement to a school water education unit. Water Sourcebooks are available in a scope and sequence format: K-2, 3-5, 6-8, and 9-12. Each Sourcebook provides the same 6 chapters: Introduction; Drinking Water and Waste Water Treatment; Groundwater, Surface Water; Wetlands; and Coastal Waters. Chapters are correlated with math, science, language arts, social studies, and related arts curriculum goals. An important resource provided by this curriculum is a set of brief background act sheets on 29 water-related topics.

054
Water Watchers 1986

Cost: free

Massachusetts Water Resources Authority
Charleston Navy Yard
100 First Ave.
Boston, MA 02129
617/242-6000, ext. 4662

Curriculum aims to improve understanding of personal water conservation practices which will improve water conservation. uses water science kit and videos to complement written materials. Instructor materials do not include a separate listing of what materials will be needed when or what is included in the science kit. Provides a science and social studies alternative for most lessons. "Water Wizards" is the companion curriculum for grades 3–4.

056
Water, Water Everywhere 1991

Cost: $24.95 for all three, plus $7.35 for shipping.

Hach Company
Box 389
Loveland, CO 80539
1/800/227-4224

Includes teacher's guide to laboratory and field testing of water for a variety of parameters supplemented by a separate student text and teacher resource manual. One of few (if any) curricula to address radioactive waste. One of few curricula to address concept of how risk decisions are made in the water quality reference unit booklet. Includes homework activities.

057
Water Wise 1989, updated 1991

Cost: $6.75 (includes shipping)

Cornell Cooperative Extension
Media Services Resource Ctr.
7 Business and Technology Park
Ithaca, New York 14850
607/255-2080

For use in 5th–6th grade classrooms. Activities focus on the water cycle, the aquatic environment, and the causes, effects, and prevention of water pollution. Provides elementary science syllabus chart which correlates water activities with elementary science skills.

058
Water Wizards 1986

Cost: 1 copy free

Massachusetts Water Resources Authority
Charleston Navy Yard
100 First Ave.
Boston, MA 02129
617/242-7110, ext. 4662

Water delivery system and conservation emphasis. Excellent support material, instructions and diagrams for instructor. "Water Watchers" is the companion curriculum for grades 7–8.

059
Water Worlds 1988

Cost: $5.35 (includes shipping)

Cornell Cooperative Extension
Media Services Resources Center
7 Business and Technology Park
Ithaca, New York 14850
607/255-2080

These materials were designed to be used in a 4-H club setting. The folder provides leader and member guides, activity fact sheets and record keeping sheets. Basic focus is to give youth opportunities to explore and observe aquatic environments. Collection/sampling section includes tips on minimal impact sampling—a nice touch. Water careers is included as a suggestion to invite as guest lecturers people whose careers involve water. Reading material may be too advanced for the young end of the suggested age range.

045
WET Water Education for Teachers (Kansas) 1988

Cost: $50 includes shipping

State 4-H Office
201 Umberger Hall
Manhattan, KS 66506
913/532-5800

This curriculum is not a version of the Montana and North Dakota WET materials. Materials cover the water cycle, the water supply, wastewater treatment/water treatment, water conservation, and water pollution. Contains activities for elementary, junior and senior high students. Doesn't delineate by grades. Appendix includes additional educational materials, information specific to Kansas, and a bibliography of resources.

055
We Depend on Illinois (formerly Water: The Liquid of Life) 1991

Cost: free

Illinois Environmental Protection Agency
2200 Churchill Road, Box 19276
Springfield, IL 62794-9276
217/782-3397

Water education materials for use in fifth grade classrooms. Materials emphasize text, with some supportive activities. The six modules include earth as a closed system, the relationship of water to life, the hydrologic cycle, wastewater treatment, water protection, water testing and treatment, and lakes. Poster included.

090
Wet and Wild Water
publishing date unknown

Cost: $3 includes shipping

Indiana Department of Education
Office of School Assistance
Room 229 State House
Indianapolis, IN 46204-2798
317/232-9141

Written for a broad audience (K–12), authors work to grab the interest of youth by creating unique units. The six units approach water education through economics, water sports, famous sea and river explorers, and legendary myths about the Loch Ness Monster and the Lost City of Atlantis. A wide range of activities from simple counting to writing resumes and filling out job applications. The "Core Knowledge" (background information) consists of a list of facts, but some units provide detailed information. Activities are to be conducted indoors.

091
Wetlands: A Major North America Issue An Environmental Case Study for Grades 6–9 1992

Cost: not available

Jerry Culen
Florida State Extension Service
904/846-0996

This study guide applies wetland study to four environmental education goals: (1) science foundations; (2) issue awareness; (3) issue investigation, and; (4) citizenship action. The author uses Dr. Seuss's *The Lorax* as the sample case study at each goal level. Students are introduced to several human attitudes about wetlands, as well as the effects of human activities on wetlands in a "Wetland Issues Web." Students then collect and analyze opinionnaires and questionnaires about the community's perception of wetlands. This data leads to the next goal level, Citizenship Action, where students suggest solutions to the identified problems. Author provides a section on "Types of Issue Action Methods" to assist students and adults with actions required to address community issues.

099
Wetlands and Wildlife: Alaska Wildlife Curriulum Teacher Information Manuals and Guides 1992

Cost: available to Alaska residents

U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503
907/786-3351

Materials provide information and teaching activities about Alaska's wetland habitats and animals for three different grade levels: K–3, 4–6, and junior/senior high school. Included are wetlands awareness, wetland ecology, human ecology, human impacts on wetlands, and migratory birds. The lower grade levels emphasize ecology while the activities for higher levels stress investigation and action skills. Field trip materials provide significant support for issues investigation activities.

060
What is Water? A Stream Becomes an Ocean. What is an Ocean? Marine Resources 1993

Cost: One copy free

4-H Marine Education
Virginia Cooperative Extension
c/o Barry Fox
Box 9081
Virginia State University
Petersburg, VA 23803
804/524-5848

Materials cover the four topics listed in the title. Designed as school curriculum or school enrichment. Includes leader and member guides.

100
Wild Louisiana. Aquatic Activities for Environmental Science

Louisiana State University and
Louisiana Sea Grant
College Program
Communications Office
Baton Rouge, Louisiana 70803-7507
504/388-6448

This curriculum is divided into three modules: Vanishing Wetlands; Gata Data: and Louisiana Redfish. Each unit includes a background information unit plan and a video unit plan (the video accompanies the curriculum). The curriculum is not clearly organized between the unit plans and the video unit plans. All units strongly emphasize the ecological and economical value of wetlands, redfish and alligators. All units incorporate ecological concepts including niche, habitat, eurtophication, ecosystem, biotic and abiotic factors.

061
Wise Water Ways 1990

Cost: teacher's guide, $1.50; activity guide, $1 (prices include shipping)

University of Nevada Cooperative Extension Service
Reno, NV
702/731-3130

Three units designed for 3rd–5th grades. Emphasizes water conservation in a desert environment.

098
Wonderful World of Water A Curriculum Guide for Elementary Schools

publication date not listed

Cost: free to teachers

Westchester County Department of Parks, Recreation, and Conservation
19 Bradhurst Avenue
Hawthorne, NY 10532
914/593-2650

Designed for the K–5 audience, activities are divided into 4 units: the water cycle, water properties, the water ecosystem, and water use by humans. A few activities draw relationships between water transport and human physiological functions; e.g., nutrient transport by blood. Some activities may be too advanced for primary grades and will have to be adapted. Authors include a list of "Interdisciplinary Ideas" for the educator.

062
WOW! The Wonders of Wetlands 1991

Cost: free for 1–2 copies + $3.50 shipping

Environmental Concerns, Inc.
P.O. Box P, Education Department
St. Michaels, MD 21663
301/745-9620

This is an educator's guide to providing activities to help kids understand wetlands, the wetland community, and wetland issues. Information is presented in a dense, but lively and attractive format. One of a few curriculum that talks about "natural pollution," and the effect of weather upon water quality. Excellent use of kinesthetic games to demonstrate water-related dynamics. Unique insert for some lessons called "Nature in Your Neighborhood." Includes suggestions to modify activities for younger and more advanced students. Materials include restoration and action guides. Includes suggestion for community action projects at end.

State/regional reviewed curricula listed by state

Alaska

Wetlands and Wildlife:
Alaska Wildlife Curriculum
(U.S. Fish and Wildlife Service)

Arizona

A Sense of Water
(Southern Arizona Water Resources Association)

California

Captain Hydro and the Further Adventures of Captain Hydro
(East Bay Municipal Utility District)

Creek Watchers: Exploring the Worlds of Creeks and Streams

Freshwater Guardians: Defending Our Precious Supply

Plastic Eliminators: Protecting California Shorelines

Water Inspectors: Examining H_20
(California Aquatic Science Education Consortium)

From Ridges to Rivers: Watershed Explorations (4-H Watershed Project, San Luis Obispo County)

Investigating Groundwater:
The Fruitvale Story
(Chemical Education for Public Understanding, Lawrence Hall of Science, University of California)

Kids In Creeks: A Creek Exploration and Restoration Program
(Aquatic Habitat Institute)

Los Marineros
(Channel Islands National Marine Sanctuary)

Mapping Fish Habitats
River Cutters

Great Explorations in Math and Science (GEMS)
(Lawrence Hall of Science, University of California)

Water Highways; Water Politics; Water Quality; and Water Trade-offs
(Metropolitan District of Southern California)

Water Precious Water. A Collection of Elementary Water Activities, Grades 2–6.
(Project AIMS)

Florida

An Activity Guide for Teachers:
Everglades National Park
(Everglades National Park)

Florida 4-H Marine Science Program
(University of Florida Cooperative Extension 4-H)

Illinois

Water: The Liquid of Life
(Illinois EPA)

Wetlands: A Major North America Issue
(Southern Illinois University)

Indiana

Water Riches
(Indiana Cooperative Extension Service)

Wet and Wild Water
(Indiana Department of Education)

Iowa

G.R.E.A.T.
(Groundwater Resource Education Activities for Teachers; Iowa DNR)

Kansas

Water Education for Teachers
Kansas Cooperative Extension Service)

Louisiana

Wild Louisiana: Aquatic Activities for Environmental Science
(Louisiana State University and Louisiana Sea Grant College Program)

Maine

Connections to the Sea
(University of Maine Cooperative Extension, 4-H)

Maryland

Decision Making: The Chesapeake Bay
(University of Maryland, Sea Grant; includes issues for all states directly affected by the Bay)

Living in Water: An Aquatic Science Curriculum
(National Aquarium in Baltimore; also listed on national list)

Massachusetts

Water Watchers
Water Wizards
(Massachusetts Water Resource Authority)

Michigan

Groundwater Education Program
(East MI Environmental Action Council)

Gee-Wow
(Ecology Center of Ann Arbor)

Missouri

Groundwater Protection Curriculum Guide
(Missouri Department of Natural Resources)

Water Riches
(Univ. of MO-Columbia Extension Service; Nebraska version reviewed)

Nebraska

Stop Look & Learn About Our Natural World
(Nebraska Natural Resources Commission)

Water Riches
(Nebraska Cooperative Extension Service; Indiana version reviewed)

Nevada

Water Conservation In-School Curriculum

Wise Water Ways
(University of Nevada Cooperative Extension Service)

New Hampshire

Coastal Issues: A Wave of Concern
(Sea Grant Extension Program University of New Hampshire)

Stream Study and Water Quality Assessment Curriculum
(University of New Hampshire-Cooperative Extension)

Through the Looking Glass
(University of New Hampshire)

New Jersey

My World, My Water and Me
(New Jersey Department of Environmental Protection and Energy)

New York

4-H Sport-Fishing Aquatic Resources Education Program
(Cornell Cooperative Extension Service)

Water Resource Education
(Cornell Cooperative Extension of Nassau County)

Water Wise: Lessons in Water Resources

Water Worlds
(Cornell Cooperative Extension Service)

Wonderful World of Water
(Westchester County Department of Parks, Recreation, and Conservation)

North Dakota

Water Education for Teachers
(North Dakota State Water Commission; different content than the Kansas Cooperative Extension WET; Montana version reviewed)

North Dakota State Extension Service Water Activities
(North Dakota State University Cooperative Extension Service)

Ohio

Always a River
(U.S. EPA)

The Great Lakes in My World
(Lake Michigan Federation and University of Ohio Sea Grant)

Paddle-to-the-Sea: Supplemental Curriculum Activities
(Ohio Sea Grant College Program, Ohio State University)

Oklahoma

Aquatic Environmental Education
(Langston University–Cooperative Extension)

Oregon

The Stream Scene: Watersheds, Wildlife and People
(Oregon Dept of Fish and Wildlife)

Pennsylvania

Instructor's Guide To Water Education Activities
(Pennsylvania Department of Environmental Resources)

Rhode Island

Active Watershed Edcuation Program
(Southern Rhode Island Conservation District)

South Carolina

Sea Sampler: Aquatic Activities for the Field and Classroom
(South Carolina Sea Grant Consortium)

Teaching Aquifer Protection
(Clemson University Cooperative Extension Service)

Tennessee

Groundwater: A Vital Resource

Utah

A Comprehensive Water Education Book, Grades K-6
(International Office of Water Education)

Vermont

Environmental Education For Youth: Groundwater, Surface Water, Water Around us
(University of Vermont Cooperative Extension Service)

Virginia

Be Water Wise
(Virginia Water Resources Research Center, also listed in national materials section)

Sensing the Sea
(Virginia Institute of Marine Science)

Virginia CES/4-H Marine Project: What is Water? A Stream Becomes An Ocean. What is An Ocean? Marine Resources
(Virginia Cooperative Extension Service)

Washington

Clean Water, Streams and Fish: A Holistic View of Watersheds
(Washington State Office of Environmental Education)

Discover Wetlands
(Washington State Department of Ecology)

Wisconsin

Caring For Our Lakes
(University of Wisconsin Institute of Environmental Studies)

Groundwater: Wisconsin's Buried Treasure
(Wisconsin Department of Natural Resources)

Local Watershed Problem Studies
(University of Wisconsin Water Resources Center)

Our Great Lakes Connection
(University of Wisconsin Cooperative Extension Service)

Project W.U.L.P.—Wetland Understanding Leading to Protection
(Outdoor Skills Center)

Canadian Provinces

Adopt-A-Stream
(Friends of Environmental Education Society of Alberta—FEESA)

Reviewed curricula from national organizations or with national application

Hands-On Save Our Streams
(Izaak Walton League)

A Hidden Treasure
(National FFA Foundation)

Aquatic Wild
(Project Wild, Boulder, CO)

Be Water Wise
(Virginia Water Resources Research Center)

EARTH: The Water Planet
(National Science Teachers Association)

Kids Network—What's in Our Water
(National Geographic Society)

Healthy Environment, Healthy Me—Exploring Water Pollution Issues
(Resource Center of Environmental and Occupational Health Sciences Institute, New Jersey)

Investigating Streams and Rivers
(Project GREEN, Ann Arbor, MI)

Living in Water
(the Baltimore National Aquarium; also listed on state list)

Naturescope: Diving Into Oceans
(National Wildlife Federation)

Project Water Works
(American Water Works Association)

Ranger Rick's NatureScope—Wading Into Wetlands
(National Wildlife Federation)

The Story of Drinking Water
(American Water Works Association)

The Tapwater Tour
(LaMotte Company)

Teacher's World Resource Guide: Oceans and Coasts and Watersheds
(World Resource Institute, Washington, DC)

Wally the Water Molecule
("Chem Kids," Moreno, CA)

Water Education for Teachers
(WET; different content from Kansas versions)

Water in Your Hands
(Soil and Water Conservation Society)

Water Magic
(American Water Works Association)

Water Quality Curriculum: Surface Water Unit,
The Groundwater Adventure, Waste Water
(Water Environment Federation, formerly Water Pollution Control Federation)

Water, Water Everywhere
(Hach Company)

WOW, The Wonders of Wetlands
(Environmental Concern Incorporated)

Unique support materials for youth water education

The following materials were not considered as youth water education curriculum, but do provide an important resource for those developing youth water education programs.

Items are included in this list if they:

- *Provide a water education resource not easily created locally*
- *Are cited frequently in water education bibliogaphies*

Unique strategies for educating youth about water are described in a companion publication titled *Educating Young People About Water: A Guide to Unique Program Strategies.*

Published water education bibliographies are listed at the end of this section in "Selected Bibliographies, Directories and Catalogs."

Materials listed in this section include:

- *Collections of water education activities*
- *General education resources*
- *Multimedia resources*

Collections of water education activities

Acid Rain Curriculum, grades 4–8 and 6–12
Acid Rain Foundation, Inc.
1410 Varsity Dr.
Raleigh, North Carolina 27606
919/828-9443

AIMS, Activities Integrating Mathematics and Science. Grades K-4 Series. Grades K-6 Series. Grades 5-9 Series
(AIMS Education Foundation)
AIMS Education Foundation
PO Box 8120
Fresno, California 93747
209/255-4094

BARK, Backyard Acid Rain Kit
(Public Focus)
Public Focus
489 College St. Suite 500
Toronto, Ontario M6G1A5
416/484-8339

The California Water Story
California's Water Problems
Project Water Science
Water Education Foundation
717 K Street, Suite 517
Sacramento, CA 95814
916/444-6240
(provides supplemental materials: posters, film strips and fact sheets)

The Changing Chesapeake—an introduction to the natural history and history of the Chesapeake Bay for upper elementary and middle school children
(National Aquarium in Baltimore and US Fish and Wildlife Service)
National Aquarium in Baltimore
Pier Three
501 East Pratt Street
Baltimore, Maryland 21202
410/576-3800

Classroom GEMS (Groundwater Education in Michigan Schools)
SEE-North, A Regional Center for Science and Mathematics
3001 Church Road
Petosky, MI 49770
616/348-9700

Clean Water Resource Packet for Youth and Youth Educators
(University of Minnesota Extension Service)
(A compilation of materials to be photocopied at cost)
University of Minnesota
4-H Youth Development
340 Coffey Hall
1420 Eckles Avenue
St. Paul, Minnesota 55108
612/625-1731

Fisheries Education Units #16, 18
(Maine Department of Marine Resources)
"Estuarine Studies. An Activities Text for Maine Schools"
"Field Trip in the Classroom"
"Field Testing Manual for Water Quality"
Maine Department of Marine Resources
The Education Division
State House Station #21
Augusta, Maine 04333-0021
207/624-6550

Fishing for Fun and Learning
University of Wisconsin–Extension
Extension Publications
Rm. 245, 30 N. Murray St.
Madison, WI 53715
608/262-3346

Fishing…Get in the Habitat
MinnAqua
Minnesota DNR
Section of Fisheries
500 Lafayette Road, Box 12
St. Paul, Minnesota 55155
612/625-1291

Friends: Special Water Edition. A Magazine for Young Readers from Georgia 4-H Clubs (available only to Clark County residents)
University of Georgia
Cooperative Extension Service
College of Agriculture
Athens, Georgia
706/542-2657

Jefferson County 4-H Water Quality Project
Christopher F. Feise
Washington State University
Water Quality and Aquatic Resources
7612 Pioneer Way E.
Puyallup, Washington 98371-4998
206/840-4556

KARE, Keystone Aquatic Resource Education. "Water Resources in Pennsylvania. An Earth Science/Biology Unit" (available only through training workshops)
Pennsylvania Fish Commission
Bureau of Education and Information
PO Box 1673
Harrisburg, PA 17105-1673
717/657-4519

Lake Game for Youth. Lake Superior Game: Use vs. Abuse.
(Minnesota Sea Grant)
Your state's Sea Grant Program, or
Minnesota Sea Grant Program
University of Minnesota
Minneapolis, Minnesota 55414
218/726-8175

Lines on the Land. A "hands-on" soil and water conservation learning package for 6th–8th grades
(National Association of Conservation Districts)
National Association of Conservation Districts
PO Box 855
League City, Texas 77574
1-800/825-5547

The Mini Page
Washington Post. October 28, 1990. Treat Water Well
CONTACT: your local library

My Wetland Coloring Book
(U.S. EPA)
U.S. Environmental Protection Agency
Region 6
1201 Elm Street
Dallas, Texas 75270
1-800/832-7828
214/665-6444 (TX residents)

Nontraditional Marine Education Activities: a planning guide
(Virginia Sea Grant College Program)
Educational Series Number 32
Publications Office
Gloucester Point, Virginia 23062
804/642-2111

OBIS, Outdoor Biology Instructional Strategies packets:
Aquatic Animal Behavior; Breakwaters and Bays; Desert; Ponds and Lakes; Seashore; Streams and Rivers
Delta Education
PO Box 915
Hudson, NH 03051-0915
1-800/258-1302
603/889-8899 (NH residents)

OEAGLS, Oceanic Education Activities for Great Lakes Schools. 27 interdisciplinary investigations for grades 5–9; four activities for primary grades; computer-based program; careers booklet. Activities can be ordered separately or in a package.
(Ohio Sea Grant and The Ohio State University)
Ohio Sea Grant
Education Office
283 Arps Hall
1945 N. High Street
Columbus, Ohio 43210
614/292-8949

The Outdoor Classroom: Experiencing Nature in the Elementary Classroom
Indiana Department of Education
Room 229 State House
Indianapolis, IN 46204-2798
317/232-0530

Pond and Stream Safari: A Guide to the Ecology of Aquatic Invertebrates. 1993.
Cornell Cooperative Extension
Media Services
Ithaca, NY 14853
607/255-5830

Project Earthcare. Soil and water stewardship activities
Soil and Water, St. Louis County Conservation District
St. Louis, Missouri
314/453-9811

Project WET Water Education for Teachers)
Publications of the Watercourse and National Project WET:
—The Liquid Treasure Water History Trunk: Learning from the Past
—The Rainstick, A Fable
—Water Celebration! A handbook
—The Water Story

The Watercourse
201 Culbertson Hall
Montana State University
Bozeman, Montana 59717
606/994-5392

Ranger Rick's NatureScope Pollution: Problems and Solutions
(National Wildlife Federation)
National Wildlife Federation
1400 Sixteenth Street, N.W.
Washington, D.C. 20036-2266
1-800/432-6564
202/797-6800

Responsible Angling. The Oregon Angler Education Manual
(Oregon Department of Fish and Wildlife, Oregon State University Extension Service)
Outdoor Empire Publishing, Inc.
PO Box 19000
511 Eastlake Avenue, East
Seattle, Washington 98109
206/624-3845

The Rivers Curriculum Project
A 5-unit river series based on the study of a local river basin integrating biology, chemistry, earth science, geography, and language arts.

The Illinois River Project
Southern Illinois University at Edwardsville
Box 2222 Edwardsville, IL
62026-2222
618/692-3788

River Rangers: Protecting Our Water
Activity packet includes booklets, stickers and badges for 250 students. Training video available.

Unified Sewerage Agency
155 N. First Avenue, Suite, 270
Hillsboro, Oregon 97124
503/648-8621

Salt Marsh Manual, an Educator's Guide
San Francisco Bay National Wildlife Refuge
PO Box 524
Newark, California 94560
415/792-0222

TVA: A World of Resources
Tennessee Valley Authority
Environmental Education Program
Forestry Bldg.
Norris, TN 37828
615/632-1599

The Tardy Twins Meet Polluto, comic and teacher's guide.
(East Bay Municipal Utility District, Oakland, CA)
Innovative Communications
207 Coggins Drive
Pleasant Hill, California 94523
510/944-0923

Toward a Sustainable Agriculture: A Curriculum
Center for Integrated Agricultural Systems
University of Wisconsin–Madison
240 Agriculture Hall
1450 Linden Dr.
Madison, Wisconsin 53706
608/262-5200

Two H's and an O: A Teaching Resource Packet on Water Education
ERIC–Center for Science, Mathematics, and Environmental Education
The Ohio State University
1929 Kenny Road
Columbus, OH 43210-1080
614/292-6717

University of Minnesota 4-H Youth Development fact sheet series:

"Wetland Restoration"
"Water Stewardship"
"Well-Water Testing"
"Household Hazardous Wastes"
University of Minnesota
4-H Youth Development
340 Coffey Hall
1420 Eckles Avenue
St. Paul, Minnesota 55108
612/625-9700

Water Can Be Fun. How to Create a Successful Science Fair
American Water Works Association
6666 W. Quincy Ave.
Denver, Colorado 80235

Water Ecology Topics. K–8 Group Outdoor Activities for Stream, Pond and Schoolyard
Youth Science Institute
296 Garden Hill Dr.
Los Gatos, California
408/356-4945

Water Fun For You
American Water Works Association
6666 W. Quincy Ave.
Denver, Colorado 80235
303/794-7711

Water Play, activities and teacher's guide
(East Bay Municipal Utility District, Oakland, CA)
Innovative Communications
207 Coggins Drive
Pleasant Hill, California 94523
510/944-0923

Water Quality and Aquatic Resources Protection Activities—a packet of twenty 4-H activities, community service and fair projects.
Christopher F. Feise
Washington State University
7612 Pioneer Way E.
Puyallup, Washington 98371-4998
206/840-4556

Water-related Teaching Activities
ERIC Center for Science Mathematics and Environmental Education
Ohio State University
1929 Kenny Rd
Columbus, OH 43210-1080
614/292-6717

Water, Water Everywhere
Seventy activities for elementary through secondary level can be ordered separately or in packets organized by age.

Oregon State University–Extension Sea Grant
Hatfield Marine Science Center
Newport, OR 97365
503/867-0271

Water Wise: A 4-H Water Program
Includes activity book, lesson plans and video.

Shirley Bond, Extension agent
Hillsboro County Cooperative Extension Service
5339 South County Road 579
Seffner, Florida 33584-3334

Wavelets: Marine Schoolhouse, Series No. 1–27
Virginia Institute of Marine Science/Sea Grant Marine Advisory Services
Publications Office
Gloucester Point, Virginia 23062
804/642-7000

Wet and Wild: Six Bilingual Supplementary Marine Curriculum Guides for Teachers, K–6. (English/Spanish)

Unit I– The Physical Ocean: Wet, Wild and Deep

Unit II–Ocean Management: Who Owns the Sea?

Unit III–Research: Innerspace Explorers

Unit IV–The Biological Ocean: Hello Down There!

Unit V–The Economic Sea: Riches of the Sea

Unit VI–Marine Ecology: You Scratch My Back, I'll Scratch Yours
(Sea Grant Institutional Program
Hancock Institute for Marine Studies)

University of Southern California, University Park
Los Angeles, CA 90089-1231
213/740-1961

Wetlands Protectors: Guarding Our Wild and Watery Lands
California Aquatic Science Education Consortium (CASEC)
Graduate School of Education
University of California, Santa Barbara, CA 93106
805/893-2739

General education resources

General education material includes fact sheets, supplemental materials, maps, ideas for special audiences, career information, etc.

Aquatic education materials being developed or adapted for the hearing-impaired
Federal Aid Division
U.S. Fish and Wildlife Service
911 N.E. 11th Avenue
Portland, Oregon 97232-4181
503/231-6128

Ask the Aquarium fact sheet packet
National Aquarium in Baltimore
Pier Three
501 East Pratt Street
Baltimore, Maryland 21202
410/576-3870

Carreras en las Ciencias Marinas. (Careers in Marine Science)
UPR SG 04-F-158-44030 A/E-71
1984. #16
(University of Puerto Rico, Sea Grant)
Programa Sea Grant
Departamento de Ciencias Marinas
Recinto Universitario de Mayaguez
Mayagues, P.R. 00708
809/832-4040

Drinking Water Week. Annual packet.
American Water Works Association in cooperation with the USDA, U.S. EPA, et al.
American Water Works Association
6666 W Quincy
Denver, CO 80235
303/794-7711

Environmental Health Risk Education for Youth: A Resource Manual
U.S. EPA
Communications and Public Affairs
Washington, DC 20460
202/260-2090

Investigating the Marine Environment: A Sourcebook. Volumes 1–3
Project Oceanology
Avery Point
Groton, Connecticut

Marine Science Methods for the Classroom, fact sheets #1–9
Virginia Institute of Marine Science
Sea Grant Marine Advisory Services
Publications Office
Gloucester Point, Virginia 23062
804/642-2111

Sandcastle Moats and Petunia Bed Holes. A book about groundwater.
Virginia Water Resources Research Center
Virginia Polytechnic Institute and State University
617 North Main Street
Blacksburg, Virginia 24060-3397
703/961-5624

Puget Soundbook (Puget Sound Water Quality Authority; also see Maryland's and Green Bay, Wisconsin's *Baybooks*) available from those states' conservation agencies

Marine Science Center
18743 Front St. NE
PO Box 2079
Poulsbo, Washington 98370

USGS Water Resources Education Initiative Program notebooks for water resource specialists visiting classrooms (USGS with Bureau of Land Management, U.S. Fish and Wildlife, U.S. EPA, the National Science Teachers Association, and the American Water Resources Association)

Chief, Earth Science Education Project
U.S. Geological Survey
Denver Federal Center
PO Box 25046 MS 414
Denver, Colorado 80225
303/236-4932

Water in the Global Environment. 1992
Pathways In Geography, Series Title No. 3.
The National Council for Geographic Education
16-A Leonard Hall
Indiana University of Pennsylvania
Indiana, PA 15705

Water, Water, Everywhere . . . A Guide to Marine Education in Oregon
OSU Extension Sea Grant
Hatfield Marine Science Center
Newport, OR 97365
503/867-0271

Multimedia resources

Today, water educators have the luxury of choosing from a large assortment of non-print materials to supplement program delivery. These multimedia resources range from computer bulletin boards, networks and programs to audiocassettes, videos, satellite programs, hotlines and clearinghouses.

Online computer networks

Access Atlanta
Online youth summer camp database
The Journal-Constitution and Prodigy
To order Access Atlanta software call, 1/800/224-5285

Classroom Earth
An environmental education network that includes AcidRain Online Lab where groups enter water sample data and then download and compare data from others. Obtain through Internet by telnet>classroom_earth.ciesin.org2010.

A Directory of Electronic Bulletin Boards: Water Resources and The Environment. 1993.
University of Wisconsin–Extension
Environmental Resources Center
216 Agricultural Hall
1450 Linden Drive
Madison, WI 53706
608/262-0020

EcoNet
International network and bulletin board for information on wildlife and other environmental topics. Used by groups and individuals to get information and participate in teleconferences.
econet-info@igc.apc.org
415/442-0220

EnviroNet
Designed to enhance science education at the middle and secondary levels in New England.
pcolombo@vmsvax.simmons.edu
617/521-2665

EPA's Nonpoint Source Electronic Bulletin Board System (NPS BBS)
Access using a modem and telecommunications software by dialing 302/589-0205. The parameters are (N-8-1).
NPS Information Exchange (WH-553)
U.S. Environmental Protection Agency
401 m Street, S. W.
Washington, D.C. 20460

GREEN—Global River Environmental Education Network
721 E. Huron
Ann Arbor, MI 48104
313/761-8142
A water quality monitoring network that links classrooms internationally to share information about local watersheds. Uses EcoNet as a network source.

Ground Water Network
Includes several online databases.
614/761-3446

Hydroexplorer. Grades 4–6
Computer game that examines a California river from watershed to the ocean. Available in both Macintosh and IBM formats.
Water Education Foundation
717 K Street, Suite 517
Sacramento, CA 95814
916/444-6240

National Consortium for Environmental Education and Training (NCEET)
Envionmental education materials on the Internet for teachers
School of Natural Resources and Environment
University of Michigan
Ann Arbor, MI 48109-1115
313/998-6726
via EE-Link: nceet-info@nceet.snre.umich.edu
(NCEET lists portions of *Educating Young People About Water: A Guide to Goals and Resources*, 1st ed.).

National Geographic Kids Network "What's in our Water?"
Online, interactive environmental education materials and programs for classrooms teachers.
See curriculum #066.
1/800/368-2728
301/921-1380

National Drinking Water Clearinghouse bulletin board
To join call 1/800/932-7459.

Computer software programs

EPA Shareware
Water-related computer programs include Wetlands Education, Groundwater Education, Water Conservation, Surface Water and Water Systems Education.
Public Brand Software
P.O. Box 51315
Indianapolis, IN 46251
1/800/426-8475

Stream Sampler Tour (for Macintosh computers)
Thames Science Center
Connecticut
Gallows Lane
New London, Connecticut 06320
203/442-0391

Watercard: A Hypercard Stack and Manual for Calculating Water Quality (University of Wisconsin Cooperative Extension)
University of Wisconsin
Cooperative Extension
Environmental Resources Center
216 Agriculture Hall
1450 Linden Dr.
Madison, Wisconsin 53706
608/262-0020

Watershed Management Simulator, an interactive computer software program. Also available—The Watershed Manager teacher's guide.
The Watercourse
201 Culbertson Hall
Montana State University
Bozeman, MT 59717-0057
406/994-5392

Other multimedia resources

ERIC–Clearinghouse for Science, Mathematics and Environmental Education
1729 Kenny Road
Columbus, OH 43210-0810
614/292-6717
(Most university libraries have ERIC online).

Environmental films
A list of environmental films to rent or buy.
The National Audiovisual Center
Information Services Section
8700 Edgworth Drive
Capitol Heights, MD 20743-3701
301/763-1896

Global Network for Environmental Education Centers (GNEEC)
Lists over 100 international environmental education centers. You can reach GNEEC via the National Consortium for Environmental Education and Training's access to EE-Link: telnet to: nceet info@nceet.snre.umich.edu
Land Between Lakes
100 Van Morgan Dr.
Golden Pond, KY 42211
502/924-5602

Groundwater flow models
Contact your local Cooperative Extension office for availability.

The Jason Project
Youth groups can experience underwater explorations.
Jason Foundation for Education
395 Totten Pond Road
Waltham, MA 02154
617/487-9995

Contact Tim Armour, Executive Director

Radio Expeditions—Water: Thirsting for Tomorrow
Audio cassette and teacher guide
NPR Outreach
635 Massachusetts Avenue, NW
Washington, DC 20001-3753
202/414-2843

Safe Drinking Water Hotline
Information responds to the Safe Water Drinking Act amendments of 1986.
1-800/426-4791

National Drinking Water Clearinghouse
Advises small communities by collecting, developing and providing information relevant to drinking water issues.
1-800/624-8301

Talk of the Nation: Water, Wetlands, and Weather. Audio cassette and teacher's guide.
NPR Outreach
635 Massachusetts Avenue, NW
Washington, DC 20001-3753
202/414-2843

Terrene Institute nonpoint source model and curriculum for fifth and sixth grade (plastic tabletop model)
Terrene Institute
1000 Connecticut Ave. N.W.,
Suite 802
Washington, D.C. 20036
202/833-8317

Turner Adventure Learning electronic field trips
Produced by Turner Broadcast Company, Atlanta Georgia.
Live, interactive events delivered via cable or satellite. For more information and the 1995/96 schedule, call 1-800-344-6219.
(1994 aired—Wetlands & Natural Resources: Methods of Science and Geography in an Environmental Ecosystem).

Wetlands Education Trunks
Designed for 4th to 6th grader, trunk contains activities, games, puppets and storeis about wetland habitats.
U.S. Fish and Wildlife Service (USFWS)
Trunks are availabe on loan to educators through USFWS state offices.

Guides, manuals and resources for program ideas

In designing a water education program for youth, consider components of program design such as water education needs in the community, partnerships, goal setting and progam delivery strategies. The following resources provide examples and guidelines for youth programs.

For further assistance with program strategies and design, refer to other guides in this series, *Educating Young People About Water: A Guide to Program Planning and Evaluation*, and *Educating Young People About Water: A Guide to Unique Program Strategies* available through ERIC Clearinghouse, 614/292-6717.

Community action—guides and resources

The following materials emphasize the action part of water education by offering youth and youth leaders background information, program design ideas and youth group facilitation.

Building Ownership: A Coach's Guide to Teaching Politics. 1992.
Project Public Life
Humphrey Institute of Public Affairs
University of Minnesota
301–19th Avenue South
Minneapolis, MN 55455
612/625-0142

Business and Education Partnerships: A Resource Guide for Building, Maintaining, and Sustaining Partnerships between Education and Business/Industry
Wisconsin Department of Public Instruction
Education for Employment
P.O. Box 7841
Madison, WI 53707-7841
608/266-2348
608/267-3167

Citizen's Guide to Clean Water
Izaak Walton League of America
707 Conservation Lane
Gaithersburg, Maryland 20878
1/800/BUG-IWLA

The Conservation Handbook. 1991.
Boy Scouts of America
Irvine, TX

Drinking Water: A Community Action Guide
Concern, Inc.
1794 Columbia Road, N.W.
Washington, D.C. 20009
202/328-8160

Getting to Know Your Stream: Making Streams Better

Getting to Know Your Stream: Streambank Habitat

Getting to Know Your Stream: Water Quality and Stream Biology

Getting to Know Your Stream: Watersheds
University of Wisconsin–Cooperative Extension
Dane County WaterWatchers
57 Fairgrounds Drive
Madison, Wisconsin 53713-1497
608/266-4271

Give Water A Hand: Organizing Water Conservation and Pollution Prevention Service Projects in Your Community. 1994.
Four booklets are available: *Community*, *Farm/Ranch*, *Home* and *School*. A leader's guide is included to help facilitate the projects.
Contact your state or county Cooperative Extension office for copies.

Groundwater: A Community Action Guide
Concern, Inc.
1794 Columbia Road, N.W.
Washington, D.C. 20009
202/328-8160

Handle With Care. Your Guide to Preventing Water Pollution
Terrene Institute
1000 Connecticut Ave. N.W.,
Suite 802
Washington, D.C. 20036
202/833-8317

How to Save A River: A Handbook for Citizen Action
River Network
P.O. Box 8787
Portland, OR 97207-8787
503/241-3506
1/800/423-6747

The Kids' Guide to Social Action: How to Solve the Social Problems You Choose and Turn Creative Thinking Into Positive Action
Free Spirit Publishing
400 First Avenue North, Suite 616
Minneapolis, MN 55401
612/338-2068

Make Waves: Become a Water Action Volunteer (WAV)
Department of Natural Resources
101 South Webster Street, Box 7921
Madison, WI 53707
608/266-2621

Making the Rules: A Guidebook for Young People Who Intend to Make a Difference
Project Public Life Press
Humphreys Institute
310–19th Avenue, South
Minneapolis, MN 55455
612/625-0142

No Kidding Around! America's Young Activists are Changing Our World and You Can, Too.
Activism 2000 Project
3909 Prospect Street
Kensington, MD 20895
1-800/KID-POWER

People Protecting Rivers: A Collection of Lessons from Successful Activists
River Network
P.O. Box 8787
Portland, OR 97297
503/241-3506
1-800/423-6747

Save Our Streams. A Citizen Action Program
Izaak Walton League of America
707 Conservation Lane
Gaithersburg, Maryland 20878
1/800/BUG-IWLA

The TEAM Notebook—Teachers' Environmental Action Manual
Sierra Club
730 Polk Street
San Franscico, CA 94109
415/776-2211

Turning the Tide on Trash: A Learning Guide on Marine Debris
U.S. EPA
Office of Water
401 M St., SW
Mail Code WH-556
Washington, DC 20460
202/260-059

Program guides, manuals and summaries

This section lists ideas for program design, collections of program summaries, and examples of settings to implement water education programs such as camps, festivals, etc.

Adopt-a-Lake
College of Natural Resources
University of Wisconsin
Stevens Point, WI 54481
715/346-3366

Adopting-a-Stream: A Northwest Handbook
University of Washington Press,
Adopting-A-Stream Foundation
P.O. Box 50096
Seattle, WA 98145
206/388-3487

Adopt-a-Watershed Program
Hayfork Elementary School
P.O. Box 70, Hwy 3
Hayfork, CA 96041
916/628-5294.

Adopting-a-Wetland: A Northwest Guide
University of Washington Press,
Adopting-a-Stream Foundation
P.O. Box 50096
Seattle, WA 98145
206/388-3311

Angler Education leader training and programs (sponsored by US Fish and Wildlife Service)
Contact your state US Fish and Wildlife Service office or Department of Natural Resources.

Conceptual Encounters I (for ages 10–12) & II (for ages 13–14).
The Institute for Earth Education-Earthkeepers Program
Cedar Grove
Greenville, West Virginia 24945

Drinking Water Education Programs: A Guide for County Faculty
Central Wisconsin Groundwater Center
University of Wisconsin-Extension
UW–Stevens Point College of Natural Resources
Stevens Point, WI
715/346-4270

Educating for Action: More Success Stories from Puget Sound. 1993.
Puget Sound Water Quality Authority
P.O. Box 40900
Olympia, WA 98504-0900
1/800/54-SOUND
206/407-7300
(also available, *Public Involvement and Education Model Projects Fund: 47 Success Stories from Puget Sound*. 1991).

Environmental Success Index
Renew America
1400 16th Street, NW Suite 710
Washington, DC 20036
202/232-2252
(Publishes an annual listing of environmental program summaries throughout the US).

Forest, Stream and Sound: A Guide to Conducting Water Quality Camps for Children and Families
and
More Activities for Forest, Stream and Sound: A Guide to Conducting Water Quality Camps for Children and Families
City of Olympia
Public Works Department
Water Resources Program
P.O.Box 1967
Olympia, WA 98507
206/753-8598

GEM. The Groundwater Education In Michigan Program
Provides projects summaries and resource lists developed through the GEM annual grant program.
The Institute of Water Research
Michigan State University
334 Natural Resources Bldg.
East Lansing, Michigan 48824
517/353-3742

A Guide to Curriculum Planning in Environmental Education. 1994
Publication Sales'Wisconsin
Department of Public Instruction
Drawer 179
Milwaukee, WI 53293-0197
800-243-8782

Hooked On Fishing—Not On Drugs. Teacher's Guide
Future Fisherman Foundation
1250 Grove Avenue, Suite 300
Barrington, IL 60010
708/381-4061

How to Plan a Conservation Education Program
World Resource Institute
1709 New York Avenue, NW,
Suite 700
Washington, DC 20006
202/638-6300

Kids in Creeks: A Creek Exploration and Restoration Program
San Francisco Estuary Institute
(formerly Aquatic Habitat Institute)
180 Richmond Field Station
1301 South 46th Street, #180
Richmond, CA 94804
510/231-9539

Making Waves: How to Put on a Water Festival
Nebraska Groundwater Foundation
P.O. Box 22558
Lincoln, NE 68542-2558
402/434-2740
800/858-4844

Natural Selections
Environmental Education-Sharing Success Programs
Florida Department of Education
Florida Education Center,
Room 224C
Tallahassee, FL 32399
904/487-2310

Reaching Tomorrow's Consumers Today. Youth Education Programs for Utility Managers
American Water Works Association
6666 W. Quincy Ave.
Denver, Colorado 80235
303/794-7711

Tennessee Valley Authority Teacher/Student Water Quality Monitoring Network
Water Quality Branch
Tennessee Valley Authority
270 Haney Bldg.
Chattanooga, Tennessee
37402-2801
303/794-7711

World in Our Backyard: A Wetland Education and Stewardship Program
New England Interstate Water Pollution Control Commission
Distributed by Environmental Media Corporation
P.O. Box 1016
Chapel Hill, NC 27514
919/933-3003

Youth Education Handbook
Trout Unlimited Youth
800 Follin Lane, SE, Suite 250
Vienna VA 22180
703/281-1100

Technical manuals and handbooks

These materials provide youth group leaders with detailed background information in water quality monitoring, groundwater models usage, restoration techniques, etc.

Classrooms Without Walls: A Guide for Developing Aquatic Education Trails
Alaska Department of Fish and Game
Division of Sport Fish, Aquatic Education
PO Box 240020
Douglas, Alaska 99824
907/965-4180

Field Manual for Water Quality Monitoring: An Environmental Education Program for Schools
University of Michigan
School of Natural Resources
Ann Arbor, Michigan 48109-1115
313/764-1817

Habitat Restoration: A Guide for Proactive Schools
by Edward D. Cheskey. 1993.
The Waterloo County Board of Education
Curriculum and Program Development
Outdoor Education Department
18-590 Bearinger Road
Waterloo, Ontario Canada N26 6C4

Lake Smarts: The First Lake Maintenance Handbook
Terre Institute
1717 K Street, NW
Washington, DC 20006-1504
202/833-8317

Manual for Use of the Sand-Tank Groundwater Flow Model
Central Wisconsin Groundwater Center
College of Natural Resources
University of Wisconsin–Stevens Point
Stevens Point, WI
715/346-4270

The Monitor's Handbook
LaMotte Company
P.O. Box 329
Chestertown, MD 21620
800/344-3100

Project Mayfly: Guide to the Determination of Water Pollution in Local Waterways
National Audubon Society
Mid-Atlantic Regional Office
1104 Fernwood Ave., #300
Camp Hill, Pennsylvania 17011
717/763-4985

The following two resources are used together.

A Study Guide to New England's Freshwater Wetlands
University of New Hampshire-Cooperative Extension and New Hampshire Fish and Game Dept.
Public Affairs Division
2 Hazen Drive
Concord, NH 03301

Interpreting Results of Water Quality Tests in Streams and Rivers. 1991.
Frank Mitchell and Jeffery Schloss.
University of New Hampshire-Cooperative Extension
Water Resources Program,
Pettee Hall, Durham, NH 03824.
603/862-1067.

Water Quality Field Guide
Water Quality Indicators Guide: Surface Waters
Contact your state office of the Soil Conservation Service, or
United States Department of Agriculture
Soil Conservation Service
PO Box 2890
Washington, D.C. 20013

Water Quality Series
Booklet 1: Water Quality Sampling Equipment

Booklet 2: Homemade Sampling Equipment (to accompany Tennessee Valley Authority's Teacher/Student Water Quality Monitoring Network)
Water Quality Branch
Tennessee Valley Authority
270 Haney Bldg.
Chattanooga, Tennessee
37402-2801

Water, Water Everywhere
Hach Company
Box 389
Loveland, CO 80539
1-800/227-4224

Wetlands and Water Quality: A Citizen's Handbook for Protecting Wetlands
Lake Michigan Federation
59 East Van Buren, Suite 2215
Chicago, Illinois 60605
312/939-0838

Selected bibliographies, directories and catalogs for further information

1994-95 Directory of American Youth Organizations
Free Spirit Publishing
400 First Avenue North,
Suite 616-43
Minneapolis, MN 55401-1730
1-800/735-7323
612/338-2068 (MN residents)

The Almost But Probably Never Complete Environmental Educator's Resource Directory. R. Troy Colley.
Grays Harbor Conservation District
330 Pioneer West
Montesano, WA 98563
206/249-5980.
(Lists environmental organizations throughout the U.S.)

Catalog of Water Quality Educational Materials
TVA Water Quality Branch
270 Haney Bldg.
Chattanooga, Tennessee 37402-2801
Center for Environmental Education
881 Alama Real Drive, Suite 300
Pacific Palisades, CA 90272
310/454-4585
Houses a comprehensive collection of environmental education materials and provides program information internationally.
Call for information about their newsletter.

Compendium of Educational Materials on the Water Environment
Alliance for Environmental Education, Inc.
51 Main Street
P.O. Box 368
the Plains, VA 22171

Designing a Water Conservation Program: An Annotated Bibliography of Source Materials
Office of Water Resource Center
U.S. EPA
Office of Water, RC-4100
401 M Street, SW
Washington, DC 20460
202/260-7786

Directory of Great Lakes Education Materials
International Joint Commission
Great Lakes Regional Office
100 Ouellette Avenue, Eighth Floor
Windsor, Ontario N9A 6T3
or:
PO Box 32869
Detroit, Michigan 48232-2869

Educational Videos for Children About Our Precious Water Resources!
(U.S. EPA, #430/09-91-016(B)
EPA's Video Lending Library
1/800/624-8301

Environmental Education Compendium for Water Resources
California Department of Water Resources
ATTN: Public Information and Education Branch
1416 9th St., Rm. 1104-1
Sacramento, California 95814
916/653-6192

Environmental Education Materials For Teachers and Young People (Grades K - 12)
(#OPA 87-022, U.S. EPA)
Office of Community and Intergovernmental Relations
(A-108 EA)
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460
202/382-4454

Environmental Media Corporation
P.O. Box 1016
Chapel Hill, NC 27514
1/800/ENV-EDUC
Designs, produces and distributes media to support environmental education.

Florida Marine Education Resources Bibliography–SGR-51
Florida Sea Grant College
Pine Jog Environmental Sciences Center
College of Science
Florida Atlantic University
West Palm Beach, Florida 33406

The Freshwater Foundation Educational Materials
Freshwater Foundation
Spring Hill Center
725 County Rd. 6
Wayzata, Minnesota 55391
612/449-0092

Ground Water Education in America's Schools. A Catalog of Resource Materials for Elementary and Secondary Education Professionals
The American Ground Water Trust
6375 Riverside Drive
Dublin, Ohio 43017
614/761-2215

1990 Nebraska Environmental Education and Information Resources Directory
Nebraska Natural Resources Commission
PO Box 94876
Lincoln, Nebraska 68509-4876
402/471-2081

National Consortium for Environmental Education and Training. (NCEET)
School of Natural Resources and Environment
University of Michigan
Ann Arbor, MI 48109-1115
313/998-6726
(see Computer Program section for Internet information).

National Directory of Volunteer Environmental Monitoring Programs
Fourth Edition, January 1994.
U.S. EPA
Assessment and Watershed Protection Division (4503F)
401 M St., SW
Washington, DC 20460

Save Our Streams Resource List
The Izaak Walton League of America, Inc.
707 Conservation Lane
Gaithersburg, MD 20878-2983
301/548-0150
1/800/BUG-IWLA

Streams, Lakes and Wetlands. A Collection of Curriculum and Reference Materials
City of Everett Department of Public Works
Storm and Surface Water Management
Community Involvement Program
Everett, Washington
206/259-8863

Water Education 101
Youth Education Manager
American Water Works Association
6666 W. Quincy Ave.
Denver, Colorado 80235
303/794-7711

Water Education Foundation Resources Listing
Water Education Foundation
717 K Street, Suite 517
Sacramento, California 95814
916/444-6240

The Water Quality Catalog.
A Source Book of Public Information Materials
Water Environment Federation
601 Wythe Street
Alexandria, Virginia 22314
703/684-2400

Water Quality Education Bibliography
Christopher F. Feise
Washington State University-Cooperative Extension
7612 Pioneer Way E.
Puyallup, Washington 98371-4998
206/840-4556

Youth Water Quality Resources
Cooperative Extension Service
4-H and Youth Development
United States Department of Agriculture
3861 South Building
Washington, D.C. 20250
202/447-5516

Water resources organizations for education, management and protection

A myriad of water-related, grass-root and nonprofit environmental groups exist today. The following organizations are interested in working on water projects with youth groups, and many serve as advisory, technical and public information sources.

American Water Works Association
6666 W Quincy
Denver, CO 80235
303/794-7711
National agency whose members represent the drinking water utility industry. Produce youth water education materials.

GREEN—Global Rivers Environmental Education Network
721 E Huron
Ann Arbor, MI 48104
313/761-8142

Environmental Protection Agency
Office of Water
401 M St., SW
Mail Code WH-556
Washington, DC 20460
202/260-059
Seeks to abate and control water pollution through research, monitoring, standard setting, enforcement and outreach activities.

Izaak Walton League of America
Save Our Streams Program
707 Conservation Lane
Gaithersburg, MD 20878-2983
301/548-0150
1/800/BUG-IWLA
Chapters across the nation, encourage participants to adopt a stream by conducting water and habitat quality monitoring.

The Groundwater Foundation
5561 South 48th, #232B
Lincoln, NE 68516
402/434-2740
A nonprofit educational foundation that educates the public about groundwater conservation and management.

National Aquarium in Baltimore
501 E. Pratt Street
Baltimore, MD 21202
410/576-3887

National Association of Conservation Districts
PO Box 855
League City, TX 77573
713/332-3402
Promotes the wise use of soil and water resources in local conservation districts.

National Marine Education Association
Dauphin Island Marine Lab
PO Box 369-370
Dauphin Island, AL 36528
205/861-7558
An organization of marine educators that teach marine science to students of all ages.

National Project WET
Montana State, Project WET
335 Culbertson Hall
Boseman, MT 59717
406/994-1909

Natural Resources Conservation Service (formerly Soil Conservation Service)
National Conservation Center/NPMC
Building 509, Barc-East
Beltsville, MD 20705-0001
301/504-7037
A United States Department of Agriculture subsidiary that assists private landowners in conservation programs and practices.

River Network
P.O. Box 8787
Portland OR 97207-8787
503/241-3506
National organization that provides information and technical assistance to grass-root river groups.

Tennessee Valley Authority
TVA-WT10D-K
Clean Water Initiative
400 W Summit Hill Drive
Knoxville, TN 37902
615/632-4713

Trout Unlimited
1500 Wilson Blvd., #310
Arlington, VA 22209-2310
703/284-9409
National fishing organization with youth fishing programs in various chapters.

U.S. Fish & Wildlife Service
4401 N Fairfax Dr., WEBB 304
Arlington, VA 22203-3247
703/358-2504
Works to conserve and enhance fish and wildlife and their habitats nationwide.

U.S. Geological Survey (USGS)
Denver Federal Center
PO Box 25046, Mail Stop 414
Denver, CO 80225
303/236-4932
Provides information about the occurrence, availability and ecology of surface and groundwater throughout the us.

Water Environment Federation
601 Wythe Street
Alexandria, VA 22314-1994
703/684-2487
An international, nonprofit organization that coordinates water quality experts to provide technical and educational services to the public.

Western Regional Environmental Education Council (WREEC)
4014 Chatham Lane
Houston, TX 77027
713/520-1936
Develops, disseminates and coordinates environmental education programs and materials.

WETnet—A national and international network of people working with national Project WET and The Watercourse Public Education Program.
For more information, contact
The Watercourse
201 Culbertson Hall
Montana State University
Bozeman, MT 59717-0057
406/994-5392

Authors: Elaine Andrews is an environmental education specialist with the Environmental Resources Center, College of Agricultural and Life Sciences, University of Wisconsin–Madison, and the University of Wisconsin–Extension, Cooperative Extension. Karen Poulin and Kelly Warren are environmental education research specialists with the Environmental Resources Center, University of Wisconsin–Extension, Cooperative Extension.

This material is based upon work suported by the Extension Service, USDA, under special project number 91-EWQ1-1-9030.