

## HARVEST

(Source: The Systems Thinking Playbook)

**AREA/S OF FOCUS** Sustainable resource management; climate change; long-term thinking

**ACTIVITY DESCRIPTION** Participants divide into small teams or fishing cooperatives. Through successive rounds, each team estimates how many fish it will catch for the year to maximize its assets. The game goes through 6-10 rounds and ends either when all the fish have been depleted or they have developed a sustainable strategy for long-term management of fisheries.

**INTENDED OUTCOMES** Participants will better understand the tragedy of the commons and how to make long-term strategic decisions for sustainable resource management

**TARGET GROUPS** Fishers, farmers, community members

**TOTAL TIME** 1 hour

**NUMBER OF PARTICIPANTS** 2– 6 teams, each comprised of 2– 6 individuals

**MATERIALS** Large can with ocean painted on front, goldfish crackers (or other material like coins or bottle caps), one container per team, ten slips of paper per team, large flipchart with steps of the game and fish regeneration written up, table

**SETTING** Open room with breakout spaces for teams

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## INTRODUCTORY FRAME

This is an activity that helps us to develop strategies for natural resource management. Describe the basic rules of the game.

## PROCESS

### Set-Up:

Put 40 goldfish crackers in the “ocean” (the coffee can). Put the remainder of the crackers in a nearby container that is not accessible to participants. Put 10 slips of paper in each team’s “ship” (small container). 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.

**Step 1:** Introduce the exercise with something like: “Congratulations! Each of you has just become a member of a fishing cooperative!” “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.” Have each team come up with the name of their fishing cooperative, write it on their boat and announce it to the group.

Now read aloud slowly through the rules of the game:

*You are part of a team of people who fish for a living. The ocean can support a maximum of 50 fish.*

*We start the game with a bountiful ocean of 50 fish! 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 wants to catch that year.*

*You indicate your desired catch 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.*

*Important: the operator will fill orders randomly. You will receive the amount of fish you requested in your ship. Except - if your order exceeds the number of fish remaining in the ocean, then you will 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 these rules:

- ❖ 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.
- ❖ The ocean has a carrying capacity of 50 fish.
- ❖ If the number of fish left in the ocean is between 25 and 50, I will add enough fish to bring the total back up to 50. For example, there are 38 fish remaining, only 12 will be added.
- ❖ If there are below 25 fish, the fish population will simply double. For example, if there are 12 fish left in the ocean, I will add 12 more fish.

Review again the Steps of the Game (written up on big paper):

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.

**Step 2:** Give the teams a few minutes to discuss their long-term strategy and 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 in front of everyone 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.

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 4:** Ask the teams to decide on their next order. While they’re doing that, count the number of fish left in the ocean and decide on the number of new fish to add to the ocean, based on the regeneration rules.

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.

*Optional:* The game operator can also decide to add a layer of complexity to the game by declaring that there has been an oil spill in the ocean. Visibly remove a random amount of fish from the ocean and tell the participants that the report of the damage is unknown but the fish population has declined. Continue the game.

## **DEBRIEF**

- What happened in this game?
- Where do you see examples in real life of the behavior we witnessed in this game?
- What structures or policies would you have to follow to achieve a sustainable result?
- Why might these policies not be followed?
- How might we shift the mental models of stakeholders to uphold new structures?

## **TEACHING POINTS**

- The tragedy of the commons is an economic theory which states that individuals acting independently and rationally according to their self-interest behave contrary to the best interests of the whole group by depleting some common resource. 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. For example, 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. This game gives groups the opportunity to practice all of these principles.