

America's Wildlife — Yesterday, Today and Tomorrow

Informal Activity: Fishing Free-for-All

Overview

Through a simulation, students will explore the growth and decline of fish populations in a shared environment. Various changes to the scenario, including the development of new technology and the introduction of government oversight, provide opportunities to understand how complex the management of common resources can be.

AFWA Core Concepts

- In North America, fish and wildlife are public trust resources managed by governmental agencies.
- Everyone impacts fish and wildlife and their habitats and as human populations grow, impacts on natural resources increase.
- Within the U.S., state fish and wildlife management is funded primarily through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting and fishing equipment and motor boat fuels.

Quick Look

Key Concepts: Public trust, conservation funding

Age Range: 9–12

Minimum Group Size: 12

Activity Time: 1–2 hours

Prep Time: 2–3 hours the first time; 10 minutes all other times

Setting: Large open space

Vocabulary: Tragedy of the commons, public trust, excise tax

Objectives

Students will:

- Experience a simulation to model overconsumption of a common resource.
- Recommend solutions to a resource's decline.
- Analyze the impact of various solutions to the resource's sustainability.

Materials

- String or yarn (each piece about 2 to 3 feet long)
- Paper clips (one per student)
- Velcro with self-adhesive
- Wooden clothespins (75-100)
- Tongs (five to 10)
- Dust pans and brushes (five to 10)
- Watch or timer
- Copies of the play money (\$10-\$15 per person)
- Copies of the fishing license (one per person)

Preparation

- Cut the string into 2- to 3-foot lengths. There should be enough for each student. These will represent fishing poles for the students.
- Attach a paper clip at one end of each of the strings.
- Cut the Velcro into small strips no more than an inch long.
- Attach a piece of the hook (rough) side of the Velcro to each side of the paper clip.
- Attach a piece of the loop (soft) side of the Velcro on each side of the clothespins near the mouth or clamp.
- Spread clothespins throughout the activity space. The number of pins available at the start of the game should be limited to about two to three per student.

Background

Ever since 1842, when the Supreme Court ruled that a New Jersey landowner did not have exclusive rights to the oysters found in a river next to his property (*Martin v. Waddell*), wildlife has been considered public property in the United States. This meant that no single person could own wildlife, even if it was found on his or her property. This was a novel idea. However, it was incredibly hard to implement effectively, at least if wildlife were not going to be driven to extinction.

In 1968, ecologist Garrett Hardin wrote an article in *Science* in which he explained the challenge. Using an example from historical England, Hardin showed that a common resource that is shared by everyone will eventually be exploited to extinction. This “**tragedy of the commons**” occurs because the benefits one person gets by overusing the resource are greater than the damage caused by that overuse. While the benefits are experienced by one, the damages are shared by the group. So, it is in an individual’s best interest to use as much of the resource as possible, to prevent someone else from receiving those benefits.

To prevent this from occurring, the use of a common resource needs to be regulated. In the United States, wildlife and other natural resources are placed in the **public trust**. They belong to everyone but are managed by government to ensure access to those resources for all current and future generations. The government establishes and then enforces reasonable rules, policies or laws for the proper and sustainable use of those resources. For wildlife, some of those rules include hunting seasons and bag (per-person harvest) limits.

By 1910, most states had recognized the importance of wildlife management and were setting laws to protect the resource. Agencies had been developed to oversee this management. But most states lacked a consistent source of funding to adequately train their staff and enforce the laws. They began to look at a user-pay concept. Based on the idea that hunters and anglers should pay for the privilege of using publicly owned resources, many states developed a license system. Anyone wishing to take wildlife would need to purchase a license. The money from the sale of these licenses could then be used to provide the financial support to manage wildlife.

But the role hunters and anglers were to play in wildlife management did not end there. They believed additional funding would be necessary to not only pay for enforcement activities, but to fund habitat improvements and wildlife science to help advance wildlife conservation. In 1937, sportsmen led the charge for the passage of the Federal Aid in Wildlife Restoration Act. Also referred to as the Pittman-Robertson Act, this law placed an **excise tax** — a tax on the sale or production of specific items or services — on firearms, ammunition and other shooting equipment. In addition, the law provided a permanent funding source for wildlife management. In order to qualify for the money collected from these excise taxes, states had to enact a law prohibiting the use of hunting license revenue for any other purpose besides wildlife management.

In 1950, Congress went a step further, passing the Federal Aid in Sport Fish Restoration Act, also called the Dingell-Johnson Act. Modeled after the Pittman-Robertson Act, this law placed an excise tax on fishing equipment to fund the management of fisheries. In addition, the law was amended in 1984 to include motorboat fuel. It protected license sale revenue from being diverted to other purposes besides fish and wildlife management.

These laws, together referred to as the Wildlife and Sport Fish Restoration Acts, were instrumental for wildlife in the United States. They established and protected permanent funding for wildlife management activities. Even today, the excise taxes and license revenues are the primary funding source for state fish and wildlife agencies. This money, which is generated from hunters and anglers, is used to conserve all wildlife.

In this activity, students will explore the concept of the “tragedy of the commons” and the role the government has in preventing it. In an interactive simulation, students will be members of a small village who rely on a common resource for their livelihood and general survival. After experiencing the complete destruction of that resource, students will brainstorm potential solutions, including government regulation. A second simulation will be run, this time using solutions they developed to see if the resource can be managed more effectively.

Instructor Talking Points

- History has shown that a resource that is shared by everyone in a community will be exploited unless there are generally accepted rules or laws for how the resource should be used. This is the premise behind the “tragedy of the commons.”
- Resources that are placed in the “public trust” belong to everyone but are managed by the government to ensure access to those resources for current and future generations. Essentially, the government enforces those generally accepted rules or laws in order to prevent a “tragedy of the commons.”
- With regards to our wildlife resources, money to fund enforcement as well as habitat restoration and wildlife management comes from the sale of hunting and fishing licenses and excise taxes on shooting equipment, ammunition, fishing equipment, firearms and motorboat fuels. While various nonprofit environmental groups assist in wildlife conservation, the vast majority of funding comes from license sales and excise taxes.

Reference:

Duda, Mark D., Martin F. Jones, and Andrea Criscione. *The Sportman’s Voice: Hunting and Fishing in America*. Pennsylvania: Venture Publishing, Inc., 2010.

Suggested Procedures

1. Tell students that today they are going to play a game in which they will pretend to be anglers. Explain that angling is another term for fishing.
2. Set up the game scenario:
 - a. Explain that they are all part of a remote fishing village.
 - b. Hold up one of the clothespins. Indicate that this is the unique clampfish. It is found nowhere else in the world. It is also the primary food source and revenue source for the villagers.
3. Explain the rules of the game:
 - a. Each student will begin with \$5. The goal of the game is to survive until the end with at least the same amount of money you started with.
 - b. Each student will be an angler whose survival is based on fishing. Each person must catch at least two fish each round in order to survive. Any additional fish can be sold at the fish market (to the instructor) for a profit.
 - c. Students will be able to purchase different types of fishing equipment: basic fishing pole (string with Velcro) for \$1, dip net (tongs) for \$2, and a trawl net (dust pan and brush) for \$4. These are the only three items that can be used to catch fish. They are not allowed to use their hands or other objects.
 - d. Each fishing round will last 30 seconds.
 - e. Any fish remaining in the activity space after each season will reproduce. One fish will be added for each fish remaining.
4. Provide each student with \$5.
5. Allow an opportunity for students to purchase their selected fishing tool. If you do not have enough dust pans or tongs for everyone, indicate that all items will be sold on a first-come, first-served basis.
6. Instruct the students to spread out around the outside of the activity space.
7. Say "Start fishing." Allow students to collect fish for 30 seconds.
8. At the end of the time, have each student move to the outside of the activity space and form a single-file line.
9. Move through the line to determine the fishing success of each student:
 - a. If they caught two fish, collect their fish and ask them to prepare for the next round.
 - b. If they caught more than two fish, inform them that you would be willing to purchase the extra fish for a price of \$1 each. If they agree, pay them the appropriate amount. Collect all of their fish.
 - c. If they did not catch at least two fish, inform them that they have the opportunity to purchase fish from the local market. Each fish will cost \$2. If they agree, collect the appropriate money from them. If they do not agree, instruct them to move off of the activity space and observe from the sidelines.
10. Add one clothespin fish to the activity space for each fish remaining.
11. If there are any fishing tools left over from the previous round, provide students an opportunity to purchase a different device. If there are no tools remaining but students are interested in upgrading, ask them to try to negotiate a trade with another student. Let them be creative to determine a deal that might work for them.
12. Perform additional rounds of fishing (repeating steps 6-11) until all of the fish have been removed from the activity space.
13. Gather the students and discuss the results. What happened to the resource? What happened to the people who rely on this resource to survive? Explain the concept of "the tragedy of the commons."
14. Ask students to brainstorm ways that this could be avoided in the future. Some guiding questions to get students engaged:
 - a. What rules could we establish that would ensure people could survive but also sustain the resource into the future?
 - b. How would we enforce those rules? How would we make sure that all of the people were following the rules?
 - c. Is there anything we could do to increase the number of fish?
 - d. Most of these actions require money. How would we fund our strategies?
15. Congratulate the students on their suggestions. Inform them the solutions they generated are very similar to the actual ways we do use to manage a common resource. Provide some background information about the role of wildlife management agencies in setting and enforcing wildlife laws, and the funding for their wildlife management activities. Be sure to discuss license fees and excise taxes on hunting and fishing equipment. Explain the difference between excise taxes and general taxes.
16. Inform the students that we will do the simulation again, this time implementing some of these solutions. In the end, we will compare how well these solutions work compared to the first simulation.

17. Inform the students that the basic rules are the same: Each person will start with \$5 and must purchase a fishing tool of their choice. They are still required to catch two fish to survive but will be allowed to sell additional ones. And any remaining fish will still reproduce. However, there are a few new rules in place:
 - a. All students who wish to fish will be required to purchase a fishing license before each round. The license will cost \$2. The license will allow each individual to take up to four fish during that round.
 - b. Students will be hired to serve as wildlife law enforcement officers. They will make sure students have their licenses and do not exceed the maximum number of fish caught.
 - c. Any student caught fishing without a license or with too many fish will have their ability to fish revoked for all future rounds.
 - d. There will be an excise tax of \$1 placed on each fishing tool. New prices for the tools will be: \$2 for fishing pole (string with Velcro), \$3 for dipnet (tongs), and \$5 for trawl net (dust pan).
 - e. All money collected from license sales and excise taxes will be used to pay for law enforcement salaries and fish stocking programs. Each law enforcement officer will receive a salary of \$5 per round but will not be allowed to fish. They must purchase fish at the end of each round to survive. For fish stocking, an additional two fish can be added for each \$1 in excise taxes and license fees collected.
18. Make sure all students are aware of the new rules.
19. Distribute money until each student has \$5.
20. Select volunteers to serve as the law enforcement officers. For this first round, it is recommended that no more than two officers be hired. More can be added later if necessary.
21. Instruct the officers to sell a license to each student who wishes to fish. Make sure they mark the box for the correct round. They should also inform each person that the license must be visible when they are fishing. Collect the money from license sales and keep it separate from all the other money.
22. While the licenses are being sold, replace the fish in the activity area. There should be about two to three fish for each student angler.
23. Allow students to purchase their fishing tools with the new prices. Be sure to pull \$1 for each sale and place it with the license sale money.
24. Repeat the simulation exercise (steps 6-8) using the new rules. Remember that the law enforcement officers will not be fishing. Instead they should wander through the crowd to make sure all individuals have a license.
25. Instruct the law enforcement officers to verify each person's catch. The licenses should be checked to make sure they are valid for the correct round. If a license has to be revoked for any reason, be sure to mark this on the license.
26. While the officers are verifying the catch, restock the fish in the lake. First add one fish for each one remaining. Then, count up the money that was collected earlier from license sales and excise taxes. Give \$5 to each of the law enforcement officers. Add two additional fish for each dollar. If you ever run out of fish to stock, explain to the students that this habitat has reached its carrying capacity for this species. No more fish can live here and be able to successfully survive.
27. Move through the line to determine the fishing success of each student:
 - a. If they caught two fish, collect their fish and ask them to prepare for the next round.
 - b. If they caught more than two fish, inform them that you would be willing to purchase the extra fish for a price of \$1 each. If they agree, pay them the appropriate amount. Collect all of their fish.
 - c. If they did not catch at least two fish or if they are a law enforcement officer, inform them that they have the opportunity to purchase fish from the local market. Each fish will cost \$2. If they agree, collect the appropriate money from them. If they do not agree, instruct them to move off of the activity space and observe from the sidelines.
28. Repeat the new simulation (steps 21 – 27) for four or five rounds, or at least as many rounds as the first simulation, whichever is larger.
29. Gather the students and discuss the results of the new simulation. Compare with the results of the previous simulation.
30. Review some of the key points with the students, including the “tragedy of the commons” and the ways we have found to solve that problem.

Modifications

- Create different species of fish. This can be done by adding unique marks or colors to the clothespins (e.g., blue stripes, green dots). Students can explore the impact that hunting seasons (e.g., only green spotted fish can be captured this round) can have on the population.
- Rather than including the predetermined regulations to the second simulation (i.e., licenses, excise taxes and bag limits), let the students determine which new rules should be used. Perhaps they only want to try one solution. Perhaps they have generated other ideas. If the simulation is run multiple times, they can compare which solutions are most effective.

ONE DOLLAR

1

GAME AND FISH BUCKS

FIVE DOLLARS

5

GAME AND FISH BUCKS

FISHING LICENSE



This allows you to catch and remove 4 fish during the fishing season. License must be visible while fishing.

Valid for the following rounds:

___ 1 ___ 2 ___ 3 ___ 4 ___ 5

This is not a valid fishing license.

FISHING LICENSE



This allows you to catch and remove 4 fish during the fishing season. License must be visible while fishing.

Valid for the following rounds:

___ 1 ___ 2 ___ 3 ___ 4 ___ 5

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