Tragedy of the Commons Simulation

PURPOSE AND BACKGROUND

The purpose of this simulation is to explore how resources are used and exploited when they are available to multiple parties. The "tragedy of the commons" is the situation in which individuals use a common resource for their own personal gain and degradation of the commons results, leading to a decrease in yield for both the group and the individual. (G. Tyler Miller, Jr., *Living in the Environment*, 13th ed., Pacific Grove, CA: Brooks/Cole, 2004)

OBJECTIVES for this lab.

Mod 2. Environmental Indicators and Sustainability

- Define sustainability and explain how it can be measured using the ecological footprint.
- Define *sustainable yield*. Describe the relationship between sustainable yield and environmental degradation.
- Describe the tragedy of the commons. Summarize how most environmentalists alleviate this type of tragedy.

MATERIALS AND EQUIPMENT

Skittles
Plastic bowls (lakes)
Straws

PROCEDURE

Part I:

Divide yourselves into groups of four. Imagine this scenario. Each person represents the head of a starving family that requires food. The only food source for these four families is a small fishing hole that can accommodate 16 fish. Fortunately, after each round of fishing by the four family heads, each remaining fish is able to spontaneously reproduce and make one new fish (i.e. 4 fish become 8, to a maximum of 16—this maximum is due to **limiting factors** in the ponds, such as dissolved oxygen, food, etc. that the fish are dependent on to survive). Each person is allowed to take as many or as few fish as you want, but if you take only one fish, your family will starve.

In this simulation, our pond is a bowl, and our fish are Skittles. Fish are caught using straws. Each round of fishing will last for 15 seconds. You should rotate your fishing order every round so that everyone has a chance to go first. At the end of every round, the number of remaining fish will be doubled to simulate reproduction. The simulation will continue for several rounds.

RESULTS :

Your results section should include data table results and calculated results for Parts I and II, as well as the analysis questions.

Part I Data: Commons pond

Round #	Initial # of fish	# taken by fisher 1	# taken by fisher 2	# taken by fisher 3	# taken by fisher 4	Total left at the end of the round
1						
2						
3						
4						
5						
Totals						

Part I: Calculated Results

- What is the total number of fish caught by each person? Record in the data table.

- The total amount of fish that could have been taken from the pond over the trial period if the fish had been managed perfectly. (Show your calculations!)

Part II:

This part is exactly like the first, except that in this simulation, everyone has a private pond in addition to the common pond. The private ponds can only hold a maximum of 3 fish, although all other rules apply. You may catch as many fish as you would like from both ponds during each round.

Part II: Commons pond

Round #	Initial # of fish	# taken by fisher 1	# taken by fisher 2	# taken by fisher 3	# taken by fisher 4	Total left at the end of the round
1						
2						
3						
4						
5						
Totals						

Part II: Private pond

Round #	Initial # of fish	# of fish taken this round	Total left at the end of the round
1			
2			
3			
4			
5			

Part II: Calculated Results

- What is the total number of fish caught by each person?

- The total amount of fish that could have been taken from the pond over the trial period if the fish had been managed perfectly. (Show your calculations!)

ANALYSIS

1. What happened to the common resource in Part I? Why?

2. Did you get different results for the pond in Part II? Why?

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

4. If you cooperated with other fishers, explain the result of that cooperation?

5. Did anyone sacrifice the number of fish they took for the good of the community? Why or why not? Does society reward that type of person?

6. Is it possible to maximize the number of fish caught per person AND the number of fish remaining in the pond at the same time? Why or why not?

7. Did you use different fishing strategies in the common pond and the private pond?

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

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

10. Think of a local commons versus a private resource such as a cafeteria vs. your home kitchen or the school bathroom vs. your home bathroom. Do you or others treat those similar resources in the same way? Why or why not?

11. What would be the ideal way to manage the common pond/common resource?

12. What are some natural resources that are common resources?

13. What are some of the global commons? Are these being used wisely?

CONCLUSION

Write a summarizing paragraph to show your understanding of the "tragedy of the commons". Discuss the implications of this simulation on the management of common resources in the environment. What other resource management examples can you think of where this topic is relevant in "real life"? What would you suggest as management techniques in these situations?

SUGGESTIONS FOR FURTHER INVESTIGATION

What changes would you make to this lab to advance your studies on this subject matter?