j0295735[1]Environmental Science

**Let’s Go Fishing! A “Tragedy of the Commons” Simulation**

The purpose of this activity is to introduce you to a concept referred to as “tragedy of the commons”. It was first proposed by Garrett Hardin in 1968, in an article published in the journal *Science* 162(1968):1243-48. Your textbook has information on this concept – you may wish to read more about the concept as you answer the final questions, as needed. Let’s go fishing!

**HERE’S THE STORY**

As the head of your family, you need to fish for food. The nearest fishing hole is a small, pleasant place that accommodates 16 fish. There are 4 families that rely on this pond. They fish in the morning, after which time the remaining fish reproduce…1 offspring per fish to a maximum of 16 total fish in the pond.

PROCEDURE: PART 1

* Join a lab table. You will work individually, as you represent your own family. 4 families per table.
* On your table find 4 fishing poles (spoons) and a fishing pond (Kleenex box). The fish are in the Kleenex box. Don’t look inside. In a real pond you wouldn’t be able to look in and see the fish (at least not very well) so don’t look now.
* The oldest person goes first. Each fisherperson may take as many or as few fish as he/she wants during their turn, but more than one fish is needed to feed each family. The morning of fishing will last 1 minute.
* At the end of the morning’s fishing double the number of remaining fish to simulate reproduction. The oldest person will reproduce the fish.
* Fish 2 more days.
* Rotate your fishing order so everyone has a chance to go first.
* No talking is allowed during this phase.
* Fill in the table below, as you fish.

**Common Pond: Part One**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Morning | # of fish at start | # of fish taken by 1st fisher | # of fish taken by 2nd fisher | # of fish taken by 3rd fisher | # of fish taken by 4th fisher | Total fish left at end of day |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| Totals | xxxxxx |  |  |  |  | xxxxxx |

(Originally written by Tori Haidinger; retrieved 6/05 apcentral.collegeboard.com)

**PART 2:**

Now the people in your village have access to 2 ponds; the common one as above, and one private. The common pond can hold a maximum of 16 fish (that’s its “carrying capacity”) but the private pond can hold just 4.

The basic rules are the same as before, however talking and strategizing are now allowed. The Kleenex box will be removed so you can see the fish. *You must remove at least 1 fish from each pond, each fishing trip,* however there is no upper limit to the fish you can catch from each pond.

Fill in the tables as you fish.

**Common pond: Part Two**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Morning | # of fish at start | # of fish taken by 1st fisher | # of fish taken by 2nd fisher | # of fish taken by 3rd fisher | # of fish taken by 4th fisher | Total fish left at end of day |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| Totals | xxxxxxx |  |  |  |  | xxxxxxx |

**Private Pond: Part Two**

|  |  |  |  |
| --- | --- | --- | --- |
| Morning | # of fish at beginning | # of fish taken | # of fish at end of morning |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| Totals | Xxxxxxx |  | xxxxxxx |

Calculate the number of fish caught by each fisherperson.

**ANALYSIS** (Think about your data and discuss these questions at your table.)

1. What happened to the common resource in part 1? Why?

2. Did you get different results for part 2? Explain.

3. What was your rationale for your fishing technique in each part of this activity? Explain.

4. Did you cooperate in part 2? Why or why not? Did it make a difference?

5. Did you use different strategies for fishing the common pond and your private pond? Why or why not?

6. Was it easier to manage the private pond for long term existence? Why or why not?

7. Common use of a shared resource can sometimes lead to exploitation. What does this mean? Did you see it in your activity?

8. How should a common resource such as a community fishing pond be managed? What problems might you encounter?

9. Can you think of other examples of common resources that have been exploited by people?

10. Renewable resources are no longer renewable if we overuse the resource. What strategies can be used to prevent “the tragedy of the commons”?

**Excerpt from Garrett Hardin’s *Tragedy of the Commons***

*The tragedy of the commons develops in this way. Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. Such an arrangement may work reasonably satisfactorily for centuries because tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land. Finally, however, comes the day of reckoning, that is, the day when the long-desired goal of social stability becomes a reality. At this point, the inherent logic of the commons remorselessly generates tragedy.*

*As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, "What is the utility to me of adding one more animal to my herd?" This utility has one negative and one positive component.*

*The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly + 1.*

*The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision making herdsman is only a fraction of - 1.*

*Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another.... But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit -- in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.*

Using the information from Hardin’s Paper and the lab you just completed do the following:

Write a summarizing paragraph to show your understanding of the “Tragedy of the Commons” (TotC). 5 point formative grade

* What is it? Use this activity to explain it.
* Where have we seen TotC in “real life”?
* What can we do about it?
* What are your suggestions?