1. **“Global Natural Resource and Environmental Issues” Notes**

* Open “Tragedy of the Commons” PowerPoint to the first slide. The purpose of this discussion is to introduce the idea of how humans contribute to environmental degradation and natural resource exploitation.
* The slides contain general questions to stimulate a discussion that should ultimately lead to the recognition that one consequence of economic development and the competition for scarce resources can be the overexploitation of natural resources (i.e. fisheries, deforestation, water consumption etc.) and the accumulation of environmental externalities (i.e. smog, greenhouse gas emissions, freshwater pollution etc.). The notion that these issues generally arise when economic agents are acting in their own self-interest should be presented (i.e. economic agents seeking to maximize profits and minimize costs).

*Following this brief discussion, begin the fishing activity. Brief descriptions of each scenario that will be played are provided below.*

1. **Fishing Scenario Instructions**

***Open Access:***

This scenario presents students with a typical environmental resource extraction problem. Students are allowed to simultaneously fish each round. **Students should not discuss fishing strategies while participating in this scenario.**

**Purpose & Possible Outcomes**

The purpose of this scenario is to simulate the traditional tragedy of the commons situation. In general fish populations are likely to be completely depleted in this scenario, because without cooperation, individuals acting in their own self-interest will harvest as many fish as possible each round in order to maximize profits.

***Random Monitoring & Enforcement:***

The intent of this scenario is to reach the socially efficient outcome, therefore the regulation stipulates that **each person can only harvest 3 fish from the lake each round**. **Communication among group members is still prohibited.** In reality, monitoring and enforcing regulations is often costly and difficult. The scenario, therefore, uses an imperfect monitoring mechanism. **After students have participated in a round of fishing and recorded their data, the teacher tosses a coin. If the coin lands on tails, then nobody will be monitored; if the coin lands on heads, then one person in the group will be monitored.** If the coin lands on heads, to determine which person will be monitored, the dice will be rolled. The number on the dice corresponds to the player in each group that will be monitored. It is possible that the same individual may be monitored multiple times. It is also possible that no one is monitored. Repeat this monitoring sequence separately for each round.

If the student monitored only harvested 3 fish, then the student is in compliance there is no penalty. However, if the monitored student harvested more than 3 fish, then the penalty is “$3” units of profit for every fish that the student harvested over the three fish quota. For example, if the person harvested 7 fish, s/he is four fish above the quota and receives a “$8” penalty. In this case, the student monitored should hand the teacher the “$8” penalty from his or her earnings.

**Purpose & Possible Outcomes:**

The ***Random Monitoring & Enforcement*** scenario parallels a situation in which an external government agency imposes regulations on the group in an attempt to establish a sustainable fishery. These regulations are sometimes imperfectly enforced. When the regulation is imposed, it is likely that high compliance will occur in the first few rounds. But compliance may deteriorate and decisions may reach the same levels as the ***Open Access***treatment.

***Communication:***

In this scenario, the regulation is no longer in effect, but **students are now given up to 3 minutes to communicate with their fellow group members prior to each round**. Students are permitted to discuss a fishing strategy, but they are not allowed to use threats or agree to transfer money. Once students begin each round, all decisions are private and the fishing proceeds like the first scenario.

**Purpose & Possible Outcomes:**

This scenario is a proxy for allowing a weak form of self- governance over the shared local resource. What may be particularly interesting about this treatment is the high degree of compliance that communication fosters, even in the absence of any regulation. Prior to the last round, we announce that this will be the end, but rarely observe any significant end-game effects.

**Property Rights**

In this scenario, students are each provided ownership of an equal share of the fish population. Students are only allowed to harvest from their pool of fish.

**Purpose & Possible Outcomes:**

This scenario is intended to simulate one classic solution to the tragedy of the commons problem. The idea is that when a user is given ownership of the resource s/he has incentive to sustain that resource in order to protect long-term profits. In general, each student’s population of fish will be harvested in a sustainable manner and profits should be distributed equally.

1. **“Introducing the Tragedy of the Commons” Notes**

* Following the class activity, open the Tragedy of the Commons PowerPoint and play the following Youtube videos:

1. Chalk Talk: Tragedy of the Commons, Part 1, NSF
   * (<https://www.youtube.com/watch?v=KZDjPnzoge0>)
2. Chalk Talk: Tragedy of the Commons, Part 2, NSF
   * (<https://www.youtube.com/watch?v=IVwk6VIxBXg>)

* Following the presentation of the videos engage the class by posing the questions offered in the following slide.
  + What is a commons?
    - The "commons" is any resource that is shared by a group of people, cities, states or countries. Such things as the air we breathe and the water we drink come from commons. In many parts of the world; new land for farming and grazing land for stock, fish from the sea, and wood for fuel and housing are treated as commons.
  + What is the primary problem that creates the Tragedy of the Commons?
    - Individuals competing for the use of a shared finite resource and acting I their own self-interest are likely to overexploit the common resource.
  + How does the fishing game represent a tragedy of the commons?
  + Which scenario in particular led to a tragedy?

1. **Group Handout 2**

* Following this brief discussion move on to the second Group Handout and have the students complete the assignment with their groups.

1. ***Class Discussion***

* If time permits, review some of the discussion questions as a class. What did different groups come up with?