

Fishing for the Future

(Adapted with permission from "Fishing with Jim" by Jim Hartmann and Ben Smith)

OVERVIEW

Through a fishing simulation, students model several consecutive seasons of a fishery and explore how technology, population growth, and sustainable practices impact fish catch and fisheries management. As the students progress through the fishing seasons, they will likely overfish their oceans and will have to migrate to other oceans to meet their basic needs.

INQUIRY/CRITICAL THINKING QUESTIONS

- What happens when a commonly owned resource is overused?
- What are the impacts of overfishing or exploiting a natural resource?
- How can we establish and maintain the sustainable use of a resource?

OBJECTIVES

Students will:

- Experience the "tragedy of the commons" as it relates to fishing resources
- Consider social, environmental, and economic impacts of overfishing
- Identify sustainable fishing practices
- Determine and explain purchasing/consumption choices

TIME REQUIRED: 1 hour

KEY ISSUES/CONCEPTS

- Tragedy of the Commons
- Sustainability

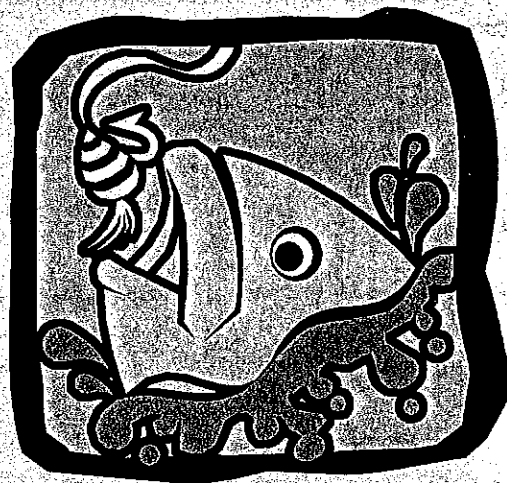
SUBJECT AREAS

- **Social Studies** (Geography, Economics, Global Studies, Contemporary World Problems)
- **Science** (Life, Environmental)
- **Math**

NATIONAL STANDARDS CONSISTENCY

- NCSS: 3, 5, 7, 9
- NSES: C, F

GRADE LEVEL: 6-12



FTF Related Reading

- Intermediate: Chapter 5 from *Global Issues and Sustainable Solutions*
- Advanced: Unit 4, Chapter 4 from *It's All Connected*

Vocabulary

- **Tragedy of the Commons:** Occurs when resources—such as the air we breathe, the water we drink, and the fish we eat—shared by everyone (or held in common) are used at a rate that exceeds the resources'

sustainable limit. Ultimately, as population grows and consumption increases, the "commons" collapse.

Materials/Preparation

- Plain, small candy-covered chocolate candies, one 16-ounce bag for up to 20 students
- Small plastic bowls, 1 per 4-5 students
- Put about 20 candies in 1 bowl per 4-5 students
- Spoons, 1 per 4-5 students
- Straws, 1 per student
- Watch, for timing activity
- Handout: *Fishing Log*, 1 per student

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Activity

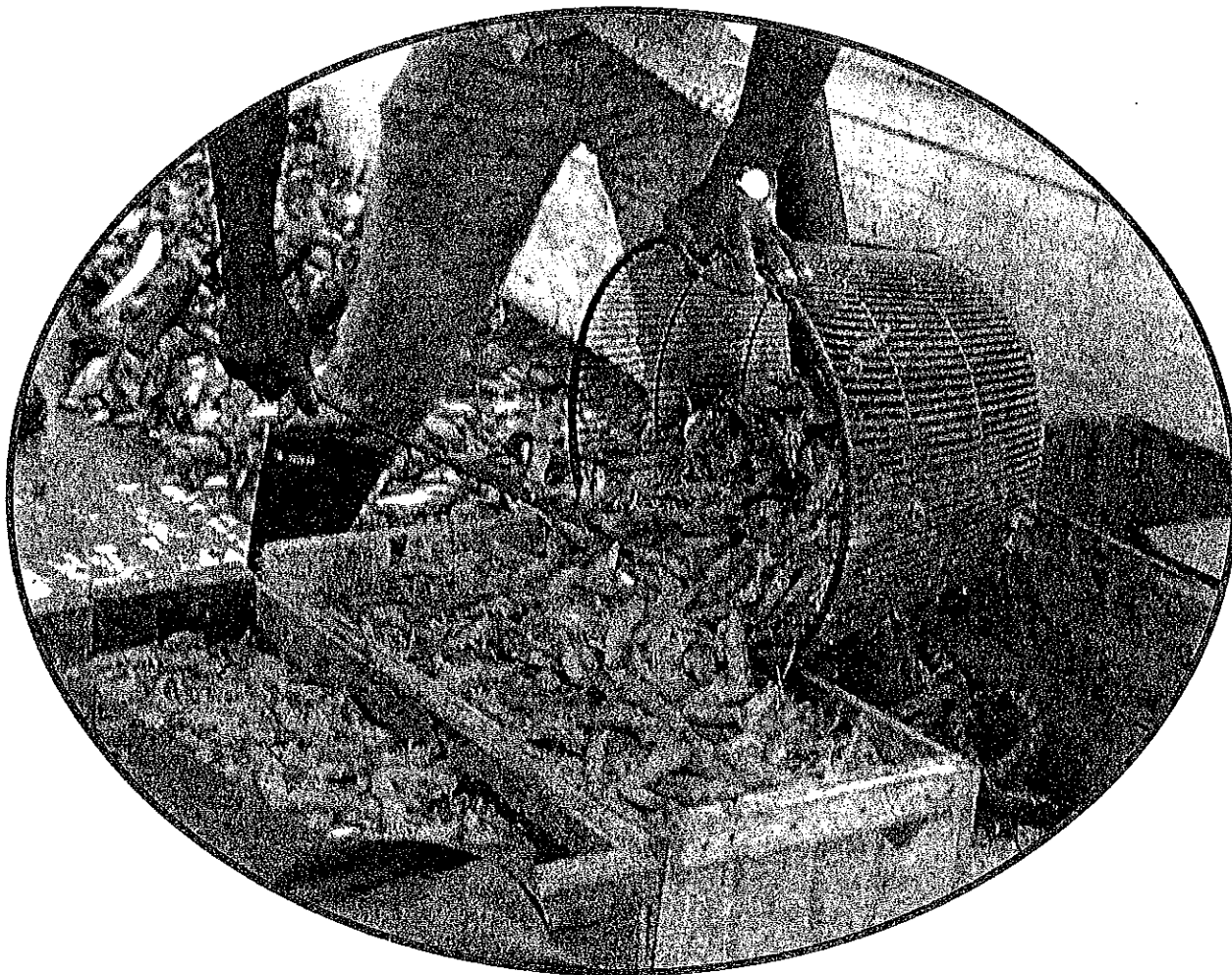
Introduction

1. Introduce and discuss the concept of sustainability using the following definition: "Sustainability is meeting the needs of the present without limiting the ability of people, other species, and future generations to meet their needs." Ask why sustainability might be an important goal for a society and what might be some of the challenges in realizing this goal.
2. Tell students that today they are going to go fishing and explore some of these sustainability issues.

Steps

1. Explain the game rules:
 - a. Each student will be a "fisher" whose livelihood depends on catching fish.
 - b. The candies represent ocean fish such as cod, salmon, tuna, etc.
 - c. Each fisher must catch at least 2 fish in each round to survive (i.e. get enough fish to either eat or sell).
 - d. When the fishing begins, students must hold their hands behind their backs and use the "fishing rod" (straw) to suck "fish" (candies) from the "ocean" (bowl) and deposit them into their "boat" (i.e. on the table in front of them).
 - e. The fish remaining in the ocean after each fishing season represent the breeding population, thus, 1 new fish will be added for every fish left in the ocean (bowl).
2. Divide the class into groups of 4 or 5 students and have each group choose an ocean name, such as North Atlantic, North Pacific, Arctic, Mediterranean, etc.
3. Give each group 1 serving bowl and give each student 1 straw and 1 copy of the handout *Fishing Log*.
4. Put one bowl with the candies by each group.
5. Say "Start fishing" and give the students about 20 seconds for the first "season" of fishing.
6. Have each fisher count his or her catch and record the data in their *Fishing Log*.
7. Fishers who did not catch the 2-fish minimum must sit out the following round.
8. Add 1 new fish (candy from the bag) for every fish left in the ocean (bowl).
9. Allow fishers to use their hands on the straws during the second session to represent "new technology".
10. After the second fishing season, give 1 fisher from each group a spoon representing more new fishing technology such as trawl nets, sonar equipment, etc. Continue the game for round 3.
11. Ask the students what happened when ocean group [name] ran out of fish. How are the fishers going to survive now (one option is to move to another ocean)? Allow students to "invade" other ocean groups when their ocean is depleted, but do not tell them that they can do this beforehand. Fishers may either go as a group to another ocean or they may disperse to other oceans.
12. Repeat fishing, recording, and replenishing fish stocks until either sustainable fishing levels are achieved or until all (or most) groups fish out their ocean.
13. (Optional) Repeat the activity after the class has experienced the "tragedy of the commons" and discuss sustainable practices to see if they can harvest in a sustainable manner.
14. Conclude with the following reflection questions.

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Assessment Reflection Questions

For Intermediate and Advanced Students

- How did you feel when you realized that you had depleted your fish stock?
- How did you feel when other fishers joined your ocean group?
- How does this activity relate to real ocean and fishery issues?
- Have students brainstorm ways to have a sustainable fishery. What rules could be developed (e.g., limit the types of equipment allowed, limit the amount and type of fish, institute shorter seasons)?

For Advanced Students

- What is missing in this game (impacts on animals that rely on fish for their survival, population growth, etc.)?
- What happens to a resource when you have infinite population growth, rapidly developing technology, and a finite resource?
- Are there any commonly owned resources in our region or community? If so, what are some similar issues that arise, and how can they best be managed? (For example, air is a commonly used resource—how do we deal with air pollution? Forestry or animal grazing rights sometimes prompt similar discussion points. You might also talk about city parks, national parks, and other public lands, and their competing uses and needs.)

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Writing Connections

- Have students do a freewrite and follow-up discussion on the following quote by John C. Sawhill, relating it to the fishing activity: "In the end, our society will be defined not only by what we create, but by what we refuse to destroy."
- Have students research a local fishery and include interviews with local fishers, biologists, and other people involved with the fishery.
- Have students choose 1 of the major world fisheries, such as salmon, cod, or tuna, and develop a sustainable fishing plan, paying attention to international laws and treaties.
- Have students investigate fish farming and its environmental and economic impacts.

Action Projects

- Students can research which fish are harvested in a sustainable manner and which are being depleted. Have them do an advertising campaign in their school promoting the consumption of sustainable fish and avoiding the consumption of threatened fish. This might include researching the kind of fish served in your school cafeteria and then recommending a sustainable seafood purchasing program to cafeteria staff and school principal. For recommendations about which seafood to buy or avoid, check out the Monterey Bay Aquarium's website "Seafood Watch" at <http://www.montereybayaquarium.org/cr/>
- Do a watershed planning/protection project to help protect local fisheries from environmental damage.
- Participate in a beach or river cleanup project.
- Join an Ocean/Fisheries Action Network

such as: Center for Marine Conservation Ocean Action Network (www.cmc-ocean.org), the Marine Fish Conservation Network (www.conservefish.org), SeaWeb (www.seaweb.org), or World Wildlife Fund Conservation Action Network (www.takeaction.worldwildlife.org).

Additional Resources

Films

- *Environmental Ethics: Examining Your Connection to the Environment and Your Community*, The Video Project, 2005, www.videoproject.com. This 62 minute documentary profiles a diverse group of courageous Goldman Environmental Prize winners who have made it their duty to protect their local environment. Includes protection of ocean fisheries. Download an accompanying study guide at: www.envethics.org.

Books

- *State of the World*, World Watch Institute, New York, www.worldwatch.org.

Websites

- www.fao.org/fi – United Nations Food and Agriculture Organization (FAO) Fisheries Resource website.
- www.montereybayaquarium.org – The mission of the Monterey Bay Aquarium is to inspire conservation of the oceans.



Fishing Log

Ocean Name: _____

Fishers: _____

Record your group's catch and the amount of fish left in ocean after each season:

Season	Catch	Fish Left In Ocean
1		
2		

Briefly describe the status/health of your fishery:

Season	Catch	Fish Left In Ocean
3		
4		

Briefly describe the status or health of your fishery now:

How could you have made your fishing practices sustainable?
