



TRAGEDY OF THE COMMONS

This activity speaks about the use of the resources on Earth called the commons. Students will demonstrate the issues with individual and collective action through an activity with goldfish, chopsticks, and cereal. Sustainable fishing is possible when positive collective action is put at the forefront.

LESSON LENGTH:

- 45 minutes

GOALS:

- To understand the tragedy of the commons and how this concept relates to students' daily lives, the environment, and politics.

OBJECTIVES:

Students will be able to:

- Explain the tragedy of the commons
- Identify environmental issues and their causes
- Explain how tragedy of the commons relates to their daily activities
- Describe measures they can take to prevent the tragedy of the commons from occurring

NATIONAL, STATE, LOCAL STANDARDS

- **EEn.2.8** Evaluate human behaviors in terms of how likely they are to ensure the ability to live sustainably on Earth.
- **EEn.2.8.3** Explain the effects of uncontrolled population growth on the Earth's resources.

STUDENT TAKEAWAYS FROM LESSON:

- Essential question / theme
 - Why is the tragedy of the commons a problem? What are ways as an individual and as a collective group of people that we can positively change this tragedy?
- Key concepts and vocabulary
 - Tragedy of the commons: a theory developed by Garrett Hardin (1968) to explain the impact of society on a shared resource. Essentially, common but limited resources are depleted and possibly collapse when individuals act selfishly to maximize personal gains.
 - **HIPPO**: Habitat Destruction, Invasive Species, Population Increase, Pollution, and Overharvesting
 - Collective action: the actions taken by a collection or group of people, acting based on a collective decision (i.e. how to work together collectively to address collective issues; tragedy of the commons).
 - Individual action: the actions taken by one individual person, acting based on his or her personal decisions.

ASSESSMENTS:

- Formative
 - Writing down environmental problems
 - Sharing with the group whether the environmental problem is a part of the tragedy of the commons
 - Journal Entry: What are examples of the tragedy of the commons in your daily life?

DIVERSITY (REACHING STUDENTS OF ALL LEVELS/ABILITIES):

- Kinesthetic learning
- Hands-on learning
- Students work in teams
- Students have group discussions

MATERIALS & EQUIPMENT:

- 1 large box of goldfish
- 1 bowl per group (group number dependent on group size)
- 1 large box of Cheerios
- 1 pair of chopsticks per group
- Napkin or paper towel (1 per group)
- Markers

LOCATION:

- Can be done inside or outside

RISK MANAGEMENT & SAFETY CONCERNS:

- This activity can become very competitive and taken personally if not facilitated properly.

BAD WEATHER ALTERNATIVE:

- If short on time, decrease the number of rounds the students will do in the *Explore* section.
- If short on time and need greater variety, instruct the different groups to have different restrictions (such as: some can communicate and some who cannot communicate; some have to close one eye while fishing, etc.)

PRE-LESSON PREPARATION:

- Fill each bowl with Cheerios and 30 goldfish. Make sure to hide the goldfish under the Cheerios.



LESSON:

ENGAGE

- Begin with a discussion about environmental problems. Have students list different issues they see that cause harm to the environment (the instructor or a student can write the problems down for everyone to see).
- Probe the students to state the causes and effects of these issues.
- Determine as a group which issues have anthropogenic sources and which have natural sources.

EXPLORE

Note: feel free to adjust the number of starting goldfish, the amount of time each student has to fish, the rate of reproduction, the number of rounds, etc. – and please make note of what numbers you used and how well the game went!

- Split the students into groups of 4 or less.
- Draw a table (like the one in the Appendix) on the board, and have the students copy it into their notebooks. Have the students draw and fill out a table for each round.
- Explain the game: each group represents a community and each student is the head of a household. They earn their livelihood and receive food for their family from a shared fishing pond. To have enough food to eat, each family must have 2 fish per week. If they have extra fish, they can have a feast or can sell the fish to buy other items.
- Give each group a bowl containing Cheerios and goldfish (the pond), as well as a pair of chopsticks (the fishing pole).
- Tell them it is the beginning of the week and that they are to go fishing to catch their food for the week.
- Each student has 1 minute to fish as much as they want using the chopsticks. At the end of the minute, they pass the chopsticks to the next student. After each student has had a chance to fish, ask the class what they noticed about fishing during the round.
- Have them count the number of fish they caught and record it on a piece of paper as Round 1.
- Tell the students that there were originally 30 fish in the pond.
- Have them calculate how many fish currently remain. For each remaining fish, give the groups 2 additional fish; the fish that remain have reproduced.
- Have them mix the fish into the bowl and tell them to go fishing. Again, each family needs 2 fish per week, but they can catch as many as they want within the 1-minute period.
- Have them count the number of fish they caught and record it on a piece of paper as Round 2.
- Repeat this process for a total of 5 rounds without replenishing the fish amount (other than the reproduction process).
- If, during any round, a group has no fish left, have them all spend a round without fishing (the equivalence of not having enough to eat for a week), then provide them with 15 goldfish in the following round.

EXPLAIN



- At the end of 5 rounds, ask the students what strategies they developed. Have an open discussion with the groups by asking some of the following questions:
 - Who was able to find the most fish? Did it get easier or harder to find more fish? Why?
 - How many fish did they decide to catch each round?
 - Did everyone have the same strategy? Did they work individually to maximize personal gain or did they work as a team?
 - Did they have to go hungry any week (catch less than 2 fish)?
 - Did they ever catch more than 2 fish?
 - Why did they choose to behave as they did? Did any groups deplete their supply of fish?
 - If they were to repeat the activity again, would they behave differently?
 - Did anyone take too many fish; how did that make other group members feel? Did anyone sacrifice the number of fish they took for the good of the community?
 - Is it possible to maximize the number of fish caught and the number of fish remaining in the pond at the same time?

EXTEND/ELABORATE

- The tragedy of the commons states that an individual will seek to maximize personal gains on a shared resource, which will lead to depletion of the resource. As a result, everyone will lose the benefits of that resource. A collective action problem is a scenario where there is conflict between the individual's interest and the group interest. With this scenario, the individuals in the group face a choice to either be selfish or cooperate. Typically, the individual gains the most by being selfish. But in the end if every individual is selfish, the worse outcome would occur.
- If, instead, each person sought to maximize gains of the entire community by only using a given share of a resource, each individual would receive a smaller benefit, but it would be sustainable.
 - This is an important lesson to teach to students, as it can be related to any shared resource or item. Environmentally, it can explain many relevant issues including overfishing, pollution, and quotas to camping permits in national parks.
- The instructor should ask: what are some solutions to a tragedy of the commons situation?
 - Communication between people
 - Education about resource use and the dangers of the “tragedy”
 - Partnership between users
 - Privatization of the resource if done properly
 - Long-range thinking—long term connection to the resource
 - Incentives for sustainable resource use
 - Governmental regulation/laws if fully enforced
- Close the lesson by relating this activity to the environmental problems they discussed at the beginning of the lesson. Can anyone give an example of how the activity relates to an environmental issue? (i.e., Which of the environmental issues that they listed are related to the tragedy of the commons?) What could be done to prevent these issues from occurring?
- Mention HIPPO (Habitat Destruction, Invasive Species, Population Increase, Pollution, and Overharvesting) as major forms of environmental degradation and discuss each.



EVALUATE

- Journal Entry: What examples of the tragedy of the commons do you see in your daily life (at school, at home, in their neighborhood/community)? What could you do to help prevent this issue from occurring?
 - Girls share out
 - Instructor gives this example if a girl hasn't mentioned it: Within the school or home, it can explain the importance of cleaning up after oneself and returning borrowed items. For example, if one student borrows a classroom pencil and decides to keep it rather than returning it, perhaps no one will notice. Then another student decides to borrow a pencil and does the same. If every student borrows a pencil and keeps it, soon there will be no pencils remaining for any student to borrow, and they will be forced to spend the day without a writing implement. At first, each student was pursuing his/her own self-interests by keeping the pencils. He/she thought only of personal gain and of not having to purchase another pencil from the store. However, when everyone began to think in terms of personal gain, everyone failed to return the pencil, and the shared resource of classroom pencils was depleted. If, instead, every student had considered the benefit of the group and had returned the pencil at the end of the day, then the students would still have a pool of available pencils to borrow from when needed; everyone would benefit equally from this shared resource.
- Final wrap-up discussion: What kinds of situations lead to a tragedy of the commons?
 - Common, limited, potentially renewable resource
 - Lack of communication and familiarity between people
 - Short-term attachment to the resource
 - No agreed-upon strategy for resource use

REFERENCEMATERIALS/RESOURCES

- http://www.garretthardinsociety.org/articles_pdf/tragedy_of_the_commons.pdf (the full article)
- https://secure-media.collegeboard.org/apc/ap03_apes_tragedy_tea_35072.pdf
- Based off: <http://www.d.umn.edu/~tbates/curricularesources/ModelLessonPlan.pdf>



Appendix

Round X (1-5)

Week #	Number of Fish in Lake Before Fishing Begins	Number of Fish Caught by Individual	Number of Fish Caught by the Group	Number of Fish Remaining
1				
2				
3				
4				
5				

