Pre-Laboratory Engagement: Tragedy of the Commons*

BACKGROUND: This activity is meant to provide a fun way for people to understand the consequences of development activities around inland lakes.

In 1968, Garrett Hardin published his classic environmental essay *The Tragedy of the Commons* in the journal *Science*. In it, he succinctly depicted the degradation and exploitation of the environment to be expected whenever many individuals share a common resource, such as federal rangeland, state, and national parks, the atmosphere, streams, and lakes. Using a community pasture as an example, he explained how each herder added more and more animals to his herd until the pasture was destroyed by overgrazing. Each herder benefited monetarily by adding animals to his herd but bore no responsibility for the pasture and its sustainability.

While Hardin popularized the tragedy of the commons, others before him identified the characteristic fate of common property. In fact, two thousand years ago, Aristotle in his book *Politics* stated, "What is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, hardly at all of the common interest". Lakes and streams are clearly a common property, shared by the riparian property owners and the community of citizens who use and enjoy the water, fish, wildlife, and aesthetic appeal.

True to the tragedy of the commons, most lakes provide countless hours of recreational enjoyment for numerous users. Some receive waste discharges from municipal and industrial sources. Nearly all are impacted by urban and agricultural development and stormwater runoff, septic systems and lawn fertilizers, increasing weed growth, algae blooms, and muck accumulation. Very few have managed to sustain their quality for future generations. With over 11,000 lakes in Michigan, limited state agency staff can provide only partial oversight and must concentrate on the most serious problems. Local governments, although possessing management tools like Lake Improvement Boards and Watershed Councils, address police and fire protection, schools, infrastructure development, and waste management as higher priorities. Riparian property owners who should be the leading advocates for lake protection and promoting collaborative management partnerships are more often interested in recreational activities such as swimming, fishing, and boating.

Unfortunately, most lakes are fulfilling Hardin's principle of the tragedy of the commons. Only a few exceptional communities are proof that the principle is not an irrefutable law of human society. When communities accept ownership in their natural resources, lakes and streams can be high quality, sustainable commons. The more each lake owner and user invests in this responsibility, the more certain our children will be that they will “inherit our water resources in the same quality that we the present generation borrowed it from them.”

*Adapted from “Tragedy of the Lake (Commons) Experiential Activity” developed by Julia Kirkwood, Michigan State University College of Agriculture and Natural Resources
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SUPPLIES

Leader Supplies:

1) Blue poster board cut out in the shape of a lake
2) A wetland area (black paper) that will be cut into two pieces labeled 1a and 1b
3) The following can either be created through drawing on colored construction paper or if you want you can use toys (or other creative options) for each of these:
   - Frogs, turtles, dragonflies, birds, butterflies.
   - Lily pads, and other aquatic plants go around the entire shoreline
   - 8 small houses to place around the lake (numbered 1-8) (see scenarios #2 and #4)
   - Lots of trees to place around the lake (enough to cover the entire shoreline)
   - Canada geese
4) Goldfish crackers
5) Sand/dirt
6) Something to represent algae blooms and excessive plant growth
7) Something to represent goose droppings
8) Small bits of green paper or green Kool-Aid or Jell-o mix
9) 1 manila envelope for each group – labeled for each group #1, #2 etc.
10) 1 cup per person

Group #1 Envelope Supplies:

- Scenario description
- 2 paper marinas (these will replace the two wetlands)
- Paper parking lot. Make sure the edge follows the shoreline shape. Draw on there a squiggly arrow that points toward the lake.

Group #2 Envelope Supplies:

- Scenario description
- Lawn (can be paper or even the fake turfgrass stuff)
  - Enough for houses #1, #2, and #3
- Sandpaper to illustrate beach sanding for houses #2 and #3
  - This will need to be large enough to show beach sanding on the land as well as in the lake. Provide enough for two years.
    - Label Year #4 Beach Sanding and the other one Year #5
- Fertilizer: Small bits of green paper or green Kool-Aid or Jell-o mix

Group #3 Envelope Supplies:

- Scenario description
- Something to represent unused bait that isn't good for the lake
- Something to represent Eurasian water-milfoil
- Something to represent a gasoline spill on the parking lot that eventually gets to the lake since they don't clean it up.

Group #4 Envelope Supplies:

- Scenario description

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- 5 Really large houses to place around the lake (numbered 5, 6, 7, 8 ,9)
- Seawalls to go the length of the shoreline in front of these large houses.
    - Year #4 for houses 5, 7, and 9; Year #5 for houses 6, 8, and 10
- Fertilizer: Small bits of green paper or green Kool-Aid mix

SET UP

Build your lake

1. Place the trees around your lake edge
2. Place lily pads around the lake edge in the water
3. Place the other aquatic plants around the lake as well
4. Put in the frogs, turtles, and dragonflies in the lily pad areas
5. Put the 2 sections of wetland next to each other in the lake next to the small marina.
6. Draw a small marina next to the wetland area.
7. Place the small houses around the lake but behind the trees
8. Place a bunch of goldfish in the lake. Each group will be harvesting fish so make sure there is enough that each person can harvest their take and some leftover after the first year.

Example of a general layout: Note: an original very small marina next to the wetland is not drawn on this but should be to start.

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CONDUCTING THE EXERCISE

1. Discuss the tragedy of the commons and how it relates to inland lakes. Connect this to why it is important that there are leaders and that we each are responsible for caring for the lake in a way that is healthy for the lake ecosystem and not just our personal desires.
2. Explain that each group
    a. is different and that they cannot talk to other groups
    b. has a set of instructions for 5 consecutive years.
    c. has a fish harvest quota. However, within each group, they harvest based on each individual's decision – not a group decision. This means each person harvests what they want up to the number they are allowed.
3. Give each group a minute to read through their respective scenarios.
4. Start with Year 1: Each group does what it says under their respective Year 1 instructions in addition to harvesting their fish according to their respective instructions.
5. As this progresses the leader will add the consequences of their actions:
    a. Trees to lawns: Add the geese to the lawns along with the goose droppings.
    b. Removal of wetlands and removal of aquatic plants: Add dirt to the lake next to the shoreline for erosion and turbidity. The plants protected the shoreline from erosion. (Do this before the seawalls go in.)
    c. Lawns and fertilizer: add algae to the lake.
    d. Seawalls (Year 4): add more dirt to the lake since the wave action is causing scour on the lake bottom as well as causing wave flanking to the neighboring property.
    e. Parking lot: add dirt and "fertilizer" to the parking lot and near shore areas. Add more algae blooms. Shows problems with impervious surfaces not controlling the runoff that goes into the lake, resulting in more turbidity and more nutrients, causing algae blooms.
    f. After Year 4 – take away the beach sand that was added by Group #2 since the waves have washed it away.
    g. As each year passes take away some frogs, turtles, dragonflies, birds, and butterflies.
    h. As each year passes put fewer and fewer fish into the lake: shows the destruction of the fish habitat. Fish cannot reproduce when their spawning beds are buried under sand. Scoured out from the wave energy or the plants have been removed. Also shows overfishing problems.

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SCENARIOS 1—4

Group #1 Scenario: Fishing industry businesses

You are a group of business people that rely on the fishing industry around the lake for your livelihood in one form or another. Selling/renting gear, renting/servicing boats, fishing charters, and selling fish to local restaurants.

Fish Harvesting: Each year your group gets to harvest up to 5 fish/person.

Year 1: Business is good and you need more space for your clients' boats.
Action: You dredge out wetland area #1a and put in a marina.

Year 2: Your clients have complained about all the plants along the lake edge near the marina.
Action: You take out all the plants near the marina.

Year 3: More parking is needed near the marina because business is so good.
Action: You put in a parking lot next to the marina.

Year 4: More boat docking is needed.
Action: You enlarge the marina by dredging out much of the remainder of the wetland (area #1b).

Year 5: No expansion. There isn't any place to expand and business is slowing down.

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Group #2 Scenario: Families have been residents for generations

You are a group of grandparents that have spent your entire summers at the lake for generations and many are now living there year-round. Your cottages are small but comfortable and you have many trees on your property. Your grandkids like to come to visit for a couple of weeks throughout the summer and they enjoy fishing, catching frogs, and exploring around the lake.

Fish Harvesting: Your group is allowed to harvest up to 2 fish/person/year

Year 1: You enjoy your property the way it is as it is beautiful with lots of birds, butterflies, turtles, and frogs.
Action: *Do nothing to your property this year as it doesn't need* "*improving*."

Year 2: Your extended family is growing and they are visiting you more often. You decide you want more space for playing down at the lakeshore.
Action: *You remove the trees and put in more lawn in front of houses #1, #2, and #3.*

Year 3: You decide you want a clearer area for your grandkids to swim especially since they are bringing friends that are not used to being in a lake with aquatic plants.
Action: *You remove most of the plants in front of houses #1, #2, #3, and #4 .*

Year 4: The kids want sand and the bottom of the lake is a little mucky.
Action: *You create a sandy beach and add sand to the water without a permit in front of houses #2 and #3.*

Year 5: Now that all the trees are gone and you have a large lawn you want to keep it looking really nice.
Action: *You use lots of phosphorous fertilizer because that is what you have been told is the best. And you need to add more sand to the beach and lake since the waves have washed last year's sand away.*

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Group #3 Scenario: Non-resident avid anglers

You are a group of people that consist of families that do not live on the lake but access the lake through the marinas or public boat launch. You fish enough so that you can feed your family fish a few times a month throughout the year.

Fish Harvesting: Your group is allowed to harvest up to 3 fish/person/year

Year 1: You are done fishing and have a bunch of leftover bait.
Action: Dump your unused bait into the lake (add your minnows to the lake).

Year 2: You consistently boat in other lakes that have invasive species and do not wash your boats every time.
Action: Your boats have Eurasian milfoil on them to add milfoil to the lake.

Year 3: You are good this year J

Year 4: You have a gas spill on the parking lot.
Action: Since you didn't clean up the gasoline spill add it to the parking lot/lake.

Year 5: No problems again this year.

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Group #4 Scenario: New lake residents

You are a group of newcomers to the lake. You are the weekend warriors – coming usually about 1 weekend/month, sometimes more often during the summer. You like to entertain people and so you have a penchant for purchasing the cute modest cottages, tearing them down, and building cottages 2x -3x the size of the previous cottages.

Fish Harvesting: Your group is allowed to harvest up to 2 fish/person/year.

Year 1: The cottages are older and not as modern and you want to show how well off you are to your friends.
Action: Replace cottages 5, 6, 7, 8, 9, and 10 with very large houses.

Year 2: Ah those pesky trees that provide shade, wildlife habitat, and keep the lake cool are in your way. They block your view.
Action: Remove all the tress and put in a lawn at houses 5-10.

Year 3: Those aquatic plants sure are pesky and messy.
Action: Take out all the plants along your shorelines to give a cleaner look.

Year 4: Oh no! You are now losing land due to shoreline erosion.
Action: Put in seawalls along houses 5, 7, and 9.

Year 5: Ah, your lawn needs to look like the lawn you have in the city and, oh no, now your neighbor's property is eroding too.
Action: Fertilize the lawns with lots of fertilizer and add seawalls to 6, 8, and 10.

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