

Fishing for the Future – M&M game

OVERVIEW

Through a fishing simulation, students model several consecutive seasons of a commercial fishery and explore how technology, population growth, and sustainable practices impact fish catch and fisheries management.

Objectives: Students will:

1. Experience the ‘tragedy of commons’ as it relates to fishing resources.
2. Consider social, environmental and economic impacts of overfishing
3. Identify sustainable fishing practices.

Subjects: Social Studies, Biology, Geography, Economics, Mathematics.

Time: 1 hour

Materials:

- M&Ms, two 14-ounce bags for up to 30 students
- Small cups one per student
- Small bowls one per group
- Spoons – one per group
- Straws – one per student
- Watch for timing activity

Background

Dr. Garrett Hardin coined the phrase “tragedy of commons’ in 1968. Hardin describes cows grazing on a common land; since there is no direct cost to using the land, individual ranchers are motivated to add to their herds in order to increase their personal wealth. But, each added animal damages the pasture a small perhaps imperceptible amount. Ultimately this gradual degradation destroys the commons. Each rancher acting alone is behaving in an appropriate rational manner yet the sum total of all the ranchers’ actions destroys the resource for them all.

From 1950 to 1990, there was a five fold increase in the world annual fish catch. An increasing demand for fish coupled with environmentally damaging fishing practices are leading to yet another tragedy of the commons. Roughly 70% of the planet’s marine stocks are fully or over-exploited, according to the Monterey Bay Aquarium’s Seafood Watch program.

In this activity, students will simulate the fishing activity in different oceans. As students progress through the fishing seasons they will likely over-fish their oceans and will have to migrate to other oceans to meet their basic needs. Most groups will eventually create a total crash of fish stocks in all the oceans. This demonstration will clearly indicate the benefits of sustainable fishing practices.

BEFORE YOU BEGIN

Divide the class into groups of 3-4 students each. Each group will start with 30 M& Ms. Count out the first round of M&Ms for each group and place them in bags. It is advisable to select one student in each group as a moderator to record catches, identify students who were unable to catch their quota and add additional M&Ms to the bowl (see points 4 & 9)

WHAT TO DO

1. Introduce and discuss the concept of sustainability using the following definition:
“Meeting the needs of the present without compromising the ability of future generations to meet their own needs.”
2. Ask why sustainability may be an important goal for a society and what might be difficult about realizing this goal
3. Tell students that today they are going to fish and explore some sustainability issues

4. **Explain the game rules:**
 - a. Each student will be a fisher whose livelihood depends on catching fish
 - b. The M&Ms represent fish in the ocean
 - 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 fishing begins, students must hold their hands behind their backs and use the fishing rod (straw) to suck fish (M&Ms) from the ocean (bowl)
 - e. The remaining fish in each ocean after each round represents the breeding population and thus one new fish will be added at the end of each round for every fish left in the ocean.

5. **Give each group:** a bowl (ocean) and have them choose an ocean to name it after.
6. **Put 30 M&Ms into each bowl**
7. **Give each student** a straw (fishing rod) and cup (fishing boat) into which they place the fish (M&Ms) that they catch
8. **ROUND 1 - Start fishing**, give the students **20 seconds** for the first season of fishing. Students should hold their **hands behind their backs** for this round.
9. **At the end of each round:**
 - Have each fisher count his/her catch (M&Ms in their cup) and record their catch. Record how many fish are left in the bowl.
 - After each round fishers who do not catch a minimum of 2 fish must sit out for the following round after which they may return to the game
 - Add one new fish for every fish left in the bowl (ocean).
10. **ROUND 2** - Allow remaining fishers to use their hand on the straws during the second season to represent new technology such as a faster boat or fish-finding sonar.
11. **ROUND 3** - After the second fishing season, give **ONE** fisher in each group a **spoon** to use instead of a straw. This represents inequity in the fishing industry in which some fishers utilize more advanced fishing technology than others; such as, electric fishing reels. Continue the game for round three.
12. Allow students to invade other oceans if they have depleted their oceans, but do not tell them that they can do this beforehand. Fishers may either go as a group to another ocean or disperse to other oceans.
13. Repeat fishing, recording, and replenishing of fish stocks until either sustainable fishing is achieved or until all or most groups fish out their ocean.

REFLECTION

Use the following sample questions to lead a discussion about the activity.

- How did you feel when you realize that you had depleted your fish stock
- How did you feel when other fishers joined your group?
- How does this activity relate to real oceans and fishery issues
- What happens to a resource when you have infinite population growth, growing technology and a finite resource?