
LIVING IN WATER

INTRODUCTION

"Living in Water" is a scientific study of water, aquatic environments and the plants and animals that live in water. It was originally written for grades four through six; however, it is most commonly adopted as science curriculum in grades 5 and 6. Some activities may also be of interest for use with older students, especially if the data collection and analysis are enhanced.

Content

This curriculum covers properties and features common to both marine and freshwater habitats. It applies more to lakes, ponds, large rivers, estuaries and oceans. It does not include topics associated with waves, tides and fast moving water. Each of five sections addresses a question about water related to a physical characteristic of aquatic environments which is then answered by a variety of activities using an experimental, science process approach to enable the students themselves to arrive at answers. Each section is preceded by teachers' information with science content related to the activities written for the teacher. The emphasis for the students is not on content, but on process. Content is built through the activities and discussions that follow them. Cooperative learning is used in most activities.

Organization and Uses

While a teacher may pick and choose from among these activities, the curriculum is organized in a way that builds a body of experience in a logical sequence. It is intended to be taught in the sequence in which it is written. The activities may be taken out of context and still make sense, however. Some districts have chosen to use parts of the curriculum in conjunction with other materials in a district designed set. Teachers may also find ideas for science fair projects or learning centers among these activities.

Application and Extensions

In addition to experiments and classification activities, several exercises test the application of basic principles through the development of models. Some activities are written in a performance assessment mode which models forms of testing being implemented in some states. Following each exercise, extension activities enable students to pursue a variety of related topics. Some allow students to apply the results of their experiments to specific environmental problems. Other extensions include art and language arts projects. There are also suggestions for using a classroom aquarium to further enhance the curriculum.

Integration of Disciplines

Mathematics is integrated into most of the activities as are graphing skills. Students are expected to report and discuss the results of their work in both language and mathematical modes. Some activities are explicitly language arts activities.

Additional Materials for the Teachers

Supporting materials offer how-to information on preparation of materials and sources of supplies. Worksheets and student information sheets may be used directly or may be replaced by materials design by students and/or the teacher. It is better to help the students think through the

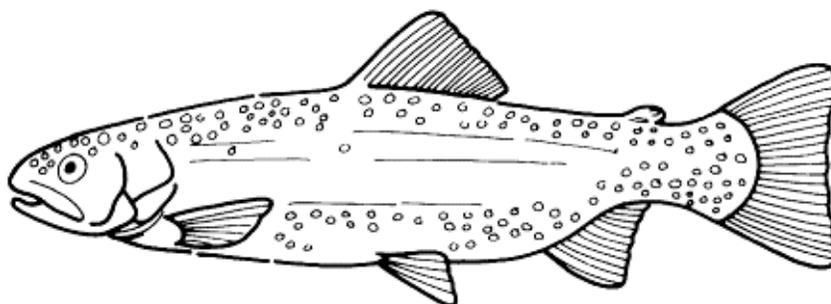
process of designing their own worksheets, but teachers may also choose to use those provided. The review of what science education research says about the "hands-on" approach to teaching elementary science will help teachers understand why the emphasis in this curriculum is on process. It may also be a useful piece in educating parents about new curricula or instructional strategies. A glossary of terms used is provided for teachers who lack extensive science background.

SUPPORT FOR PROJECT

"Living in Water" was originally developed by the Department of Education and Interpretation of the National Aquarium in Baltimore under National Science Foundation grant no. MDR8470190 in 1987. The LaMotte Chemical Co., the White Rose Paper Co. and the National Aquarium in Baltimore provided additional support for the printing of the first edition. The second edition was produced in 1989, using teacher input from the original group of master teachers. The third edition will be available in 1996 and will be substantially rewritten with additional earth science activities. This edition is about 2.5 since corrections and additions have been made in 1995 to the 2nd edition before CD-ROM publication.

REPRODUCTION PERMISSION

The National Aquarium in Baltimore retains rights to this edition of the curriculum. Activities, worksheets and student materials may be freely duplicated by teachers, schools, or school districts. These materials may not be reproduced for profit. Districts using them in customized curricula and/or adapting them should do two things. First, the source of the materials should be clearly and prominently displayed. Second, written notification should be made to the editor listed below. You do not have to ask permission. Just tell us if you are using the materials. Groups other than teachers and school districts that wish to use these materials in curriculum projects or publications need to request permission by writing the editor.



PROJECT PARTICIPANTS AND SEQUENCE

The project started with a three-day meeting in July 1985, of the authors, eight consulting teachers from the Mid-Atlantic States and a science educator. The consulting teachers were: Bonnie Bracey (Washington, DC), Cindy Dean (Delaware), Sarah Duff (Maryland), Margaret Gregory (Virginia), Jean McBean (Maryland), Jo Anne Moore (Maryland), Martin Tillett (Maryland) and Harold Wolf (Pennsylvania). Dr. Leon Ukens, Department of Physics, Towson State University, served as science education consultant. During the following school year, the authors produced first and second drafts of thirty-six activities.

In July 1986, sixteen children tested the activities during a two-week class at the Aquarium. Following revision, third drafts went to the consulting teachers, who tested them in their own classes during fall of 1986 and reviewed each activity. The third drafts were read for science education and science content by Dr. Leon Ukens and Gary Heath, environmental education specialist for the Maryland State Department of Education. Dr. Thomas Malone, a biological oceanographer at the University of Maryland's Horn Point Environmental Laboratories, and Dr. William S. Johnson, a marine ecologist at Goucher College, read the text for scientific content. During spring of 1987 the activities were rewritten, using comments from the above persons. First distribution was accomplished through two graduate courses for master teachers taught by the authors at Goucher College during July 1987.

Activities 4, 5 and 24 were written by Karen Aspinwall, education specialist, NAIB. Activities 21, 22 and 23 were done by Lee Anne Campbell, education specialist, NAIB. Activity 18 was written jointly by Lee Anne Campbell and Martha Nichols, education specialist trainee, NAIB. Activity 16 was contributed by consulting teacher, Martin Tillett, Howard B. Owens Science Center. All other activities were the work of Dr. Valerie Chase, staff biologist, NAIB, who also served as editor and project director. Martha Nichols proofed final drafts and typeset copy for the entire curriculum. Layout, design and illustration are the work of Cindy Belcher, illustrator, NAIB.

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Valerie Chase, Ph. D.
Department of Education and Interpretation
National Aquarium in Baltimore
Pier 3, 501 East Pratt Street
Baltimore, Maryland 21202

