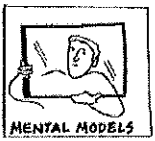
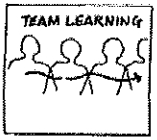
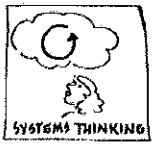
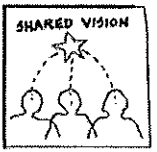
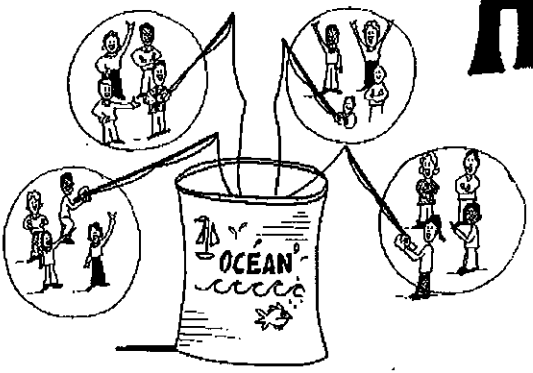








Harvest



"You are informed about where you are coming from, not where you are going."
A proverb of the Maasai tribe

What if the three Musketeers had used the following rallying cry? "All for one, and none for all!" Would that cry have inspired the sword-wielding heroes to the great feats of bravery and teamwork that helped them protect the queen from the evil Duke Leval? Probably not.

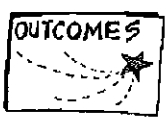
Yet "all for one, and none for all" is exactly what occurs when a system's structure encourages individuals to take action for their own benefit—but doesn't motivate them to see the value in collectively coordinated actions. Overcrowded swimming pools, over-fishing, and jammed shopping malls during the holidays are just a few examples of this behavior pattern. Indeed, this pattern is so pervasive, in so many areas of our lives, that it has a name: "tragedy of the commons." When a tragedy of the commons situation kicks in, people who are acting to advance their own well-being cause the collapse of the very environment on which that well-being depends.

Harvest provides a visible and enjoyable means of exploring the tragedy of the commons archetype. This

exercise also helps participants explore the phenomenon of "worse before better"—a widely observed tendency in complex systems. In "worse before better," the actions required to produce fundamental, long-term solutions often make the situation seem worse in the short run. When politicians or economists persist in looking at only the short-term indicators of success as they select policies, the long-term results can prove tragic. This fact has been graphically illustrated in many sectors of society, but especially in our flagrant overuse of natural resources such as fishing grounds. In some areas, over-fishing has destroyed fish populations' ability to regenerate themselves.

To keep using a resource in the long term, we often have to accept a short-term reduction in what we harvest from that resource. And to implement sustainable-use policies, we must understand the system's long-term dynamics, value our long-term (not just our short-term) welfare, and trust each other to observe short-term constraints. **Harvest** gives groups the opportunity to practice all of these principles.

- To illustrate the tragedy of the commons archetype
- To enable participants to quickly experience a dynamic behavior that often takes decades to unfold in the real world
- To provide an opportunity to practice communication and decision making in a complex system
- To illustrate the problems that a "free rider" can cause for a group that is trying to negotiate a compromise to serve its long-term goals. A free rider is an actor who attempts to gain the long-term benefits of the group's policies without personally paying the short-term price required to implement those policies.



- ☆ Understanding of how quickly and unexpectedly a "commons" can collapse
- ☆ Insight about how teams can improve group discussion when they're attempting to define and solve problems

Something about the sound of coins jingling at the bottom of a coffee can attracts attention. **Harvest** starts out with that sound, and it's a great way to give participants a break from more traditional lectures and discussions.

This game also reveals what can happen when a select few dominate a system to the detriment of the collective good. If you find yourself working with a group dominated by a few individuals who insist on getting their way, or who push for short-term benefits at the expense of long-term gains, you may choose to interrupt the conversation and play this 15–30 minute game.

To Run This Exercise:

Number of People: 2–6 teams, each comprised of 2–6 individuals

15–30 minutes

You'll need to select a space that accommodates two kinds of activity. First, you will introduce and facilitate the game to the whole group of participants. Then, you will lead participants through a debriefing conversation. It is most convenient to conduct both of these activities using a flip chart placed in front of a sufficient number of chairs to seat your entire audience.

Also, you'll need a room that lets people break into teams of 2–6 people. These small teams will need to sit or stand far enough apart so that they don't overhear one another's conversations.

One large coffee can or some other opaque, metal container that can hold 50 coins. The container must be large enough that you can reach into it to retrieve a small number of coins. Five rolls (200) of nickels or some other coins of about the same diameter—3/4" or 2 cm.

One container per team (paper coffee cup, a small basket, or anything equivalent), numbered sequentially on both sides with easily visible numerals (1, 2, 3, and so forth); 10 slips of paper or 3"by 5" index cards per team; 1 large flip-chart sheet showing the following four charts (in this order):

Chart #1: Game Title:
Harvest

Chart #2: Rules of the Game:
You are part of a team of people who fish for a living. Your team's goal is to maximize its assets by the end of the game. Each fish you catch is worth $.05.

The ocean can support a maximum of 50 fish. We start the game with between 25 and 50 fish in the ocean.

We will play for between 6 and 10 "years," making one round of decisions per year.

With each decision round, your team decides how many fish it will try to harvest that year. You indicate your desired harvest by writing the number on a slip of paper, putting the slip in your "ship" (the paper cup or other comparative container), and taking your ship to the game operator.

The operator will fill orders randomly. The fish you catch are returned to you in your ship. If your order exceeds the number of fish remaining in the ocean, you receive no fish that year.

After all orders are processed, and your team's ship is returned, the fish in the ocean will regenerate according to the curve shown on Chart #3.

Chart #3: Regenerating the Fish

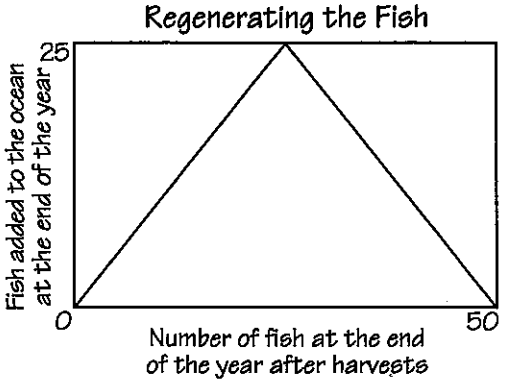
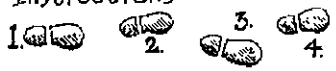


Chart #4: Steps of Play:

1. Decide on your team's long-term strategy.
2. With each decision round, select the number of fish you wish to harvest this year.
3. Record the number on a slip of paper, insert the paper in your ship, and take the ship to the game operator.
4. Harvest requests will be filled in random order.
5. Receive your ship, remove the fish, and start again with Step 1.

Put 40 coins in the "ocean" (the coffee can). Put the remainder of the coins in a nearby container that is not accessible to participants. Put 10 slips of paper in each team's "ship" (paper cup). Divide players into roughly equal teams. Try for 2–6 teams, each comprising 2–6 members. Assign each team a number. Teams can sit or stand anywhere in the room. But, they should be far enough from one another that no team overhears another's strategy. They should also be close enough to the front of the room that they can see the charts and follow your instructions. If time allows, you may also encourage teams to give names to their ships.

Instructions



Step 1: *Compose the teams that will play the game.* Ask the members of each team to stand near their fellow members. Introduce the exercise with something like: "Congratulations! Each of you has just become a member of a fishing company. We start with a bountiful ocean." (Hold up the coffee can and shake the coins in it loudly.)

"Your team's goal is to maximize its assets by the end of the game. For this purpose, each team has a state-of-the-art fishing ship." (Hold up one of the paper cups.)

Now read aloud slowly through the rules on Chart #2. Answer any questions.

Explain the curve in Chart #3. "The curve means that if there are no fish left in the ocean after all orders have been filled, then no *new* fish will be added to the ocean. But if, for example, there are 25 fish left after all orders are filled, then 25 new fish will be added, to reach the ocean's carrying capacity of 50. If there are 38 fish remaining, 12 will be added."

"We will play 6 to 10 rounds. Each round represents one year."

The number of rounds you play will depend on the time you have available. Each round lasts approximately five minutes.

Step 2: *Display Chart #4, Steps of Play.* Leave this where it can be seen by all teams during the game. Give the teams a few minutes to discuss their long-term strategy and to submit their first fish request.

Step 3: *Fill requests in random order.* After gathering all the "ships," place them on the table in front of you, close your eyes, and *mix the ships up.* Open your eyes and arrange the ships in a straight line—left to right—visible to all participants. You do this mixing,

because it is important that you fill orders in random order. Ship #1 should not necessarily be the first one to have its orders considered. Nor is the first team to hand in its ship guaranteed that they will have first call on the remaining fish.

Step 4: *Pull the paper from the left-most ship.* Do not reveal the size of the request. If there are enough coins in the "ocean" to fill the request, remove the requested number of coins from the can and put them in the ship. Then fill the orders from the next ship in the line, and so forth. If one order is larger than the number of fish remaining in the ocean, return that paper to the ship with no coins and go to the next ship. When you have processed all the orders, return the ships to their respective teams.

Step 5: *Ask the teams to decide on their next order.* While they're doing that, count the number of coins in the ocean and consult the Regeneration Curve to decide on the number of new fish to add to the ocean. This is quite simple. For any number of fish in the ocean between 25 and 50, you simply add enough coins to bring the total back up to 50. Below 25 coins, you add a number equal to the number remaining in the ocean after processing all the orders. For example, if there are 12 fish (or coins) left in the ocean, you would then add 12 more coins. You may either count the coins physically in the can or keep track, using a piecé of paper, of the initial number minus the total of what you put in the ships.

Step 6: *Collect the ships for Year 2, process the orders, and continue.* If the teams quickly catch all the fish, let them go through one or two more yearly cycles experiencing the consequences of their mistake—no catch. Then stop the game. If you can see that the entire group has adopted a strategy that will keep the fish population sustained around the point of maximum regeneration, you can also stop the game. But with most groups, you will have to go through at

least 6–8 cycles before participants experience the consequences of their decisions.

Debrief

Typically one or two teams will pursue an aggressive strategy and place large orders early in the game. That causes the fish population to decline, pulling down the possible harvest for everyone. Sometimes there will be a serious effort to coordinate all the teams' decisions and produce a total harvest that can be sustained over the entire period of the game. But that effort usually fails. Either it is ignored by one or two teams or it is based on a false estimate of the maximum number of fish that can be harvested annually.

The regeneration curve, Chart #3, shows that 25 is the maximum number of fish which can be added to the ocean each year. Therefore 25 fish/year is the maximum number that can be harvested sustainably. Over 10 years, 250 could theoretically be harvested without reducing the fertility of the ocean. Divide that number by the number of teams, multiply by the value of each fish, and you have the maximum average wealth possible per team. If any team fails to reach that level of assets, it is typically because there was over-harvesting early in the game.

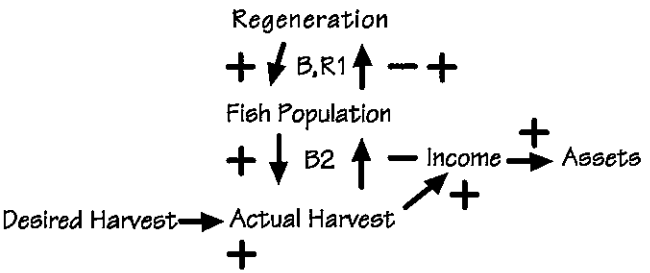
Have each team report its wealth on the flip chart in front of the room.

Then lead the participants through a discussion about their experience.

- What happened in this game?
- Who was responsible for this result? Actually, in **Harvest**, the structure of the game bears more responsibility for the collapse in the fishery than any individual does.
- What would have been the maximum possible wealth available to all the teams in this exercise?
- What wealth did teams actually achieve?
- Was there a winner in the game?

- What policies would you have to follow to achieve maximum wealth for all the teams? Why might these policies not be followed?
- Where do you see examples in real life of the behavior we witnessed in this game?
- What policies could be followed in real life to produce a more sustainable result?

Ask participants to draw the behavior-over-time graph for their total harvest during the game. Then show them the following causal loop diagram with a balancing loop involving Actual Harvest and a regeneration loop that is initially balancing. But it becomes reinforcing, in a downward direction, once Fish Population declines below 25. Ask them to use this diagram to explain the results they received in the game. They could use it also to identify possible new policies governing Desired Harvest.



A more elaborate version of this game is available for those who have the time and the goals to warrant its use. FishBanks, Ltd. is a computer-assisted, role-playing game for groups up to 50. It takes two hours to play, but it is rich in learnings. Contact: Publications Manager, Institute for Policy and Social Science, University of New Hampshire, Thompson Hall, Durham, NH 03824. 603/862-2186.

For an excellent discussion of the tragedy of the commons archetype, see *Systems Archetypes II: Using Systems Archetypes to Take Effective Action*, by Daniel H. Kim. Pegasus Communications.: 1994).