

CLASSROOM ACTIVITY

Overfishing / Sustainable Fishing Activity

Adapted and modified from California Academy of Sciences Sustainable fishing in the Philippines: <http://www.calacademy.org/teachers/resources/lessons/sustainable-fishing-in-the-philippines/>
Originally adapted from Fishing for the Future in Curriculum Guide 2002. Retrieved from www.facingthefuture.org.

Grade level: Grades 3-9

Time frame

This activity can be performed in one 30-50 minute class period.

MA Science Frameworks

Life Science (Biology) - Grade 3-5:

LS 7. Give examples of how changes in the environment (drought, cold) have caused some plants and animals to die or move to new locations (migration).

LS 10. Give examples of how organisms can cause changes in their environment to ensure survival. Explain how some of these changes may affect the ecosystem.

Life Science (Biology) - Grade 6-8:

LS 12. Relate the extinction of species to a mismatch of adaptation and the environment.

Biology - High school:

Ecology 6.2 Analyze changes in population size and biodiversity (speciation and extinction) that result from the following: natural causes, changes in climate, human activity, and the introduction of invasive, non-native species.

Objectives

Students will see how unregulated fishing can lead to depletion of fish stocks. They will also have an opportunity to discuss the factors that may contribute to the depletion and come up with ways (regulations) to better manage their resource.

Overview

- * Each student will be a “fisher” whose livelihood depends on catching fish.
- * Each piece of popcorn represents a fish.
- * Each fisher must catch at least two fish in each round to survive to the next fishing season.
- * When the fishing season begins, students must hold their hands behind their backs and use the “fishing rod” (straw) to suck “fish” (pieces of popcorn) from the “ocean” (plate) and deposit them into their “boat” (cup).
- * The fish remaining in the ocean after each fishing season represent the reproductive population, and thus one or two new fish will be added for every fish left in the ocean (plate).
- * After each round, fishers must record their catch in their Fishing Log.

Materials

- * two or three bags of popped, plain popcorn (amount depends on class size)
- * small paper cups (1 per student)
- * large paper plates (1 per group)
- * spoons (1 per group)
- * straws (1 per student)
- * watch (for timing the activity)
- * Fishing Log (1 per student)

(Activity - cont on page 2)

Procedure

- Divide the class into groups of three or four students and have them come up with a name for the area or reef where they fish.
- Give each group one plate and each student one cup, one straw, and one copy of the Fishing Log.
- Put 30 popcorn pieces on each group's plate. These are the fish that inhabit their fishing area or reef.
- Remind students that all fishers fish at the same time and must keep their hands behind their backs and wait for a signal to start fishing.
- Give students 20 seconds for the first "season" of fishing. Note: You can change the time allotted for each season to get the required effect. For example, if students are not depleting their stocks fast enough, you may increase the "season" to 30 seconds or if they are depleting the stocks too fast, you can decrease the time.
- After the first round, have each fisher count his or her catch (fish in their cup), the total bycatch for the table (dropped before reaching the cup), and the total fish left in the ocean (plate). Have them record the data in their Fishing Log. Note: Bycatch is any fish (or other creature) that is unintentionally wasted. In the game, a "fish" that leaves the ocean but is not placed into the "boat" is considered bycatch and cannot be put back into the ocean or counted as catch.
- In order to survive to the next fishing season, fishers must catch at least two fish. Fishers who did not catch the minimum amount must sit out for the following round.
- Add one or two new fish for every fish left on the plate, explaining that the fish reproduced in between the seasons.
- Play a second round and have students record catches on the Fishing Log.
- For the third round, tell students that some fishers have decided to use other "gear types" to increase their catch. Give a spoon to one fisher from each group (use of the spoon represents trawling).
- Continue playing more rounds until one group runs out of fish. Note: If students are not depleting their stocks fast enough, you may give more fishers spoons.
- When one group runs out of fish, ask them what they would do in the real world if they caught all of the fish who inhabited their surrounding waters. (One option is to switch to a different profession, but another option is to move to another area to fish.) Allow students to "invade" other groups when their area is depleted, but don't tell them that they can do this beforehand. Fishers may either go as a group or they may disperse separately to other areas.
- Repeat fishing, recording, and replenishing fish stocks until all (or most) groups fish out their areas. The Fishing Log allows for up to six seasons.

Conduct a discussion about the concept of sustainability. If any group did not completely deplete their fish discuss why this happened (less people fishing, etc.) Ask why sustainability might be an important goal for a community and why it might be difficult to achieve that goal. Have each group of students brainstorm ways that they might have made the fisheries more sustainable. Some possible ways are catch limits (a certain number of popcorn pieces), marine reserves (an area of the plate where fishing is not allowed), bans against trawling (no use of spoons).

Extensions:

- Have each group decide on a plan to make their fishery more sustainable.
- Conduct another six rounds (or less) of fishing, using the sustainability plans that the students developed. Because students know how to play, these rounds will go faster. Have students record their new season catches and compare them to the trend seen in the previous seasons.

* Another modification to this activity can be the introduction of different "species" (e.g. M&M's). These species can be more valuable (although more difficult to catch) or incur a penalty if more than one are caught.