

Supplemental Curriculum Activities
for use with
Holling Clancy Holling's

Paddle-to-the-Sea

by

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and

a special thanks to
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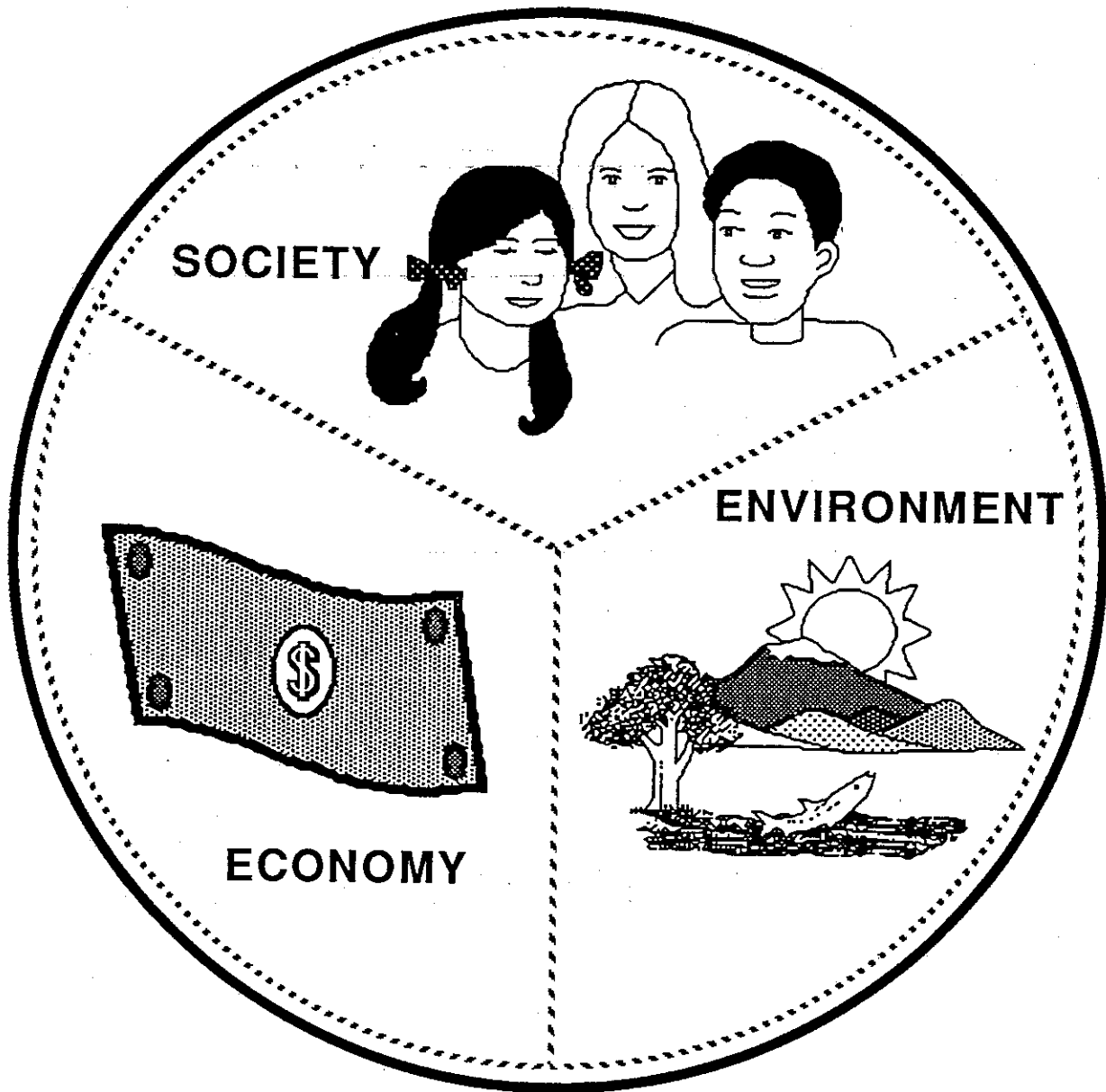
Using Paddle-to-the-Sea

Holling Clancy Holling's talents are at their best in the classic *Paddle-to-the-Sea*. The story can be read, understood, and enjoyed on at least three levels of student ability, thanks to Holling's artistry with words and pictures. On the simplest level, the color illustrations alone can be used to tell the story. Each chapter contains a full-page picture that perfectly shows what the chapter is about. On a second level, the words of the chapter reveal the ideas, develop the characters and settings, and explain what the pictures are showing. For detailed study, the black-and-white drawings in the margins of the text offer an expanded view of main points in the story and teach new material to enhance understanding. From these drawings we learn how locks work, see interim maps showing where Paddle is at each point, and compare the before and after of a forest fire. Enjoy Paddle on the level most appropriate for your class.

You may also wish to show the 1967 film, *Paddle-to-the-Sea*, which is distributed by the National Film Board of Canada. The film is 28 minutes long. Students who previewed it with us were attentive throughout.

Using this Curriculum Guide

These Curriculum Activities have been developed for use in grades 3 through 6. They have been tested among students and teachers in those grades and found to be an interesting supplement to existing curriculum topics, as well as an exciting way to teach those same topics. Choose any or all of the activities presented to reinforce the concepts introduced in the story. The time you will need to complete each activity varies; some activities require planning and preparation in advance. At the beginning of each activity, you will find a statement of objectives that may help you to choose activities appropriate for your class.



The Ecosystem Approach

Preface

The Ecosystem Approach

Research by the Ohio Sea Grant Education Program¹ has shown that middle school students in the Great Lakes region do not have a great deal of knowledge about the lakes. In fact, 54% of the fifth graders and 40 percent of the ninth graders tested in Ohio in 1983 could not identify Lake Erie on a map of the Great Lakes. Even fewer could identify the other lakes. Those ninth graders are now voters, each with a vote equal to yours and mine. We cannot be satisfied with the implications of this level of knowledge among our students when it comes to resources as vital as our Great Lakes. Lack of knowledge is a symptom of a larger problem: a lack of holistic thinking about the ecosystem. We are an integral part of this system. What happens to it happens to all citizens of the world.

Paddle-to-the-Sea, a classic in children's literature, offers an opportunity to learn about the Great Lakes Basin ecosystem in a meaningful and memorable way. On one level the story teaches about the geography and economy of the region. On a higher level it provides a look at the interactions of animals in the environment, of people with the environment, and of the ecosystem's impact on all who live or even pass through this "long river reaching to the sea." On this level, *Paddle* is an example of the ecosystem approach².

To approach something on an ecosystem level is to view it as a connected whole, to see the importance of specific parts, but always in relation to the whole and with us in it. While it is interesting to learn what animal tracks can tell us, or how a beaver's lodge is built, or how iron ore is shipped on the Great Lakes, these should be viewed as environmental information that has been designed to contribute to an understanding of the entire Great Lakes Basin ecosystem. The physical conditions of the region—its geography, its climate, its water quality—define and interact with the environments depicted in *Paddle-to-the-Sea*; in turn all those environments are influenced by people and influence them in return. Together it is an ecosystem.

There is a consensus among organizations and governments in the Great Lakes Basin that the lakes must be managed with an ecosystem approach. This not only requires an understanding of what the individual parts to be managed actually are, but more importantly, an understanding of how those parts interrelate with each other and with the ecosystem as a whole. To teach about the Great Lakes using the Curriculum Activities for *Paddle-to-the-Sea* is to take an ecosystem approach. The authors and promoters of this work hope that teachers will find a place in the curriculum to use most of the activities described here. Individually the activities can teach about the environments *Paddle* visits, but together they convey the important concept that everything is connected. It is our hope that students will carry away from this unit some of the awe and respect that Holling Clancy Holling felt when he wrote about the Great Lakes, as well as a feeling of being a part of this remarkable ecosystem.

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¹Fortner, Rosanne W. and Victor J. Mayer, 1983. Ohio students' knowledge and attitudes about the oceans and Great Lakes. *Ohio Journal of Science* 83(5): 218-224.

²Vallentyne, John R. and Alfred M. Beeton, 1988. The ecosystem approach to managing human uses and abuses of natural resources in the Great Lakes Basin. *Environmental Conservation*. 15(1): 58-62.

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Sharing Ecosystem Resources																									*	*	*	*	*
The Sea at Last!																									*	*	*	*	*
Paddle Makes Headlines																													
A Dream Comes True																													*

Summary of Activities

Great Lakes Geography

Identify the shapes of the Great Lakes and surrounding states and provinces on a map.

Travel-to-the-Sea

Learn how local streams or rivers merge with other waterways to reach the ocean.

Carving a Paddle Person

Learn how to use scale patterns in making carved models and how to carve safely.

In One Lake and Out Another

Study the hydrologic cycle. Compare the filling times of the Great Lakes and the time it takes for pollutants to flow through.

How Big is a Crowd?

Compare the number of people that live around each lake and demonstrate how people must share and care for resources.

Rivers in the Air

Learn how air currents act like rivers to carry floating objects.

Tour by Mail

Learn how to write a business letter correctly and receive information from various Great Lakes cities.

Time Line

Illustrate the major events that occurred during each season of Paddle's voyage and find out how long it took Paddle to reach the sea.

What Do You "See" in the Great Lakes

Use the shape of each lake to suggest the outline of familiar figures or shapes.

Taken by Surprise

Write a story about being taken by surprise while trying to finish a project.

Animal Snowshoes

Learn how feet can act like snowshoes and calculate foot area and pressure for different animals.

Tracking a Good Story

Identify pictures of animal tracks and make a track picture "story."

Pond Diorama

Make a diorama illustrating the beaver pond.

Beaver's Point of View

Write a story about the pond from the old beaver's point of view.

Summary of Activities

Forest Careers

Find out about job responsibilities in many types of forest careers. Take a field trip (optional)

Uses of Trees

Learn how trees are used and what products are made from them.

Logs to Lumber

Find out how a tree becomes lumber. Complete the puzzle using vocabulary words from the story.

How Waves Move

Learn the parts of a wave and do an experiment to show how objects move in waves.

Passport to Adventure

Learn passport terminology, make your own "passports," and play a travel game.

Energy Flow and Food Webs

Learn how animals and plants interact in a food web using a pond food web as an example.

Food Chain Tag

Play a game illustrating the effects of toxins on animals in a simple food chain.

Travel Math

Work with perimeter and distance-rate-time problems.

Uses of Iron Ore

Learn where iron ore is found, how it is processed, and what products are made from it.

Something's Fishy

Learn basic fish anatomy, play a game to identify parts of a fish, and complete a fish puzzle.

Going Fishing

Create your own fish with paper and paint.

Thunderbirds and Sunsets

Explore folktales about weather and write your own story explaining a weather event.

Oral History

Interview an older person about how things have changed over time.

Breeches Buoy Rescue

Use small pulleys and string to build a working model of a breeches buoy.

How Locks Work

Use milk cartons to build a working model of a system of locks.

Summary of Activities

Clean Campaign

Organize a litter cleanup in your community and see how much recyclable material you can collect.

Forest Fires—Good and Bad

Learn how fires can benefit as well as harm the environment.

Building a “Birchbark” Canoe

Use oaktag and yarn to make a model of a birchbark canoe.

Harbor Guides

Play a game to illustrate how ships move through busy harbors.

Over the Falls

Write a story about how Paddle might have felt as he fell over Niagara Falls.

Great Lakes Bulk Carriers

Learn the parts of a Great Lakes bulk carrier and find out what cargoes are moved on the Great Lakes.

Parlez-vous français?

Learn simple French words and phrases and complete a word puzzle. Sing a voyageurs' song.

Life in an Estuary

Learn what an estuary is and why it is an important resource.

Sharing Ecosystem Resources

Use role-playing to simulate a Law of the Sea conference. Compare it with Chief Seattle's view of resource use.

The Sea at Last!

Write about how Paddle might feel now that he has finally reached the sea.

Paddle Makes Headlines

Write and illustrate an article that might have appeared in a French newspaper when Paddle arrived in France.

A Dream Comes True

Write a story about how you might feel if your dreams really came true.

How Big is a Crowd?

Introduction

As Paddle travelled through the Great Lakes, he passed by forested wilderness areas and cities where thousands of people live. The Great Lakes and the surrounding land provide many resources for the people who live in the area. Water for drinking and industry, fish for food, minerals, and other resources are abundant. But people create wastes and add chemicals to the environment when they use resources, and these can be harmful. When many people are concentrated in one area, they may compete for scarce resources. In addition, the wastes these people generate tend to concentrate in the area immediately around them and may cause pollution problems.

Objectives

When students have completed this activity, they will be able to list the relative areas and relative human populations of the five Great Lakes and to describe some of the problems that arise when many people need a limited resource.

Materials

Ball of string; masking tape; area, population and **Fish Production tables** (master on page 133); 100 (minimum) Hershey kisses or peanuts in shells; 5 paper bags.

Advance Preparation

1. Cut lengths of string and tie the ends together to make loops proportional to the areas of the five Great Lakes. Suggested lengths in meters are given for groups of less than thirty and more than thirty participants (less/more).

Lake Superior	8.5 / 11.0 m
Lake Michigan	6.0 / 7.5 m
Lake Huron	6.0 / 7.5 m
Lake Erie	2.5 / 3.0 m
Lake Ontario	2.0 / 2.5 m

2. Decide how many students will be "populating" each of the lakes. Use the chart on the next page to assign numbers of students to represent the relative numbers of people living around each lake. Numbers are given for both United States and Canadian residents (U.S./Canada). Remember that Lake Michigan is the only Great Lake which shares no border with Canada.

NOTE

You may want to invite another class to share in this activity, especially if your class has less than twenty people in it. Larger numbers of participants better illustrate the differing concentrations in population throughout the Great Lakes region.

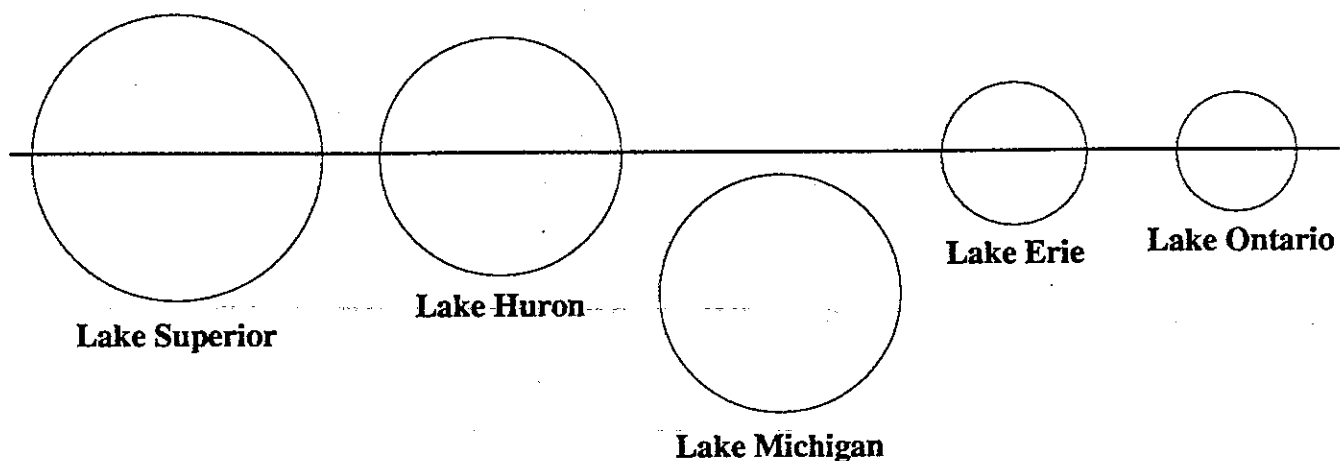
Number of people U.S./Canada								
Total participants	15	20	25	30	35	40	45	50
Lake Superior	0/0	0/0	0/0	1/0	1/0	1/0	1/0	1/0
Lake Huron	1/0	1/1	1/1	1/1	1/1	2/1	2/1	2/1
Lake Ontario	1/2	1/3	2/3	2/4	2/4	2/5	3/5	3/6
Lake Erie	4/1	5/1	8/1	8/2	11/2	12/2	13/3	15/3
Lake Michigan	6/0	7/0	9/0	11/0	13/0	15/0	17/0	19/0

3. Divide Hershey Kisses or peanuts in shells into groups representing the proportional number of fish caught annually in each of the Great Lakes. You will need at least 100 Kisses or peanuts. One Kiss or peanut represents approximately 50 tons of fish. Label the five bags with the names of the five lakes and use the table below to put the correct number of "fish" in each bag. (For groups of less than 25 students, you may want to halve these numbers.)

Lake Superior	8
Lake Michigan	35
Lake Huron	5
Lake Erie	50
Lake Ontario	2

Procedure

- Look at the tables of information about the Great Lakes and discuss the following questions:
 - * Which of the lakes has the largest area? Which has the smallest?
 - * Which lake has the largest population? Which has the smallest?
 - * Are more people living near the eastern or the western lakes?
 - * Are more people living near the United States or the Canadian shores?
 - * Which lake produces the most fish? Which produces the least?
 - * Where would you go if you wanted to catch fish?
- Make an "international border" on the floor with a strip of tape. Arrange the loops of string that represent the five Great Lakes along the border from left to right according to the diagram on the next page.



3. Assign the appropriate numbers of participants to the United States and Canadian sides of each of the lakes. (An alternative is to assign participants to each lake without specifying a country; in this case you do not need the tape border.) Each participant should put one foot on the string "shore" of the lake. Where are people closest together? Did anyone have a hard time finding room to stand? On which lake or lakes do you think the biggest cities are located?
4. Pass the appropriate bag of "fish" around each lake. Each person takes ONE Kiss or peanut each time the bag is passed to him or her until the bag is empty. (If you have no one assigned to Lake Superior, set aside that bag and do not distribute those "fish" in the other lakes.) Which lake had the most "fish"? In which lake did people catch the most? Why do you think this is so?
5. People create waste when they use resources, and much of that waste is carried by water. Too much waste causes pollution problems. Open and eat your "fish." Put the foil wrappers or peanut shells on the floor inside the loop of string that is your lake. Which lake is the waste most concentrated (closest together)? Remember that the water from each lake flows into the lake downstream (in this case, to the right) of it. In which lake or lakes do you think might have the worst pollution problems? Why do you think so?
6. Clean up and discuss the activity together.

Discussion Questions

1. What relationships have you seen between population, resources, and waste?
2. What could you have done to make sure ALL participants got an equal number of "fish"? (*Sell or trade for other resources or services, for example.*)
3. How do you think the amount of pollution in the Great Lakes could be reduced?
4. How could you reduce the amount of waste you produce?

Extension Activities

Play math games with Great Lakes areas and populations. For example, find out how many times Lake Erie could fit in one Lake Superior, how many people per square meter there are in each lake, and so on. Or organize a **Clean Campaign** (page 107) to learn more about recycling.

Additional Information

The Great Lakes: An Environmental Atlas and Resource Book.

Jointly produced by the U.S. Environmental Protection Agency and Environment Canada. Copies are available free of charge from:

**Great Lakes National Program Office
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604**

or

**Conservation and Protection, Ontario Region
Great Lakes Environment Program
Environment Canada
25 St. Clair Avenue East
Toronto, Ontario, Canada M4T 1M2**

Water Surface Areas of the Great Lakes (km²)

Lake	Area
Lake Superior	82,100
Lake Michigan	57,800
Lake Huron	59,600
Lake Erie	25,700
Lake Ontario	18,960

Great Lakes Population (as of 1981)

Lake	Canada	United States	Total
Lake Superior	180,440	558,100	738,540
Lake Michigan	0	13,970,900	13,970,900
Lake Huron	1,051,119	1,321,000	2,372,119
Lake Erie	1,621,106	11,347,500	12,968,606
Lake Ontario	4,551,875	2,090,300	6,642,175

Average Annual Catch of Fish (tons)

Lake	Annual catch
Lake Superior	400
Lake Michigan	1,800
Lake Huron	280
Lake Erie	2,600
Lake Ontario	100

Introducing . . .

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by

Marcia L. Seager, Rosanne W. Fortner & Timothy A. Taylor



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