Tragedy of the Commons

Hurray, you've decided to run the Tragedy of the Commons Game (ToC)! Perhaps it will be an activity for the first day of camp, or a team-building program, or embedded as an integral part of your curriculum.

Whatever your objective may be, ToC is designed to be flexible and work across a wide range of settings, devices, and age groups. This **Getting Started** guide will help you prepare ToC for your specific context.

Overview: What to expect when you run the game

Before running ToC

The facilitator:
1. Reviews this guide in preparation for running each step of the game and discussion.
2. Ensures that the players have powered, compatible devices.
3. Uses the online pSims platform to create a game and select parameters.

Game parameters - *section (c) of the Quick Reference Guide*	
Season	The "round" of fishing that the students are in.
Stations	Add a new station for fishing, and choose the starting number of fish in it. **Note:** In order to set up the classroom, you need to print the QR code for each station. For instructions, see "set up the stations" under **How to Prepare for ToC**.
Leaderboard	Displays the students with the top number of fish caught.
Trading	Toggle determines whether players can donate fish to other players during game play.
Graphs	Display and track the station populations over seasons and players' numbers of fish.

While running ToC

The facilitator:
1. Guides players to set up their mobile devices and introduces the game to the players.
2. Uses the dashboard to start the game and monitor the game progress.
3. Creates stations for the players to fish at and sets up the

initial parameters.
4. Starts and ends each season of the game periodically.

The players:

1. Walk around scanning the QR codes of various stations in order to "fish" from them.
2. In between seasons, buy bigger boats or research to improve their fishing yield.
3. Negotiate with other players and the community to coordinate fishing and/or research and boats purchased.
4. In between seasons, have the options to trade/give a number of fish to another player by scanning that player's QR code.

The digital simulation (the system controlling what appears on screen):

1. The number of fish set for each station determines the starting amount.
2. Taxes each player 20 fish at the start of each season.
3. Doubles the number of fish at each station at the start of each season.

Preparing to run ToC

While running ToC (specific)

The facilitator:

1. Pauses the game between seasons and asks players to take a seat.
2. Leads a discussion for players to develop a hypothesis and design an experiment, usually aimed at figuring out how to stabilize and sustain the number of fish, without over-fishing. Discussion should be quite general and elicit student ideas rather than imposing any particular structure for the system or how it works. Students will have many varied ideas that should be entertained and tested.
3. Use the game dashboard to advance seasons or replay and/or reconfigure ToC for players to conduct their experiment(s). Students should not see the game dashboard except for the graph when needed.

Note: The game can be replayed as many times as needed. It is recommended that students go through an entire game until the fish population is virtually gone before starting a discussion, developing an experiment, and replaying the game.

How to prepare for ToC

Collect Supplies:

- For each player:

- For the facilitator: Any device (e.g. phone, tablet, laptop, or desktop computer) that can connect to an internet browser. A tablet or desktop is suggested.

A charged mobile device with a camera and:
- Android devices: Chrome browser
- Apple devices [iOS 11 or later]: Safari browser
- Fire tablets: Silk browser

- Reliable wireless internet that all players' devices can access.
- A chalk/dry-erase board for recording notes.
- A means of sharing the Game Code, URL, and other set-up steps for players (e.g. a handout, digital slide, or space on a chalk/dry erase board).

Set up the stations:

- Once you have created a new game, create a number of stations with your preferred starting number of fish.
- Display the QR code for the station around the classroom on paper by selecting the QR code icon under each station and pressing the print button that appears.
- Display the station QR codes around the room, spreading them out.
- It is recommended that you use the following combinations of number of stations and starting number of fish, given the number of players in the game:

Number of players	Recommended starting setup
<= 5	3 stations, 50 fish each
6-10	3 stations, 100 fish each
11-15	5 stations, 150 fish each
16-20	5 stations, 200 fish each
21-25	7 stations, 200 fish each
26-30	7 stations, 250 fish each
31-40	9 stations, 250 fish each
41-50	10 stations, 300 fish each

Note: These recommended starting fish amounts are mean values. Stations should have some variability. They can often be 10-25% higher or lower than these values. Some stations can be off by even more.

Create Game

1. Go to **psims.games** and select Host a Game.
   - Log in with a Google Account.
   - **Tips:**

        - If another person will be facilitating the game (e.g. a co-teacher), consider creating a shared Google Account that others can access.

2. Select ToC from the Choose a Game Type dropdown.
3. Create a Game Code of your choice, for players to enter at the start of the game.
    - **Tips:**
        - Create a Game Code for each group of players (e.g. one Game Code for each class period).
        - To prevent autocomplete errors when players enter a Game Code on shared devices, create Game Codes that begin with a unique game identified, such as: *adult12* and *bjul12.*
        - Use a Game Code that will be easy for you to find in a list of other Game Codes created with your Google Account.
4. Set parameters for your game: create the number of stations you want, and select the starting number of fish in each station.
    - **Tips:**
        - Be mindful of classroom space when deciding how many stations to create and how to organize them around the classroom.

During each season, players will travel between stations and fish in them, receiving a certain number of fish each time. Each time a player fishes in a station, they will use up limited "time" in the season.

If trading is enabled, players are also about to trade fish with other players, donating them.

Note: This can become helpful later on if students set rules for the game (e.g. for each season, all players should obtain the same number of fish).

Between seasons, players will have the opportunity to upgrade their supplies:

- **Boats:** Upgrading and buying a bigger boat (for a cost of fish) will allow players to obtain more fish each time they fish and/or decrease the game time it takes to fish.
- **Research:** Research takes one unit of game time and allows players to investigate information about the station before choosing to fish in it, saving them future game time and granting them more efficiency when fishing.

The top of each player's screen displays their number of fish. At the start of each season, players' number of fish will be depleted by 20 fish.

Players may go into **debt** with their number of fish, but are not allowed to start a season if they are in debt by more than 20 fish (their count will be less than -20).

Prepare to be an effective facilitator

As a facilitator, two of the most important things to keep in mind are:

1. Plan to give players as little information as possible for them to start playing the game.

- Do not refer to parameters like “Double Agent” or related concepts.
- Avoid answering questions about the end result of the game, whether players should be coming up with strategies, whether they should be working together, etc.

Tell players: **Their objective is to be a “successful fisher.” It is up to them to determine what that means!**
Explain that that’s it! It’s normal to be confused about what’s happening in the game. In fact, part of the game is to come up with questions to ask. Save them for the discussion after this first round.

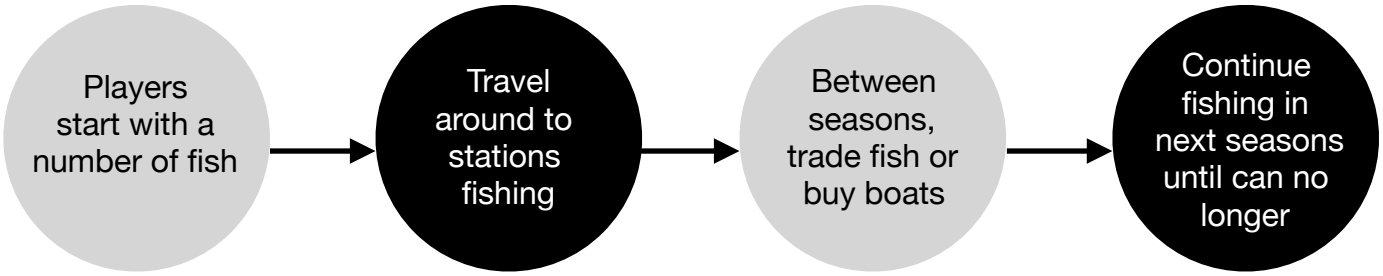
2. Plan to encourage players to make observations, ask questions, and listen to other players.

- Ask players what they see on their screens.
- Make sure players pay attention to what other players are saying.
- If players ask questions directed at the facilitator, tell them to ask other players.

Reminder: All **boxed content** also appears in the Quick Reference Guide. The Quick Reference Guide is intended to be printed for the facilitator to use while running ToC.

Running ToC

ToC typically flows as follows:



First Game	
Start	Have players go to **psims.games**, and enter the class game code and personal usernames. Tell players to get up from their seats. Select **Start Game.** Note: Once a game starts, it is not possible for the host to change the game parameters/ add more stations. Select **Run Game.** Note: Before running the game, students should have access to the boat store to see what is available or make purchases before playing.

First Game	
During	Keep an eye on the host dashboard in order to: • Monitor the status of the game, including the leaderboard. • Accept rejoin requests from players who accidentally log out. • Once players have used up all their fishing time, pause the game. • Between seasons, allow players time to make purchases in the boat store or trade fish with players if trading is enabled. • After giving players enough time, select the **Next Season** button and then **Run Game** to allow players to fish again.. If players ask questions, say “Good question!” and remind them that they’ll have the chance to ask each other questions during the pauses between seasons.
End	When a majority (or most) of the fish are gone, end the game by not advancing to the next season, and ask players to take their seats.

Discussion

The job of the facilitator is to initiate a student-driven discussion while pointing out concepts and questions that are important for players to explore in the next game. To do so, a facilitator:

- Records notes on a chalk/dry-erase board (try organizing notes as observations, questions, guesses, ideas, proposed experiments).
- Names the target (Key Terms) concepts as players describe them: **Growth Rate**, **Initial Population**, **Harvest Rate**, **Maximum Sustainable Rate**.

The facilitator *embraces all players' ideas* (even those that are off track) and *gently guides players to a consensus* about how the game will be played in the next game. The following table outlines how a discussion shifts from observations about each **individual's experience**, through a process of analyzing players' **collective experience**, to a proposed experiment that will answer **players' questions**.

Common Facilitator Questions	Common Player Responses
Observational:	I fished and sometimes it was more productive, sometimes it was less so.
What happened? What stations did you visit? What happened to you? What did you do in the game? What were your strategies? What did you do when you noticed the number of fish decreasing?	As time went on, I started getting more fish because I bought better materials. I sat down during the first few seasons to save fish for later. There were fewer fish so I started only finishing at ____ stations/stations with fewer people.
What questions do you have?	Why did the number of fish go down? Can the population decline be prevented?

Common Facilitator Questions	Common Player Responses
Hypothesis: Why do you think the number of fish decreased? How? Develop a theory: How did it start? Did you notice any pattern? Was anything not affected?	Stations had less fish when many players fished from them. Stations that were …
Experiment Design: Now you have a chance to play the game again, with the exact same starting conditions. How will you play differently in order to answer your questions and test your ideas? How might you keep the most fish in the game for longer?	Let's have only a certain number of people go to each station. Let's limit the number of fish a player can have in each season. Let's have players with more fish donate/trade to struggling players.

Game Two
To initiate a new game, choose **Rerun** or **Clear Game** and press the circular button in the box. **Rerun:** Rerun will keep players and stations, but revert player fish amounts and station fish populations to their initial amounts. Commonly used to quickly restart while keeping everything constant. **Clear:** Clear players will reset players and revert the game to its initial state at Season 1. Commonly used to start a new game with the same stations but new players.

Key Terms	
Population Growth Rate **Population Size** **Exponential Rate** **Maximum Sustainable Yield** **Quota**	During the discussion, players will describe many of the concepts in this list without necessarily using the exact terms listed here. The job of the facilitator is to give names to these core learning goals as players "discover" them. For example, when a player suggests, "we fished at some stations so often they were not able to recover or produce more fish," it might be appropriate for a facilitator to respond, "So, you're wondering if there's a maximum sustainable yield" and write the term on the board.

Reflection

The purpose of the reflection is to help players learn that systems are made up of many parts, and problems are solved by many people, each with different perspectives. Additionally:

- Each player's participation is important – both in playing the game and in discovering how it works.
- The concepts this game explores are important, and connect to disciplines beyond ecology and population biology.

Common Prompts

What was this game about? What was the objective?
Is the game a realistic model/simulation?
How might we limit overfishing in the real world?
What are the ethical implications of your ideas?
What did we learn about population biologies/fisheries management/ sustainability?
How did we work together to answer questions?
What questions do you still have?