THE "MARINATED" CLASSROOM

A SOURCEBOOK OF AQUATIC ACTIVITIES FOR THE SECONDARY CLASSROOM

BY
STEVEN J. RAKOW

THE "MARINATED" CLASSROOM

BY: STEVEN J. RAKOW

This work was supported by a grant from the Minnesota Sea Grant Program.

Principal Investigators: Dr. Eugene Gennaro
Dr. Allen Glenn
Associate Principal Investigator: Dr. Roger Johnson
Editorial Assistant: Evelyn Donald

UNIVERSITY OF MINNESOTA
Minneapolis, Minnesota
1982

WHAT IS "AQUATIC EDUCATION"

"Aquatic" is defined by Webster as "of or pertaining to water." In its broadest sense, then, Aquatic Education would refer to any learning activities that relate to water. However, this broad definition has the potential of being confusing. There are two types of water environments that are of interest to educators, and these two environments differ greatly in their properties and characteristics. Teachers living in coastal regions will be most concerned about the salt water environment of the oceans, estuaries and salt marshes. For this reason, the term "marine" has generally been applied to activities related to the salt water environment. This leaves educators in the midwest, concerned primarily with the study of freshwater lakes and streams, without a good term of reference to describe this specific environment. It is becoming more and more common for the term "Aquatic Education" to be applied to the study of freshwater systems. While this is not a totally accurate use of the term, it is the best term available at this time.

WHY A HANDBOOK OF AQUATIC EDUCATION

Minnesota is termed the "Land of 10,000 Lakes" so it is not surprising that Minnesota students are both interested in and experienced with water environments. However, little teaching specifically related to this uniquely Minnesotan environment is going on in the schools. A frequently heard complaint from teachers is that there are no materials available to meet their needs. This handbook is an attempt to break down that myth.

Curriculum education projects related to Marine and Aquatic Education have gone on in many parts of the country. Some of these have been school district sponsored projects and some sponsored by Title IV-C. However, the vast majority of materials designed to help teachers teach about water have come from the National Sea Grant Program. This agency, part of the Department of Commerce under the auspices of the National Oceanic and Atmospheric Administration, was created in 1966. The goals were to provide the same sort of research emphasis and support to the "water" environment as the Land Grant College Program of the 1800's had to the field of agriculture.

When the program was established, they defined the Great Lakes region as our nation's fourth coastline. This provided the means for Great Lakes states to receive financial support from the program in the areas of Fisheries and Aquaculture, Coastal and Environmental Processes, Water Safety, Recreation and, of course, Education.

HOW TO USE THIS HANDBOOK

The handbook is divided into three sections.

Part I: INTRODUCTION (First section of white pages)

This section of the handbook provides an overview of aquatic education, a description of the use of handbook, and two indices to the curriculum materials. The first index lists the curriculum materials by source with full references for requesting the materials by mail. The second index lists the curriculum materials by their Minnesota Water topic Area. Those topics, with examples are listed below.

WATER TOPICS

A. WATER AND SOCIETY

(1). Water in Our Daily Lives

e.g., water in our homes, city water supplies, transportational and recreational uses of water

(2). Water in History and as a Part of Culture

e.g., importance of water in the choice of sites for cities, importance of Lake Superior in Minnesota's cultural history

(3). The Water Quality Problem

e.g., water shortage, water pollution

B. WATER IN NATURE

(1). Nature's Water Cycle

e.g., characteristics of lakes and streams, the water cycle, the water table, water in erosion, distribution of freshwater

(2). Properties of Water

e.g., physical and chemical properties of water

(3). Life in Water

e.g., biological properties of water, water organisms

C. ATTITUDES AND EXPERIENCES

(1). Attitudes About Water

e.g., importance of protecting water supply, perceived magnitude of the water problem, value for freshwater resources

(2). Experiences With Water

e.g., field trips and vacations to lake areas, ability to swim, films and books about water

Part II: Curriculum Materials (Yellow pages)

For the purposes of this handbook, curriculum materials are defined as instructional materials providing ideas or plans for activities related to water activities. These may be complete courses of study, or they may be short collections of activities. These materials are listed alphabetically by title. In addition, an Index is given to each item so that it can be cross-referenced with the two indices in Part I. This number is composed of three parts. The first part (either CM or R) identifies the citation as referring to either Curriculum Materials or Resources. The second part (either E or S) identifies the grade level of the materials as Elementary or Secondary (both junior high and high school age). Finally the third part (a number) gives a sequential identifier to each of the materials. This might be thought of as a page number for the curriculum materials or the resources. Hence, an item with an Index of:

CM/S/25

would be a curriculum material for secondary students and would be the 25th listing in the yellow paged curriculum materials section.

Part III: Resources (Second section of white pages)

The last part of the handbook lists resources with short annotations. These resources include teacher and student references, trade books, bibliographies, pamphlets, and audio-visual materials and sources. The materials are arranged alphabetically and given an index number in the same manner as curriculum materials. Because many of these materials cover a wide range of topics, they have not been indexed by Minnesota Water Topic Areas.

SECONDARY CURRICULUM MATERIALS INDEXED BY SOURCE

ACID PRECIPITATION AWARENESS PROGRAM
Independent School District #197
1037 Bidwell St.
West St. Paul, MN 55118

COAST PROJECT
Willard Hall Education Building
University of Dealware
Newark, Delaware 19711

ERIC-SMEAC
1200 Chalmers Rd.
Columbus, OH 43212

THE GARDEN CLUB OF AMERICA
598 Madison Ave.
New York, NY 10022

HOLT, RINEHART AND WINSTON
901 N. Elm St.
Hinsdale, Illinois 60521

Miniclimates	CM/S/32
Pollution	CM/S/42
Running Water	CM/S/46
Snow and Ice	CM/S/52

LA SALLE-PERU TOWNSHIP HIGH SCHOOL
District #120
La Salle, Illinois 61301

Water: A Pollution Unit	CM/S/57

MICHIGAN SEA GRANT
School of Natural Resources
University of Michigan
Ann Arbor, Michigan 48109

Investigating the Great Lakes Environment--The Sea Lamprey	CM/S/21

MINNESOTA SEA GRANT EDUCATION PROJECT
c/o Dr. Eugene Gennaro
370 Peik Hall
University of Minnesota
159 Pillsbury Dr. SE
Minneapolis, MN 55455

Minnesota Sea Grant--A Water Primer	CM/S/33
Minnesota Sea Grant--Earth Science Modules	CM/S/34
Minnesota Sea Grant--Extension Modules	CM/S/35
Minnesota Sea Grant--Life Science Modules	CM/S/36

MINNESOTA SEA GRANT EXTENSION SERVICE
University of Minnesota-Duluth
109 Washburn Hall
Duluth, MN 55812

Lacustrine Lessons	CM/S/25

NATIONAL SCIENCE TEACHERS ASSOCIATION
1742 Connecticut Ave., NW
Washington, D.C. 20009

How To...Activities in Physical Oceanography	CM/S/18

NATIONAL WILDLIFE FOUNDATION
Education Servicing
1412 16th St., NW
Washington, DC 20036

Changes in a Small Ecosystem	CM/S/6
Fish and Water Temperature	CM/S/12
Stream Profiles	CM/S/53

NORTHERN NEW ENGLAND MARINE EDUCATION PROJECT
206 Shibles Hall
University of Maine
Orono, Maine 04469

The ABC's of Celebrating the Year of the Coast in Your School	CM/S/1
Aquaculture	CM/S/3
Have You Been to the Shore Before?	CM/S/17
Lighthouses	CM/S/26
Navigation	CM/S/37
Seaweeds	CM/S/47
Shipping, Ships and Waterways	CM/S/49
What Adventures Can You Have in Wetlands, Lakes, Ponds and Puddles?	CM/S/62

OHIO SEA GRANT
283 Arps Hall
1945 N. High St.
Columbus, Ohio 43210

Coastal Processes and Erosion	CM/S/7
The Estuary: A Special Place	CM/S/11
Geography of the Great Lakes	CM/S/14
Getting to Know Your Local Fish	CM/S/15
The Great Lakes Triangle	CM/S/16
How to Protect a River	CM/S/19
How to Recognize, Record and Analyze Characteristics of a Sandy Beach Environment	CM/S/20
It's Everyone's Sea or Is It?	CM/S/23
Knowing the Ropes	CM/S/24
Oil Spill	CM/S/38
PCB's in Fish: A Problem?	CM/S/39
Shipping on the Great Lakes	CM/S/48
Shipping: The World Connection	CM/S/50
To Harvest a Walleye	CM/S/56

POLLUTION CONTROL EDUCATION CENTER
Union Public Schools
Union, New Jersey 07083

Priority One Environment	CM/S/43

PUBLICATIONS DEPARTMENT
Alameda County Public Schools Office
685 A. Street
Haywood, CA 94541

Marine Ecology Research--Junior High Curriculum CM/S/28

SEA GRANT COLLEGE PROGRAM
Texas A and M University
College Station, Texas 77843

Investigating the Marine Environment and Its Resources CM/S/22
Marine Organisms in Science Teaching CM/S/29

SHAWNEE MISSION SCHOOLS
Shawnee Mission, Kansas

Project CLEAN CM/S/44

THOMAS ALVA EDISON FOUNDATION
2000 Second Ave.
Detroit, MI 48226

Environmental Experiments ... from Edison CM/S/10

US FISH AND WILDLIFE SERVICE
Office of Extension Education
Washington, DC 20240

Freshwater Marsh CM/S/13

YOUTH COASTAL EDUCATION PROGRAM
21 S. Grive St.
East Aurora, NY 14052

Aquatic Activities for Youth CM/S/4

SECONDARY CURRICULUM MATERIALS INDEXED BY MINNESOTA WATER TOPIC AREAS

A1. WATER IN OUR DAILY LIVES

A2. WATER IN HISTORY AND AS A PART OF CULTURE

A3. THE WATER QUALITY PROBLEM

Acid Precipitation Awareness Program	CM/S/2
Dissolved Oxygen Measured Qualitatively	CM/S/8
Environmental Experiments...from Edison	CM/S/10
The Estuary: A Special Place	CM/S/11
Fish and Water Temperature	CM/S/12
How To...Acitivities in Physical Oceanography	CM/S/18
How To Protect a River	CM/S/19
How to Recognize, Record and Analyze Characteristics of a Sandy Beach Environment	CM/S/20
Investigating the Great Lakes Environment--The Sea Lamprey	CM/S/21
Investigating the Marine Environment and Its Resources	CM/S/22
Lacustrine Lessons	CM/S/25
Marine Ecology Research Project--Junior High Curriculum	CM/S/28
Measuring Dissolved Oxygen Quantitatively	CM/S/30
Mercury--It's Chemistry in the Ecosystem	CM/S/31
Minnesota Sea Grant--A Water Primer	CM/S/33
Minnesota Sea Grant--Earth Science Modules	CM/S/34
Minnesota Sea Grant--Extension Modules	CM/S/35
Minnesota Sea Grant--Life Science Modules	CM/S/36
Oil Spill	CM/S/38
PCB's in Fish: A Problem?	CM/S/39
Pesticides and the Marine Environment	CM/S/40
Pollution	CM/S/42
Priority One Environment	CM/S/43
Project CLEAN	CM/S/44
Quantitative and Qualitative Analysis of Phosphates in Water	CM/S/45
Testing Water for Bacterial Pollution	CM/S/55
Water: A Pollution Unit	CM/S/57
Water-Related Teaching Activities	CM/S/60
We Can Help	CM/S/61

B1. NATURE'S WATER CYCLE

The ABC's of Celebrating the Year of the Coast in Your School	CM/S/1
Acid Precipitation Awareness Program	CM/S/2
Beaches: A Geological Study	CM/S/5
Coastal Processes and Erosion	CM/S/7
Ecology of Sand Dunes	CM/S/9
Environmental Experiments ... from Edison	CM/S/10
Geography of the Great Lakes	CM/S/14
How to Protect a River	CM/S/19
How to Recognize, Record and Analyze Characteristics of a Sandy Beach Environment	CM/S/20
Investigating the Marine Environment and Its Resources	CM/S/22
Lacustrine Lessons	CM/S/25
Miniclimates	CM/S/32
Minnesota Sea Grant--A Water Primer	CM/S/33
Minnesota Sea Grant--Earth Science Modules	CM/S/34

B1. NATURE'S WATER CYCLE, cont.

B2. PROPERTIES OF WATER

B3. LIFE IN WATER

B3. LIFE IN WATER, cont.

C1. ATTITUDES ABOUT WATER

C2. EXPERIENCES WITH WATER

C2. EXPERIENCES WITH WATER, cont.

Freshwater Marsh	CM/S/13
Have You Been to the Shore Before?	CM/S/17
Investigating the Marine Environment and Its Resources	CM/S/22
Lacustrine Lessons	CM/S/25
Minnesota Sea Grant--A water Primer	CM/S/33
Minnesota Sea Grant--Earth Science Modules	CM/S/34
Minnesota Sea Grant--Extension Modules	CM/S/35
Minnesota Sea Grant--Life Science Modules	CM/S/36
Snow and Ice	CM/S/52
Stream Profiles	CM/S/53
Water-Related Teaching Activities	CM/S/60
We Can Help	CM/S/61
What Adventures Can You Have in Wetlands, Lakes, Ponds and Puddles?	CM/S/62

CURRICULUM MATERIALS

Index: CM/S/1

NAME: The ABC's of Celebrating Year of the Coast in Your School

SOURCE: NNMEP (Northern New England Marine Education Project)

PRICE: $2.00 + $1.50 Handling

GRADE LEVEL: K-12

SUBJECT AREA(S): Various

MINNESOTA WATER TOPICS (A1) (A2) A3 (B1) (B2) (B3) (C1) (C2)

TOPICS:

STUDENT PREREQUISITES:

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED:

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

(READINGS) (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: The unit is a collection of ideas for learning about the marine environment. An excellent resource.

Index: CM/S/2

NAME: Acid Precipitation Awareness Program

SOURCE: Acid Precipitation Awareness Program

PRICE:

GRADE LEVEL: Secondary

SUBJECT AREA(S): (on back)-6 Areas

MINNESOTA WATER TOPICS (A1) (A2) (A3) (B1) (B2) (B3) (C1) (C2)

TOPICS: (on back) topics listed under each area

STUDENT PREREQUISITES: Knowledge of Acid Rain and Environmental Problems.

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

Before each unit background information is provided.

TIME REQUIRED:

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) (GAMES/SIMULATIONS)

(READINGS) (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) (EVALUATION MATERIALS)

(LAB EQUIPMENT AVAILABLE) (AUDIO VISUAL MATERIALS)

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

An extensive list of references and helpful resources is included.

COMMENTS: These units suggest ways in which teachers can help students learn science while also learning about a major environmental problem: acid precipitation. It is a flexible curriculum which could be used in an interdisciplinary manner.

Index: CM/S/3

NAME: Aquaculture

SOURCE: NNMEP (Northern New England Marine Education Project)

PRICE: $2.00 + $1.50 handling

GRADE LEVEL: 9-12

SUBJECT AREA(S): Biology, Social Studies, Home economics

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 (B3) C1 C2

TOPICS: Preparing meals from marine organisms

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Specifically related to marine organisms. May be difficult to obtain specimens for activities.

Index: CM/S/4

NAME: Aquatic Activities for Youth

SOURCE: Youth Coastal Education Program,

PRICE: 9 units x 35¢ each

GRADE LEVEL: 4-9

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS (A1) (A2) A3 B1 (B2) (B3) (C1) (C2)

TOPICS: Introduction; 1-Fish Aquariums; 2-Raising Earthworms; 3-Entomology and Water; 4-Rope; 5-Calculating Stream Flow; 6-Cobbler's Cove; 7-A Saltwater World in a Jar; 8-Fish in Your Diet

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	(GAMES/SIMULATIONS)
READINGS	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Units were originally designed for 4H and scouting groups. Material easy to obtain except for some which are specific to the marine environment.

Index: CM/S/5

NAME: Beaches: A Geological Study

SOURCE: COAST

PRICE: $1.50

GRADE LEVEL: 8-12

SUBJECT AREA(S): Earth Science, General Science

MINNESOTA WATER TOPICS A1 A2 A3 (B1) B2 B3 C1 (C2)

TOPICS: Erosion, beach formation

STUDENT PREREQUISITES:

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 5-10 Class periods (1 day field trip)

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Presents plans for building equipment to study a beach and adjacent lake region.

Index: CM/S/6

NAME: Changes in a Small Ecosystem

SOURCE: National Wildlife Federation,

PRICE: $1.50

GRADE LEVEL: 5-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 (B3) C1 C2

TOPICS: Field Trip, classroom observation, sampling

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 21 days (minimal observation each day)

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)

READINGS

(LAB ACTIVITIES)

LAB EQUIPMENT AVAILABLE

GAMES/SIMULATIONS

(DISCUSSION QUESTIONS)

EVALUATION MATERIALS

AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Materials common and easily obtained. Many open-ended activities. "Lots of inquiry.". "We have many places where students can apply these activities."

Index: CM/S/7

NAME: Coastal Processes and Erosion

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: $1.00 (teacher and student guide)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 (B1) B2 B3 C1 C2

TOPICS: Effect of shoreline erosion; methods of controling erosion

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 2-3 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)
(READINGS)
(LAB ACTIVITIES)
LAB EQUIPMENT AVAILABLE

GAMES/SIMULATIONS
(DISCUSSION QUESTIONS)
(EVALUATION MATERIALS)
(AUDIO VISUAL MATERIALS)

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/8

NAME: Dissolved Oxygen Measured Qualitatively

SOURCE: COAST

PRICE: $1.40

GRADE LEVEL: 7-10

SUBJECT AREA(S): Biology, Chemistry, General science

MINNESOTA WATER TOPICS A1 A2 (A3) B1 (B2) B3 C1 C2

TOPICS:

STUDENT PREREQUISITES: Basic lab and science skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 4-5 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

READINGS (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/9

NAME: Ecology of Sand Dunes

SOURCE: Coast

PRICE: $.50

GRADE LEVEL: 7-12

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 (B1) B2 B3 C1 C2

TOPICS:

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 1 class period

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/10

NAME: Environmental Experiments ... from Edison

SOURCE: Thomas Alv. Edison Foundation

PRICE:

GRADE LEVEL: 4-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS (A1) A2 (A3) (B1) B2 B3 C1 C2

TOPICS: Water from Plants; A Model Water Filter; Water Holding capacity of Soils

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 1 class period

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
OTHER _____	

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS: Easily obtained materials

Index: CM/S/11

NAME: The Estuary: A Special Place

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: $1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 (A3) B1 B2 (B3) C1 C2

TOPICS: Ecological Sampling; Organisms in an Estuary, Effects of human forces on estuaries.

STUDENT PREREQUISITES: None.

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 2 class periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS:

Index: CM/S/12

NAME: Fish and Water Temperature

SOURCE: National Wildlife Federation

PRICE: $1.50

GRADE LEVEL: 4-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 (A3) B1 B2 (B3) C1 C2

TOPICS: Thermal pollution, behavior of fish

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 4-5 days

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

Teacher and student lists.

COMMENTS: Material easily obtained.

Index: CM/S/13

NAME: Freshwater Marsh

SOURCE: U.S. Fish and Wildlife Service

PRICE: Trial Edition currently limitedly available - Free

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 (B3) C1 (C2)

TOPICS: Marsh Succession; Marsh Settlers; A Model Marsh

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 3-5 periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) (GAMES/SIMULATIONS)

(READINGS) DISCUSSION QUESTIONS

LAB ACTIVITIES (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

(OTHER) Posters

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: "All materials are easily adaptable" "Information is clearly described."

Index: CM/S/14

NAME: Geography of the Great Lakes

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: $1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 (A2) A3 (B1) B2 B3 C1 C2

TOPICS: Names of Great Lakes and major Great Lakes Cities; Mapping activity; Volume by water displacement

STUDENT PREREQUISITES: Mapping skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 3-4 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

READINGS (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/15

NAME: Getting to Know Your Local Fish

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE:$1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 (B3) C1 C2

TOPICS: Classification

STUDENT PREREQUISITES:

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED:

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
READINGS	(DISCUSSION QUESTIONS)
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS:

Index: CM/S/16

NAME: The Great Lakes Triangle

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: $1.00 (teacher and Student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Social Studies, Literature

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

TOPICS: Great Lakes Triangle, Bathymetric charts, The Wreck of the Edmund Fitzgerald

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 2-3 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)

(READINGS)

LAB ACTIVITIES

LAB EQUIPMENT AVAILABLE

OTHER _____

GAMES/SIMULATIONS

(DISCUSSION QUESTIONS)

(EVALUATION MATERIALS)

AUDIO VISUAL MATERIALS

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Excellent background material on the wreck of the Edmund Fitzgerald in Lake Superior.

Index: CM/S/17

NAME: Have You Been to the Shore Before?

SOURCE: Northern New England Marine Education Project

PRICE: $2.00 + $1.50 handling

GRADE LEVEL: 7-9

SUBJECT AREA(S): Life Science, Biology

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

TOPICS: Life at the Shore; Seashore life; Beach field activities

STUDENT PREREQUISITES: Some basic biology would be helpful

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES NO

RESOURCES/REFERENCES CITED YES NO
Film and book list

COMMENTS: Major focus is on ocean seashore.

Index: CM/S/18

NAME: How To... Activities in Physical Oceanography

SOURCE: National Science Teachers Association

PRICE: $1.00

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 (A3) B1 (B2) B3 C1 C2

TOPICS: Water Hardness, Freshwater from Sea Water, Water Pressure and Depth, Waves, Beach Formation and Erosion, Density Currents, Icebergs

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES (NO)

TIME REQUIRED: 1 calss period for each activity

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	(DISCUSSION QUESTIONS)
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO
Minimal number

COMMENTS:

Index: CM/S/19

NAME: How to Protect a River

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: $1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 (A3) (B1) B2 B3 C1 C2

TOPICS: River characteristics, river pollution

STUDENT PREREQUISITES: Map reading skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 2-3 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
READINGS	(DISCUSSION QUESTIONS)
LAB ACTIVITIES	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
OTHER _____	

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS: References a river in Ohio, but could be adapted to local needs.

Index: CM/S/20

NAME: How to Recognize, Record and Analyze Characteristics of a Sandy Beach Environment

SOURCE: COAST

PRICE: $5.60

GRADE LEVEL: 10-12

SUBJECT AREA(S): Biology

MINNESOTA WATER TOPICS A1 A2 (A3) (B1) B2 B3 C1 C2

TOPICS: Dune Formation

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	(AUDIO VISUAL MATERIALS)

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/21

NAME: Investigating the Great Lakes Environment - The Sea Lamprey Story

SOURCE: Michigan Sea Grant,

PRICE: $37.50 (186 Pages and film strip)

GRADE LEVEL: 6-8

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1 (A2) (A3) B1 B2 (B3) (C1) C2

TOPICS: The Sea Lamprey (life cycle, history, control)

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Varies from 1 period for some activies to 14 periods for the whole unit.

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) (GAMES/SIMULATIONS)

(READINGS) (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE (AUDIO VISUAL MATERIALS)

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: A comprehensive approach to a single environmental issue utilizing a variety of techniques. "Reading level seems high for 7th-8th graders." "Even though we are not right on the Great Lakes in Mpls/St. Paul, it's important to stress the interrelationships of animals, especially when a foreign organism is intorduced into a new environment." "Materials are too indepth-and too specific."

Index: CM/S/22

NAME: Investigating the Marine Environment and Its Resources

SOURCE: Sea Grant College Program, Texas A & M University

PRICE: $8.00 (500 pages)

GRADE LEVEL: 4-9

SUBJECT AREA(S): Science, Social Studies, language, art

MINNESOTA WATER TOPICS (A1) (A2) (A3) (B1) (B2) (B3) (C1) (C2)

TOPICS: Extremely comprehensive and varied

STUDENT PREREQUISITES: Variable

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable (most activities designed for 1-2 periods)

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) (GAMES/SIMULATIONS)

(READINGS) (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) EVALUATION MATERIALS

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: The single most comprehensive collection of marine activities available.

Index: CM/S/23

NAME: It's Everyone's Sea or Is It?

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: $1.00 (teacher and student guide)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

TOPICS: Topography of Atlantic Basin; International Trade and Regulations

STUDENT PREREQUISITES: Map reading skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 2-3 Class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	(GAMES/SIMULATIONS)
READINGS	(DISCUSSION QUESTIONS)
LAB ACTIVITIES	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS:

Index: CM/S/24

NAME: Knowing the Ropes

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: $1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Social Studies, Language

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

TOPICS: Rope construction, Sailor's knots

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 2 class periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES NO

RESOURCES/REFERENCES CITED YES NO

COMMENTS: Activities relating the construction, history and folk-lore of ropes on sailing vessels.

Index: CM/S/25

NAME: Lacustrine Lessons

SOURCE: Minnesota Sea Grant Extension Service

PRICE: Free

GRADE LEVEL: K-12

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS (A1) (A2) (A3) (B1) (B2) (B3) (C1) (C2)

TOPICS: Variety including Freshwater Aquaria, Turn-over, Gyotaicu, Building a Coastal City, Acid Rain

STUDENT PREREQUISITES: Varies

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Generally 1-2 class periods per activity

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	(GAMES/SIMULATIONS)
READINGS	(DISCUSSION QUESTIONS)
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: A periodic newsletter published by Minnesota Sea Grant listing aquatic activities.

Index: CM/S/26

NAME: Lighthouses

SOURCE: NNMEP (Northern New England Marine Education Project)

PRICE: $2.00 + $1.50 Handling

GRADE LEVEL: 8

SUBJECT AREA(S): Literature, Social Studies, Math

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

TOPICS: Reminiscences of a lighthouse keeper, navigation activities.

STUDENT PREREQUISITES:

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: Various

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	(GAMES/SIMULATIONS)
(READINGS)	(DISCUSSION QUESTIONS)
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	(AUDIO VISUAL MATERIALS)

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Would need major revision to be suitable for MN. Could be used before a trip to Split Rock Lighthouse.

Index: CM/S/27

NAME: Marine Aquaria #3

SOURCE: COAST

PRICE: $.50

GRADE LEVEL: K-12

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 (B3) C1 C2

TOPICS:

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/28

NAME: Marine Ecology Research Project - Junior High Curriculum

SOURCE: Publications Dept., Alameda County Schools Office,

PRICE: $5.50

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Language

MINNESOTA WATER TOPICS A1 A2 (A3) B1 (B2) (B3) C1 C2

TOPICS: Estuaries, Intertidal zones, intertebrates, taxonomy, fish, plankton, food web, marshes, seaweeds, saltwater.

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Complete curriculum (activities of variable length)

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) (GAMES/SIMULATIONS)

(READINGS) (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) EVALUATION MATERIALS

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO
Films, loan books, children's books - Extensive

COMMENTS: Wide variety of activities. Most marine oriented, but many of interest to or adaptable for MN students. (esp. section on plankton, food web, and some fish activities).

Index: CM/S/29

NAME: Marine Organisms in Science Teaching

SOURCE: Sea Grant College Program, Texas A & M University

PRICE: $4.00 (192 pages)

GRADE LEVEL: 4-12

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 (B3) C1 C2

TOPICS: Marine Organisms

STUDENT PREREQUISITES: Variable (from none to basic biology)

TEACHER BACKGROUND INFORMATION PROVIDED: YES (NO)
Only minimal background given

TIME REQUIRED: Variable depending on activity (most activities designed for 1-2 periods).

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Each unit uses the format: pre-lab, lab, post-lab. Some organisms (brine shrimp) easily available to MN teachers. Others (e.g. sea anemone's) could be ordered. A list of supplies is given.

Index: CM/S/30

NAME: Measuring Dissolved Oxygen Quantitatively

SOURCE: COAST

PRICE: $1.20

GRADE LEVEL: 10-12

SUBJECT AREA(S): Biology, Chemistry

MINNESOTA WATER TOPICS A1 A2 (A3) B1 (B2) B3 C1 C2

TOPICS:

STUDENT PREREQUISITES: Chemistry skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

READINGS (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) EVALUATION MATERIALS

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/31

NAME: Mercury - It's Chemistry in the Ecosystem

SOURCE: COAST

PRICE: $1.35

GRADE LEVEL: 10-12

SUBJECT AREA(S): Chemistry, Biology

MINNESOTA WATER TOPICS A1 A2 (A3) B1 B2 B3 C1 C2

TOPICS:

STUDENT PREREQUISITES: Chemistry skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 1-4 periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	(DISCUSSION QUESTIONS)
LAB ACTIVITIES	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS:

Index: CM/S/32

NAME: Miniclimates

SOURCE: Holt, Rinehart, Winston

PRICE:

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1 A2 A3 (B1) B2 B3 C1 C2

TOPICS: Temperature; Light; Moisture; Wind; Soil

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

(READINGS) (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) EVALUATION MATERIALS

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/33

NAME: Minnesota Sea Grant - A Water Primes

SOURCE: Minnesota Sea Grant Education Project

PRICE: Free

GRADE LEVEL: 5-8

SUBJECT AREA(S): Science/Social Studies

MINNESOTA WATER TOPICS (A1) (A2) (A3) (B1) (B2) (B3) (C1) (C2)

TOPICS: Water Properties; Water Pollution; Acids and Bases; Acid Precipitation

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
READINGS	(DISCUSSION QUESTIONS)
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Open-ended activities providing a background knowledge for the study of water pollution.

Index: CM/S/34

NAME: Minnesota Sea Grant Earth Science Modules

SOURCE: Minnesota Sea Grant Ed. Project

PRICE: Free

GRADE LEVEL: 5-8

SUBJECT AREA(S): Science/Social Studies

MINNESOTA WATER TOPICS (A1) (A2) (A3) (B1) (B2) (B3) (C1) (C2)

TOPICS: The Water Cycle; Minnesota's Glacial Past; Acids and Rocks; Stream Tables

STUDENT PREREQUISITES: Basic knowledge of acids

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
READINGS	(DISCUSSION QUESTIONS)
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/35

NAME: Minnesota Sea Grant - Extension

SOURCE: Minnesota Sea Grant Education Project

PRICE: Free

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science/Social Studies

MINNESOTA WATER TOPICS (A1) (A2) (A3) (B1) (B2) (B3) (C1) (C2)

TOPICS: The Acid Rain Game; A B.W.C.A. Case Study; The Acid Rain Controversy

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) (GAMES/SIMULATIONS)

READINGS (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/36

NAME: Minnesota Sea Grant - Life Science Modules

SOURCE: Minnesota Sea Grant Education Project

PRICE: Free

GRADE LEVEL: 5-8

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS (A1) (A2) (A3) (B1) (B2) (B3) (C1) (C2)

TOPICS: A Model Ecosystem; Food Chains; Acids and Brine Shrimp; A Field Trip Guide

STUDENT PREREQUISITES: Basic knowledge of Acids

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)
READINGS
(LAB ACTIVITIES)
LAB EQUIPMENT AVAILABLE
OTHER _____

GAMES/SIMULATIONS
(DISCUSSION QUESTIONS)
EVALUATION MATERIALS
AUDIO VISUAL MATERIALS

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/37

NAME: Navigation

SOURCE: NNMEP (Northern New England Marine Education Project)

PRICE: $2.00 + $1.50 handling

GRADE LEVEL: 9-12

SUBJECT AREA(S): Math

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

TOPICS: Dead reckoning, determining latitude and longitude, bearings

STUDENT PREREQUISITES: Range of background knowledge from algebra to trigonometry depending on problems chosen.

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

(OTHER) Math Problems

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Of primary value only to those living on the ocean or a very large lake. Some extension activities can be adapted to land use.

Index: CM/S/38

NAME: Oil Spill

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: $1.00 (student and teacher guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 (A3) B1 B2 B3 C1 C2

TOPICS: Sources of oil spills, cleaning-up spills, effects of oil on organisms

STUDENT PREREQUISITES: Decimal multiplication skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 3 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

(READINGS) (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Contains several highly motivating activities dealing with various methods of cleaning up oil spills.

Index: CM/S/39

NAME: PCB's in Fish: A Problem?

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE:$1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 (A3) B1 B2 (B3) C1 C2

TOPICS: PCB pollution

STUDENT PREREQUISITES: graphing skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 1-2 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

READINGS (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) EVALUATION MATERIALS

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/40

NAME: Pesticides and the Marine Environment

SOURCE: COAST

PRICE: $1.05

GRADE LEVEL: 7-12

SUBJECT AREA(S): Biology

MINNESOTA WATER TOPICS A1 A2 (A3) B1 B2 B3 C1 C2

TOPICS: Effects of pesticides on photosynthesis

STUDENT PREREQUISITES: Some knowledge of pesticide toxicity

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 1-2 periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Activity is a "dry lab' designed by students. Masters for data are provided for duplication.

Index: CM/S/41

NAME: Physical Properties of Water

SOURCE: COAST

PRICE: $1.10

GRADE LEVEL: 10-12

SUBJECT AREA(S): Biology, Chemistry

MINNESOTA WATER TOPICS A1 A2 A3 B1 (B2) B3 C1 C2

TOPICS:

STUDENT PREREQUISITES:

TEACHER BACKGROUND INFORMATION PROVIDED: YES (NO)

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Presents a general outline for the study of water properties. Includes transparency masters for duplication.

Index: CM/S/42

NAME: Pollution

SOURCE: Holt, Rinehart, Winston

PRICE:

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1 A2 (A3) B1 B2 B3 (C1) C2

TOPICS:

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)
(READINGS)
(LAB ACTIVITIES)
LAB EQUIPMENT AVAILABLE
OTHER _____

GAMES/SIMULATIONS
(DISCUSSION QUESTIONS)
EVALUATION MATERIALS
AUDIO VISUAL MATERIALS

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/43

NAME: Priority One Environment

SOURCE: Pollution Control Education Center, Union Public Schools, Union, NJ 07083
PRICE: $5.50 - Teacher Guides

GRADE LEVEL: 7-12

SUBJECT AREA(S): Science, Social Studies, Language

MINNESOTA WATER TOPICS A1 A2 (A3) B1 B2 B3 (C1) C2

TOPICS: Air Pollution and Your Health; Open Lands and Wildlife; Water Supplies; The Energy Challenge

STUDENT PREREQUISITES: Basic science skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)
(READINGS)
(LAB ACTIVITIES)
LAB EQUIPMENT AVAILABLE
OTHER _____

GAMES/SIMULATIONS
DISCUSSION QUESTIONS
EVALUATION MATERIALS
(AUDIO VISUAL MATERIALS)

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS:

Index: CM/S/44

NAME: Project CLEAN

SOURCE: Shawnee Missions Schools

PRICE:

GRADE LEVEL: 9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 (A3) B1 (B2) B3 C1 C2

TOPICS: Properties of Acids; Acid Pollution

STUDENT PREREQUISITES: Completion of Chapter IV in IPS

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 10 days

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

READINGS (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO
Very limited

COMMENTS: "Introductory unit on Acids."

Index: CM/S/45

NAME: Quantitative and Qualitative Analysis of Phosphate in Water

SOURCE: COAST

PRICE: $1.00

GRADE LEVEL: 11-12

SUBJECT AREA(S): Chemistry

MINNESOTA WATER TOPICS A1 A2 (A3) B1 (B2) B3 C1 C2

TOPICS: Spectiophotometric analysis of phosphate.
Qualitative analysis of phosphate.

STUDENT PREREQUISITES: Advanced chem/math skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 6 periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Quantitative method requires a spectrophotometer.

Index: CM/S/46

NAME: Running Water

SOURCE: Holt, Rinehart, Winston

PRICE:

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS (A1) A2 A3 B1 B2 B3 C1 C2

TOPICS:

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

(READINGS) (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) EVALUATION MATERIALS

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/47

NAME: Seaweeds

SOURCE: NNMEP (Northern New England Marine Education Project)

PRICE: $2.00 + $1.50

GRADE LEVEL: 9-12

SUBJECT AREA(S): Biology, Chemistry, History

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 (B3) C1 C2

TOPICS: Marine plants, industrial uses, ecology of marine plants

STUDENT PREREQUISITES:

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO
Extensive background on marine plants

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Specimens would be difficult to obtain in Minnesota.

Index: CM/S/ 48

NAME: Shipping on the Great Lakes

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: $1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

TOPICS: Transportation on the Great Lakes, map reading.

STUDENT PREREQUISITES: Decimal manipulation; map reading

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 1-2 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
LAB ACTIVITIES	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/49

NAME: Shipping, Ships and Waterways

SOURCE: NNMEP (Northern New England Marine Education Project)

PRICE: $2.00 + $1.50 handling

GRADE LEVEL: 7

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

TOPICS: Types of ships

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
OTHER _____	

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: Primary focus on ocean shipping. It does have an extensive appendix on the wreck of the Edmund Fitzgerald in Lake Superior.

Index: CM/S/50

NAME: Shipping: The World Connection

SOURCE: Ohio Sea Grant (OEAGLS)

PRICE: $1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

TOPICS: Locks along the Great Lakes, international shipping on the Great Lakes.

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 2 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

(READINGS) (DISCUSSION QUESTIONS)

LAB ACTIVITIES (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

(OTHER) Crossword Puzzle

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS:

Index: CM/S/51

NAME: Simulation Game: Super-port

SOURCE: COAST

PRICE: $1.65

GRADE LEVEL: 10-12

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

TOPICS: Simulation of the effect of a "super-port" on the marine environment.

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 12 class periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	(GAMES/SIMULATIONS)
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/52

NAME: Snow and Ice

SOURCE: Holt, Rinehart, Winston

PRICE:

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1 A2 A3 (B1) (B2) B3 C1 (C2)

TOPICS: Structure of Snow

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

(READINGS) (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) EVALUATION MATERIALS

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/53

NAME: Stream Profiles

SOURCE: The National Wildlife Federation

PRICE: $1.00

GRADE LEVEL: 4-9

SUBJECT AREA(S): Science, Math

MINNESOTA WATER TOPICS A1 A2 A3 (B1) B2 B3 C1 (C2)

TOPICS: Survey of a stream

STUDENT PREREQUISITES: Basic mathematics skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 4-5 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

READINGS (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) EVALUATION MATERIALS

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS: Materials easily obtained. High degree of student involvement.

Index: CM/S/54

NAME: Testing Water for Bacterial Pollution #205

SOURCE: COAST

PRICE: $1.30

GRADE LEVEL: 8-12

SUBJECT AREA(S): Biology

MINNESOTA WATER TOPICS A1 A2 (A3) B1 B2 B3 C1 C2

TOPICS:

STUDENT PREREQUISITES: Basic biology skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 3-4 periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/55

NAME: The Subsets of a Pond

SOURCE: COAST

PRICE: .95¢

GRADE LEVEL: 7-9

SUBJECT AREA(S): Math

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 (B3) C1 C2

TOPICS: Set theory applied to marine examples

STUDENT PREREQUISITES: basic 7th grade math skills

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 1 class period

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
(OTHER) Math problems	

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS: Uses marine organism relationships to develop the concept of sets.

Index: CM/S/56

NAME: To Harvest a Walleye

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: $1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science/math

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 (B3) C1 C2

TOPICS: Population dynamics of walleye, Food webs

STUDENT PREREQUISITES: basic math

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 1-2 class periods

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) (GAMES/SIMULATIONS)

READINGS DISCUSSION QUESTIONS

LAB ACTIVITIES (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

(OTHER) Masters for game boards

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS:

Index: CM/S/57

NAME: Water - A Pollution Unit - Project Creation

SOURCE: La Salle-Peru Township High School

PRICE: $2.25

GRADE LEVEL: Secondary

SUBJECT AREA(S): Earth and Life, Biology, Chemistry

MINNESOTA WATER TOPICS (A1) A2 (A3) (B1) (B2) (B3) (C1) C2

TOPICS: Water's Cycle and the Ecosystem, Source of Water Pollution, BOD: Organic Water Pollution, the Government and Water Pollution

STUDENT PREREQUISITES: Student Background info. in provided in the unit.

TEACHER BACKGROUND INFORMATION PROVIDED: YES (NO)

TIME REQUIRED: 17-23 hours

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS (GAMES/SIMULATIONS)

(READINGS) (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

Several options are given to students.

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS: The Water Pollution Unit is one of 15 Creation Units, an interdisciplinary curriculum (science/social studies) in High School environmental education. It is designed to prepare students to to examine local water pollution problems and to understand why citizens must develop an environmental ethic based on sound technological choices. (The materials needed are easy to locate or are provided.)

Index: CM/S/58

NAME: Water Density and Ocean Currents

SOURCE: COAST

PRICE: $.90

GRADE LEVEL: 7-10

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 (B1) (B2) B3 C1 C2

TOPICS: Density of water, currents

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED:

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS)	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/59

NAME: Water Quality and Treatment

SOURCE: COAST

PRICE: $1.15

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, English

MINNESOTA WATER TOPICS (A1) A2 A3 B1 B2 B3 C1 C2

TOPICS: Treatment of Drinking Water, Tap Water

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 2 class periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS:

Index: CM/S/60

NAME: Water-Related Teaching Activities

SOURCE: ERIS-SMEAC

PRICE:

GRADE LEVEL: K-12

SUBJECT AREA(S): Science, Math Social Studies, Art, Language Art, Music

MINNESOTA WATER TOPICS (A1) (A2) (A3) (B1) (B2) (B3) (C1) (C2)

TOPICS: Collection of activities appearing in ERIC documents

STUDENT PREREQUISITES: Variable, but generally none

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO
Minimal

TIME REQUIRED: generally 1 period per activity

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	(GAMES/SIMULATIONS)
(READINGS)	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS: Excellent collection of a variety of activities.

Index: CM/S/61

NAME: We Can Help

SOURCE: U.S. Fish and Wildlife Service

PRICE: $20.00 for 24 units + $1.00 postage

GRADE LEVEL: Level I (4-6) Level II (7-12)

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1 A2 (A3) B1 (B2) B3 (C1) (C2)

TOPICS: Examples are: Water Flow and Impoundment; Snow; Fish Hatcheries; Water Quality Analysis; Waterfowl Nest Structures; Wetlands and Wildlife; Fish Populations

STUDENT PREREQUISITES: Variable

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 1 day for each unit

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) (GAMES/SIMULATIONS)

READINGS DISCUSSION QUESTIONS

(LAB ACTIVITIES) EVALUATION MATERIALS

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES (YES) NO

RESOURCES/REFERENCES CITED (YES) NO

COMMENTS: The focus is specifically on outdoor education. Good supplement to an environmental field trip.

Index: CM/S/62

NAME: What Adventures Can You Have in Wetlands, Lakes, Ponds and Puddles?

SOURCE: Northern New England Marine Education Project

PRICE: $2.00 + $1.50 Postage/handling

GRADE LEVEL: 7-9

SUBJECT AREA(S): Life science; social studies

MINNESOTA WATER TOPICS: A1 (A2) A3 (B1) B2 (B3) (C1) (C2)

TOPICS: Introduction to Wetlands, streams, lakes, ponds and puddles. Fieldguide, classroom model ecosystem, aquatic art activities.

STUDENT PREREQUISITES: Some basic biology would be helpful.

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO
Excellent background information

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

(WORKSHEETS) GAMES/SIMULATIONS

READINGS (DISCUSSION QUESTIONS)

(LAB ACTIVITIES) (EVALUATION MATERIALS)

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED (YES) NO
Teacher and student booklist provided.

COMMENTS: Some materials for the field trip may be difficult to obtain. Interdisciplinary approach used.

Index: CM/S/63

NAME: What is Physical Oceanography

SOURCE: COAST

PRICE: $1.00

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 B1 (B2) B3 C1 C2

TOPICS: Properties of Sea water, Physical properties of water, Physical features of the ocean.

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	(DISCUSSION QUESTIONS)
(LAB ACTIVITIES)	(EVALUATION MATERIALS)
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS

OTHER _____

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS:

Index: CM/S/64

NAME: The World Around You - Environmental Education Packet

SOURCE: The Garden Club of America

PRICE: Free

GRADE LEVEL: 6-9

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

TOPICS: General topics in environmental education

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
(READINGS)	DISCUSSION QUESTIONS
(LAB ACTIVITIES)	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
(OTHER) Posters	

EXTENSIONS OR RELATED ACTIVITIES YES (NO)

RESOURCES/REFERENCES CITED YES (NO)

COMMENTS:

RESOURCES

R/S/1
AMERICANS AND THE WORLD OF WATER
edited by Harold Goodwin
Sea Grant Publication
University of Delaware
College of Marine Studies
Newark, DE 19711 1977

Marine specialists contribute the chapters that recall the importance of the world of water to Americans everywhere.

R/S/2
AQUATIC SCIENCE - MARINE FISHERIES BIOLOGY
James T. Davis, and Deborah J. Lightfoot
Marine Information Service, Sea Grant Program
Texas A & M University
College Station, Texas 77843

The information about food chains and webs could be used in study on freshwater. Otherwise most of the activities are most appropriate for marine science. However, the suggested activities could be adapted for freshwater study.

R/S/3
AROUND THE SHORES OF LAKE SUPERIOR: A GUIDE TO HISTORIC SITES
Margaret Beattie Bohue, and Virginia A. Palmer
University of Wisconsin Press
Wisconsin Sea Gratn College Program 1979

A book to enrich anyone's historic background about the Lake Superior Region and would promote an appreciation for the unique qualities of the area.

R/S/4
BIENNIAL REPORT: LIMNOLOGICAL RESEARCH CENTER
H. E. Wright, Jr., Director
University of Minnesota
Minneapolis, MN 55455 1978-79

The Limnological Research Center, located in Pillsbury Hall with the Department of Geology and Geophysics, consists of a number of offices and laboratories for chemical, biolcgical, and historical studies of lakes. The "Biennial Report" summarizes current limnological research, includes a list of cited references, publications, and theses completed during 1978-79.

R/S/5
BILLIONS OF YEARS IN MINNESOTA - THE GEOLOGICAL STORY OF THE STATE
Edmund C. Bray
Science Museum of Minnesota
North Central Publishing Co.
St. Paul, MN 1977

This brief summary of the geological history of Minnesota is useful for teacher's knowledge of how the state's bodies of water were formed. Although it is somewhat technical, the glossary of geological terms helps in understanding.

R/S/6
BIOLUMINESCENCE IN MARINE ORGANISMS
Steven McDonough
Marine Education Program
Office of the Los Angeles County Superintendent of Schools
9300 E. Imperial Highway
Dorney, CA 90242

This report defines bioluminescence as light produced by chemical reactions in a living system, mainly found in organisms that live in the sea. An interesting account, but probably more useful with marine biology.

R/S/7
CANADA
Canadian Embassy
1771 N. Street NW
Room 300
Washington, DC 20035

The acid rain problem in the lakes of eastern Canada and the northeastern U.S. is explored including the economic, biological, and political ramifications. In this volume, Canada Today surveys some of the damage done, considers possible damage in the future, and suggests solutions. An excellent resource to increase a teacher's knowledge and awareness about this complex issue.

R/S/8
A CITIZEN'S GUIDE TO MINNESOTA'S QUALITY MANAGEMENT PLAN
Minnesota Pollution Control Agency
1935 County Road B2
Roseville, MN 55113

This Booklet explains what Minnesota's Water Quality Management Plan is, how it works, what some of its programs are and what are some of the future plans concerning water quality.

R/S/9
EARLY LOGGERS IN MINNESOTA - VOL. II
J. C. Ryan
Minnesota Timber Producers Association
200 Christie Building
Duluth, MN 55802 1976

A book filled with pictures that tell the story of logging themselves. A teacher could read excerpts from the script, which is rich with descriptions of the lumberjacks lives, to help students increase their awareness of the early lumber industry.

R/S/10
THE EDGE OF THE SNOWHEAD
Ryck Lydecker
Minnesota Marine Advisory Service, Office of Sea Grant
National Oceanic and Atmospheric Administration
U.S. Dept. of Commerce
Agricultural Extension Service
Continuing Ed. and Extension
Univ. of MN 1976

This book explores the Minnesota coast, its setting and its history, its problems and potentials. It's purpose is to aid in the conservation and development of the nation's coastal resources through educating the public.

R/S/11
EDUCATOR'S GUIDE TO GREAT LAKES MATERIALS
Pam Johnson
University of Wisconsin Sea Grant College Program
Sea Grant Communications Office
1800 University Ave
Madison, WI 53706

A bibligraphy of contemporary materials on many aspects of the Great Lakes which will aid educators in locating appropriate books, maps, charts, pamphlets, and films for classroom use.

R/S/12
80 A DECADE FOR DECISIONS WATER
The Freshwater Society
Journal of Freshwater - Special Report/Fall & winter 1980
Freshwater Foundation for members of the Freshwater Society
2500 Shadywood Road, Box 90
Navarre, MN 55392

This report explores four major water issues, water and health, water quantity, water and energy, and water law. The issues are stated from differing viewpoints and the values they involve. It is intended to be used by teachers, students, and others as a reference and springboard for discussion.

R/S/13
ENVIRONMENTAL EDUCATION - GUIDELINES AND ACTIVITIES FOR TEACHERS
S. Audean Allman, O. W. Kopp, and David L. Zufelt
Charles E. Merrill Publishing Co., A Bell & Howell Co.
Columbus, Ohio 43216 1976

Some education encounters directly related to water pollution and conservation. A good resource book to get started, but lacks detailed info. needed for student activities, but a list of concepts and related encounters is listed at the beginning of the book.

R/S/14
ENVIRONMENTAL EDUCATION REPORT - POLLUTION
Center for Environmental Education, Inc.
Suite 206
1925 K Street NW
Washington, DC 20006 1980

This volume contains several articles on Acid Rain and has a section for A-V resource and suggested children's and Resouce Books.

R/S/15
FISH OF LAKE SUPERIOR - FISH OF LAKE MICHIGAN
Warren Downs
Univ. of Wisconsin, Sea Grant College Program
Sea Grant Communications Office
1800 University Ave.
Madison, WI 53706

Good resources for information about the information about the fish found in the Lake Superior and Lake Michigan.

R/S/16
RISH KILLS CAUSED BY POLLUTION IN 1975 - 16TH REPORT
U.S. Environmental Protection Agency
Office of Water Planning and Standards
Monitoring and Data Support Division
Washington, DC 20460

This annual fish kill report includes a total summary of fish reported killed in 1975 and then statistics for each state is given. The information concerning the pollution - caused Fish Kill would certainly raise the awareness of students and teachers about this problem. In an effort to encourage individuals to report kills to state officials the Appendices list the State Agencies to be notified, give a sample form to show the report information desired of the types of operations identified as pollutant sources.

R/S/17
FRIENDS OF THE BOUNDARY WATERS WILDERNESS
1783 Lindig Street
St. Paul, MN 55113 Oct. 1978

This publication summarizes the history of the Battle for protective legislation for the Boundary Waters. It includes a map of the area and a list of the provisions of the Boundary Waters Canoe Area Wilderness Act.

R/S/18
A GEOLOGIC FIELD TRIP ACROSS MINNESOTA
Donald A. Johnson, and David L. Williams
Minnesota Field Trip
P.O. Box 1582
St. Cloud, MN 56301

Two MN earth science teachers developed this guide for students to take a geologic field trip across their own state via cartoons, photographs, slides, and written explanations. It would enhance an earth science classroom motivating interest in students and making geology more relative to them.

R/S/19
THE GEOLOGY OF COOK COUNTY
Frank F. Grout, Robert P. Sharp and George M. Schwartz
The Lund Press, Inc.
Minneapolis, MN

This book covers the complex geology of Cook County, the extreme Northeastern top of Minnesota. It would be a useful reference for a teacher to find any needed information about the geology of this area.

R/S/20
GOPHER HISTORIAN
Minnesota Historical Society
Cedar and Central
St. Paul, MN 55101

A periodical publication of the Minnesota Historical Society contining articles of interest about Minnesota history.

THE GREAT LAKES
Hawkhill Associates
125 E. Gilman St.
Madison, WI 53703

A series of three sound-filmstrips (Beginnings, Voices and Environmental Problems). Narration, graphics and photography highlight the environmental problems in the region.

R/S/22
THE GREAT LAKES GUIDEBOOK--LAKE SUPERIOR AND WESTERN LAKE MICHIGAN
George Cantor
The University of Michigan Press
Ann Arbor, MI

A book for teachers to use to become familiar with the Great Lakes region.

R/S/23
THE GREAT LAKES REGION IN CHILDREN'S BOOKS
Edited by Donna Taylor
Green Oak Press
Brighton, Michigan

An annotated guide to works about the Great Lakes region including hard and soft cover books, pamphlets and magazines. Very useful when locating materials about the Great Lakes, especially because it is divided by states. There are several indices included which further aid in finding appropriate materials.

R/S/24
GUIDE TO THE MARINE EDUCATION SYSTEM
Susan C. Gammsib and James A. Lanier
SEA Grant Program
Virginia Institute of Marine Science
Oboucester Point, Virginia 23062

This book consists of an explanation of the Marine Educational Materials System (MEMS) and how to use it, an ongoing list of the publications which have been entered, an index of descriptors and listings of entries by author and grade level. Using the index of descriptors, it is possible to conduct a manual cross-referenced search of MEMS entries.

R/S/25
MINNESOTA'S BOUNDARY WITH CANADA - ITS EVOLUTION SINCE 1783
William E. Tass
Minnesota Historical Society Press
Public Affairs Center Publications
St. Paul, MN 1980

This book includes more than a comprehensive history of the boundary line demarcation between Minnesota and Canada, but it also represents the aspirations, successes, frustrations, failures, and compromises of these two countries. Readers will have a better understanding of America - Canadian relations which would help in realizing the political complexities of the Boundary Waters Canoe Area issues today.

R/S/26
MINNESOTA'S ROCKS AND WATERS
George M. Schartz, and George A. Thiel
University of Minnesota Press
Minneapolis, MN

This volume is a general summary of the major geological features of the state. A useful resource, but no activities are included for students - so it would mainly be used as a reference book.

R/S/27
VOLUME I: MINNESOTA WALK BOOK - A GUIDE TO BACKPACKING AND HIKING IN THE ARROWHEAD AND ISLE ROYALE
James W. Buckanan
Nodin Press
519 North Third Street
Minneapolis, MN 55401

Lists the necessities for backpacking and hiking in the Arrowhead and Isle Royale regions and describes the trails that can be used. Helpful in promoting positive attitudes about enjoyment of water nature and its recreational pleasure.

R/S/28
MINNESOTA WATER QUALITY - REPORT TO CONGRESS SECTION 305(b)
Minnesota Pollution Control Agency
1935 West County Road B-2
Roseville, Minnesota 55113 1980

This report concerns the quality of Minnesota's waters including 12,000 lakes of ten acres or more, many miles of streams and three major river systems: the Mississippi, the Minnesota, and the Red River of the North. It lists the 1972 Federal Water Pollution Control Act requirements, describes some of the various water quality programs in the state, some of the various water problems, and an overall program evaluation and a discussion of possible modifications to existing water pollution control programs. It would be a useful classroom resource when studying water quality in Minnesota.

R/S/29
OUR GREAT LAKES
University of Wisconsin Sea Grant College Program
Sea Grant Communications Office
1800 University Ave.
Madison, WI 53206

A useful pamphlet of information on the Great Lakes - great for expanding the teacher's background knowledge about the region.

R/S/30
OUTCROP MAP OF SOUTHERN PART OF DULUTH COMPLEX AND ASSOCIATED KEWEENAWAN ROCKS, ST. LOUIS AND LAKE COUNTIES, MINNESOTA
Bill Bonnicksen
Miscellaneous Map Series
Map M-11
The University of Minnesota
Minneapolis, MN 1971

This series of Minnesota maps includes hydrogeologic, bedrock and various topographic maps of Minnesota, with a special map of the Duluth - Lake Superior area.

R/S/31
PADDLE-TO-THE SEA
Holling Clancy Holling
Houghton Mifflin Company
Boston, MA 1941 & 1969

Story of a young Indian boy's canoe as it floats through the Great Lakes to the Atlantic Ocean.

R/S/32
PIONEER FACES AND PLACES
Cook County Historical Society
Arrowhead Printing,
Superior, WI 1979

This book contains a collection of photographs which help explain the lives, hardships and toils of the pioneers in the Arrowhead Region of Lake Superior. Brief descriptions are given for each picture, but otherwise there is little script. Students can find out a great deal about the hopes and heartbreaks of the pioneers by just viewing the photos.

R/S/33
A PLUG FOR THE GREAT LAKES BASIN COMMISSION
Robin J. Irwine
Supplement to Wisconsin Natural Resources
D.N.R. Bureau of Planning
Box 7921
Madison, WI 53707

This supplement reports on the development of a management plan for the entire Great Lakes basin and the issues of concern, including wetlands policy, wastal hazards, water quality, water conservation and hazardous waste management.

R/S/34
A PRIMER ON LIMNOLOGY
John B. Lundquist
Limnological Research Center
University of Minnesota March 1975

The purpose of this book is to provide an introduction to limnology, the scientific study of inland waters, including lakes, ponds, and rivers. It also identifies some of the lake problems that are influenced by human activities, and outlines some procedures for studying individual lakes, which would be especially useful when planning this type of field trip activity.

R/S/35
ROOTS
Minnesota Historical Society
1500 Mississippi Street
St. Paul, MN 55101

Each magazine provides a study guide which lists possible student activities, discussion questions from the articles in the magazine, glossary of new terms, and a resource list.

R/S/36
SAVING LAKE SUPERIOR
Wendy W. Adamson
Dillon Press, Inc.
South Third St.
Minneapolis, MN 55415 1976

Traces the geologic and industrial history of Lake Superior, the pollution of the lake, and steps being taken to save it.

R/S/37
TRANS - MISSISSIPPI BIOLOGICAL SUPPLY
Jerry Hawkins
550 Cardigan Road
St. Paul, MN 55112

R/S/38
THE VOYAGEURS AND THEIR SONGS
Theodore C. Blegen
Minnesota Historical Society
St. Paul, MN 1966

This pamphlet contains a vivid description of the lives of voyageurs in the Great Lakes Region. It would be an excellent resource for depicting the history and for capturing the flavor of our heritage in song. An interesting account that could be read by the teacher to the class.

R/S/39
THE VOYAGEUR'S HIGHWAY
Grace Lee Nate
The Minnesota Historical Society
St. Paul, MN

Depicts the life of the voyageur, fur trading, logging industries as well as famous persons during this era and physical features. A chronology of famous events and people is also provided.

R/S/40
EPA 905/9-80-005
TOXIC SUBSTANCES IN THE GREAT LAKES June 1980
United States Environmental Protection Agency
Washington, DC

This pamphelt summarizes the affects of toxic substances in the Great Lakes, and lists toxic substances by use, describes each probable source, shows where it is found, and characteristics/ health effects.

EPA 600/8-80-026
RESEARCH SUMMARY
INDUSTRIAL WASTEWATER June 1980
United States Environmental Protection Agency
Washington, DC

This pamphlet reports about the research on industrial wastewater, what treatments are now being used for the various toxins, and future research. It lists individual research projects and publication for further information.

EPA
CLEAN WATER AND THE DAIRY PRODUCTS INDUSTRY
United States Environmental Protection Agency
Washington, DC

This pamphlet was written for persons in the dairy products industry to inform them about how water pollution laws affect the dairy industry and why water pollution must be controlled.

R/S/41
WATER - EXPERIMENTS TO UNDERSTAND IT
Boris Arnov
Lothrop, Lee & Shepard Books
William Morrow & Co., Inc.
105 Madison Ave.
New York, NY 10016

Properties of water are demonstrated through simple experiments. Cookbook approach, little room for child's creativity and somewhat uninteresting because of this approach. Good teacher reference on experiments on chemical and physical properties of water.

R/S/42
WATER POLLUTION
Charles W. Lavaroni & Patrick A. O'Donnell
Addison-Wesley Environmental Studies Series
Addison-Wesley Publishing Co., Inc
1843 Hicks Road
Rolling Meadows, IL 60008 1971

Possibly most useful as a teacher resource and then modified for student use - Cookbook experiments on water pollution.

R/S/43
WHEN ALL THE CLEAN WATER IS GONE
Kathleen Brandl and Linda Watson
Minnesota Department of Natural Resources
Centennial Office Building
St. Paul, MN 55101

A colorful, appealing pamphlet that could be used at several grade levels as a starting point for discussing the political, economic, and esthetic problems associated with water pollution.