The Commons Dilemma

Conducting the Activity

Preparation
Prior to the activity, count out sets of "fish" for each "lake" to be sampled by the participants. Using peanuts, kidney beans or something similar in size as panfish or forage fish and Goldfish[7] as predatory fish, count out 16 of the smaller and 4 of the larger "fish". If desired use a larger number, but keep the ration of 4:1 intact. Prepackage enough of these to stock as many "lakes" as you will have groups, sealing each set in a sealable plastic bag. Placing a bowl or plate, the "fish" and all other supplies in a larger bag, makes set up for the exercise quick and easy.

Conducting the Exercise
When the participants assemble, divide them into groups of 4 and have each group sit around a table or in a small circle. Provide each group with a "lake" (a bowl or plate) stocked with the fish previously prepared. The number provided represents the carrying capacity of the lake. [***Note: if you intend to count out the fish, be sure to keep your counting unobtrusive to avoid calling the participants' attention to the significance of the numbers.***] Provide each group with a copy of the Fish Data Table and a writing instrument.

Provide necessary background information, explaining that the container is a local lake or pond, providing a name to enhance the reality of the model. Explain that the lake is at its carrying capacity that is that it is stocked with as many fish of each type as it can support under the present conditions. [***Keep this simple! It is an introduction, not a final exam in ecology***.] Note that the Goldfish[7] and the peanuts or beans each represent fish species. Assign species names that make sense for the area, allowing the peanuts or beans to represent common fish like bluegill, perch, suckers or carp and assigning to the models the Goldfish[7] to a sportfish or commercially valuable species like black bass, striped bass, walleye, trout, or a similar species.

The rules for conducting the exercises are simple.

1. No talking while the groups are fishing!
2. Each participant is an angler, and each angler will fish during each bout of fishing.
3. Each angler may harvest from 0 to 3 fish during their turn.
4. The number and types of fish taken are the choice of the angler fishing.
5. Each bout of fishing (every angler fishing once) will represent a year.
6. At the end of each year, a new fish of each species will be recruited (added) for every fish of that species remaining in the lake. [***The original number of fish of each species in the lake, however, may not be exceeded***.]
7. Each angler should keep the fish they catch in front of them. (Anglers will be able to eat their catch later.)

Start the activity by opening the lake/pond/sea to fishing. Remind them that they are not allowed to talk while they are fishing and the the maximum number they may take is three fish total. [***This may be a place to introduce the term "aggregate" that is used frequently in regulations***.] Have each angler keep his or her catch separately. Once each angler has had a chance to fish and take the number of fish they have decided to harvest, have each group record its annual catch (harvest) and the fish population (number of fish of each species remaining in the lake). If the Fish Data Tables are not used, the numbers should be recorded on a newsprint pad or chalkboard for each group. Determine the number of fish that can be recruited (the number of each species remaining, but not more than the original number for that species) and add the annual recruitment to the lake. [**Note that any population that is completely harvested cannot be replenished because that species has been extirpated (completely eliminated) from the lake!**]

Repeat the entire process for another Ayear,@ allowing each angler to determine his or her harvest and to take the fish they chose from the population. Record the annual catch and the fish population on the table, chalkboard or pad; and replenish the population according to the formula with recruited fish.

Remind the young people that they cannot talk until the exercise is over, and repeat the process for the third year. After the harvest has taken place, record the annual catch and fish population and allow recruitment to restock the lake. [***Note the alternative and additional ways of using this exercise listed below***.]

Discussion Ideas

1. Who caught the most fish?
   Refer to the fish each person has in front of them for the answer.
2. Which lake provided the greatest total harvest of fish?
   Refer to the table to determine total catches for each of the lakes in the exercise.
   Why?
   Anglers were able to maintain recruitment and keep the lake at or near its carrying capacity.
3. Which lake was fished out the soonest?

Refer to the table to determine if any of the lakes were completely fished out or had a species extirpated during the exercise and when that took place.

Why?

If a species was fished to extinction in the lake, it was because the harvest exceeded the recruitment potential of the population.

4. Which species was wiped out first?

Refer to the table for this data.

Why did this happen?

Recruitment could not keep up with the harvest.

5. Why were fish replaced proportionally to the remaining stock and only if some remained in the lake?

Reproduction and recruitment require parental stock.

6. Why were fish only replaced to the total numbers that were originally in the lake?

That was established as the carrying capacity of the lake. The lake was not capable of sustaining more that that number of each species.

7. What were the best strategies for "sustained yield"?

Proposed answers will vary, but taking half the fish each year would maximize the number that can be recruited and harvested in this example.

8. How did you feel as you played the game?

Did anyone take too many fish?

How did that make the other anglers feel?

Did everyone try to take as many fish as possible?

Why or why not?

Did fishing strategy change among anglers when fish stocks appear to become depleted?

All of these questions can produce excellent discussions. Be prepared to "go with the flow" and serve as a monitor for the resulting discussions.

9. What happens when anglers do not use a cooperative fishing strategy?

Fish stocks can be severely depleted or even extirpated leading to the "tragedy of the commons" as a result of the over fishing.

10. In a natural system, what management strategies might be used to influence populations, for example, managing to have more Goldfish[7]?

Regulations like catch and release, size/bag limits, habitat improvement to increase carrying capacity, stocking, and similar things can be used to augment populations.

11. What kinds of local commons can you think of?

Answers will vary from parking spaces or parks to wildlife populations or seats in a classroom. Be prepared to accept any that are reasonable examples and have teen leaders ready to expand the sphere of thinking if necessary.

Can you think of natural resources that are common in the U.S.?

Allow this list to be as wide-ranging and broad as desired, trying to get it to include both commons resources and proprietary ones and both renewable and non-renewable types, e.g.fisheries, forests, wildlife, pasture and grazing lands, oil, natural gas, coal, water.

How do these resources differ?

Some, like forests, are renewable, while others, like natural gas and oil, are non-renewable.. Some are commons resources, owned by all people corporately, while others are proprietary resources, where possession of the resource may be vested in an individual, group or corporation. Some may be either type depending upon their location. For example, state or national forests are commons resources, while industrial forest or private forested lands are proprietary resources.

Are all natural resources considered "commons resources" throughout the world?

No, European traditions for fish and wildlife make them proprietary, while North American traditions regard them as commons resources. Water can be considered a commons resource in most of the eastern United States, but in "water rights" states (most of the western United States) it may be considered at least partially a proprietary resource.

12. How do natural resources agencies manage commons resources?

As the representatives of the corporate body of the people, these agencies develop and enforce regulations, allocate (set apart) resources to various user groups, and generally control the use of commons resources for the common good, at least until a resource is rendered the private property of a legal taker of that resource, by catching and keeping a legal fish, for example.

13. Think ahead to the future. What advice would you leave for your great-grandchildren about fishing in this lake/pond/sea?

Answers will vary, but they should reflect improved understanding of the interactions of carrying capacity, harvest rates and recruitment and the influence of these factors on commons resources to prevent the tragedy of the commons. They should also reflect cooperative use to maintain sustainable resource populations.

Activity Adaptations for Advanced Learners

Now that the group is familiar with how this activity works, experiment with other versions listed below. You may want to have each group conduct a different version and compare results after they've fished for another three years. Or, you could have youths create their own versions by brainstorming variables that can affect fish population size (fertility of the system, predation, weather factors, availability of spawning habitat, human regulation, etc.). If they create their own scenarios, write them on index cards and distribute them among the groups. If not, copy or cut out the ones listed below.

Instructions

1. Follow instructions in the original version of this activity, allowing each group to fish for three years.
2. At the end of each year, stop the groups and have them record their data. Restock fish as before.
3. After three years, reward the anglers by allowing them to eat their "catch."
4. While snacking, have each group report their strategies and results and discuss their scenarios among the whole group. Which strategies do they believe provided the best chance for sustained fishing? Why?

Activity Variations:

Fishing Blind

Assume that the fish population size is unknown. Using a shallow box to represent the lake, cut a hole (two to three inches square) into the lid (a shoe box works nicely). Youths fish by reaching into the box with a spoon to "catch" their fish. Restock fish populations randomly (remember you don't know how many fish remain in the lake). Point out that this situation is similar to real-life fisheries management where people work from *estimates* of fish populations. Which fishing strategy would work best for this scenario? (cooperative) Why? How can managers regulate uncertain fish populations? (for commercial fishing operations - set quotas, require catch reports; for recreational fishing - conduct creel surveys, set size/bag, and seasons limits).

Fishing with Information

Conduct the original activity, but use your knowledge gained from playing it the first time. (If people take out fish in limited numbers, the fishery has time to keep up with the harvest rate. In the long run, there will be more fish available in the lake. On the other hand, if people take fish too rapidly, people get fish for themselves very quickly, but the fish population does not have time to replenish itself. The fish population soon crashes!). Conduct the activity again with no talking. Did the knowledge gained while playing the original version result in longer, more successful fishing? Why, or why not?

Fishing with Strategy Provided

One good strategy to use is for each person to take 1 or 2 fish most of the time. This will make the population last longer. Youths are free to make their own choice. Play again with no talking. Did this strategy result in more successful fishing? Did all youths cooperate in limiting their harvest? If so, how did this affect the outcome of the activity?

Fishing with Communication or Cooperation Allowed

Before beginning this version, take a few minutes to talk among your group about how you can successfully fish in a sustainable manner. During this version, the group may continue talkingCask questions and decide together how many fish to harvest. Did this version result in successful fishing? How would this strategy be conducted in real life? (fishing cooperatives, councils, etc.)

Fishing with Competition

For this version, each person in the group must have at least one (or two) fish at the end of each year in order to "survive." Those without the requisite survival fish must drop out. Play a few rounds, and then add new players to simulate an increase in human population. Play a few more rounds. Discuss the implications of "human carrying capacity."