Tragedy of the Commons / Common Pool Resource Management Fishing Lesson

The purpose of this lesson is to demonstrate the concept behind the tragedy of the commons and to illustrate that there are multiple different ways of avoiding it. This lesson should be completed *before* students have read Hardin's Tragedy of the Commons or any literature regarding commons management (e.g. Ostrom). It is intended to be an introduction to concepts that will be explored in detail in the literature and future lectures/discussions. In particular, it is intended to provide a basis for students to critically evaluate Hardin's assertions that state oversight and private property are the sole ways to avoid resource depletion.

The target audience is undergraduate or master's students without training in common pool resource management. It is best for a group of 5-15 students. For larger lectures, volunteer groups of students may complete the exercise as a demonstration for the rest of the class.

For this activity, students will "fish" for individually-wrapped candies (e.g. Starbursts) that are on the "ocean" (or table) in front of them. Begin the first round of each scenario (except scenario 5, as explained below), with approximately 4 times the number of candies as student participants. Tell students that these are resources that can be personally consumed for sustenance as well as sold—in any case, they are important to your livelihood as a fisher. Inform students that there are several scenarios we will explore, and each will have multiple "seasons" of fishing. The fish will spawn and reproduce after the season is over, but (at first) we don't know at what rate, and we don't know the maximum number of fish the ocean can sustain. (We do know that there is some maximum—if there are too many fish, they'll start to die naturally.)

Scenario 1 (Open-Access Resource, No Information, No Communication): Inform students that they are not permitted to communicate before or while fishing. Instruct students that fishing season is open and they have one minute to fish, then turn your back so you can't see the table. Return and doubling the number of fish between seasons. (End when fish are gone or stock is seriously depleted.)

Discussion Questions:

- Why did you decide to take the number of fish that you did?
- How was that decision impacted by the behavior of those around you?
- [If the fish were not totally depleted in the first season]: Did you alter your behavior between the first and second seasons in response to what you saw happen to the stock in the off-season? Why or why not?
- Do you think you would have behaved differently if I had not turned around? Why or why not?

Points this demonstrates:

- It's difficult for everyone to know how many fish to take without knowing information about the stock, such as carrying capacity or spawning rates.
- This scenario usually leads to overharvesting as everyone comes in and takes fish.

Scenario 2 (State regulation with No Penalty) Inform students that you are a fisheries manager and you are going to set fishing limits. Each student is permitted to take one fish per season. Students may communicate with each other about these limits and their fishing behavior.

Part A (With Oversight): Allow two rounds of fishing while watching. Replenish the fish between rounds, but then take some back, explaining that some of the fish have died naturally.

Discussion questions:

- Did you consider taking more than one fish? Why or why not?
- Did the fishing limit I set seem fair? Why or why not?

Points this demonstrates:

- State regulations can impact behavior, but failure to explain the basis / regulations that aren't supported by science can cause lack of trust in regulators.

Part B (No State Oversight): Tell students that the next season is beginning, but you need to step away for a phone call. You'll return in approximately a minute.

Discussion questions:

- Did anyone take more than 1 fish? Why or why not?
- Did you have any discussions about how much fish or the limit that I imposed? If so, what did you discuss?

Points this demonstrates:

- The "state" setting rules can influence norms, even if the state is not directly overseeing.
- In some cases, actors may decide to disregard state regulations that they deem irrational, particularly in the absence of oversight.

Part C (With Fines): Tell students that this time you will be imposing a fine associated with overfishing. Each student who takes more than one fish will be fined 50% of their fish at the end of one season.

Discussion questions:

- Did anyone take more than 1 fish? Why or why not?
- How did knowing that you had to pay 50% of your fish as a penalty affect what you decided to take?

Points this demonstrates:

- Financial penalties can impact behavioral norms and turn violations into something that can be "bought" and "sold". If the penalty is less than the incentive, this actually encourages violations. (This article is a helpful illustration, especially if the class decides not to violate.)

Scenario 3 (Information and communication; no regulation): Tell students that this time, there is no regulation. You are not setting any regulations or telling them how much they may fish. However, the ocean is at the maximum number of fish it can possibly hold. In addition, the population will double during the spawning season, after the fishing season is closed. Students are allowed to communicate with one another. Tell students to fish and promptly turn your back and leave the room. Repeat seasons, doubling the number of fish roughly between seasons to see if they're depleted. They likely won't be, but perhaps there will be some violators or people who jump to fish before discussing! This

depends on class dynamics and norms of cooperation trust—just like in real life, sometimes the participants don't know or trust one another, and occasionally a student purposefully seeks to violate to be contrary, which can lead to cascades of violators even among those who were otherwise cooperative. This is also a useful lesson and may make scenario 4 unnecessary; if so, incorporate the scenario 4 questions, and you may skip that scenario.

Discussion questions:

- Did you all discuss how many fish to take? How did you decide?
- Did you all take the agreed number of fish? Why or why not?

Points this demonstrates:

- With proper information, people can work together to figure out how many fish each fisher can sustainably take.
- They take these actions even without state enforcement but are guided by other social norms.

Scenario 4 (Impact of norm violators): Tell students that you are a new fisher to the area, and you plan to join in on the fishing they began in the prior round. Everything is otherwise the same. Once you announce that fishing has begun, take your allotted 2 fish, then jump in and start scooping handfuls. In practice, this usually leads to a race to grab all the candy, but if it doesn't, don't take them all, and repeat seasons as necessary showing depletion.

Discussion questions:

- How did you react when I started taking fish?
- Did this make you take more fish? Why or why not?

Points this demonstrates:

- When one person starts to violate the rules, others may as well
- Violations may lead to a race to fish

Scenario 5 (MPA and spatial management): Tell students that they each have their own fishing area with 2 fish. No one else is permitted to fish there. There is a protected area in the center, and no one may fish from that area. Tell them the fishing season is open. After each season, first double the fish in each territory and in the MPA. Then move some fish from the MPA into some, but not all, fishing territories. Move some fish from one territory into another and to into the MPA. Create scenarios where sometimes people have no fish in their territory.

Discussion questions:

- Why did you decide to take the number of fish you did in the first season?
- Did you change your approach in the second season? Why or why not?
- Did any of you fish from the MPA? Why or why not?
- Did this approach seem fair to you? In what scenarios would it have been more fair?
- Are there some circumstances in which this approach might be more equitable than it was here?

Points this demonstrates:

- Territorial management may be useful in encouraging some to sustainably manage the resource, but for mobile resources it is complicated and may result in unintended consequences
- MPAs can cause spillover into territories, but there may be winners and losers

Note: after the exercise, make sure everyone has equal candy so there is no actual inequitable treatment or reward for people who violate the rules and norms!

Follow-up assignment for the next class: Read Hardin (1958). As you read, ask what are the assumptions underlying Hardin's thinking? Reflecting on this activity, in which cases might those be assumptions true? In which cases might they not be true?

Other reading for future classes may include Chapter 1 of Ostrom Governing the Commons, Ostrom (1999), Schlager (2002), Basurto 2005, or a host of other literature on commons management depending on the specific course.

Credit: This exercise was inspired by activities and discussions I participated in as a student in courses taught by Dr. Martin Smith and Dr. Anastasia Quintana.