

Sustainable Oceans & Seas



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Video Page



Sustainable Oceans and Seas **Teacher's Guide**

This Teacher's Guide includes the following:

- Suggested Lesson Plan
- Preview Questions and Preview Activity
- Key Terms
- Viewing Guide
- Discussion Questions
- Activity: Who Chooses
- Quiz
- Enrichment and Integration Activities
- Answer Key
- Appendix

Suggested Lesson Plan

These materials may be used in a variety of ways. For maximum benefit, we suggest the following lesson plan:

- As a class, discuss the Preview Questions and Key Terms, and complete the Preview Activity.
- Distribute copies of the Viewing Guide for students to use as a note-taking tool during the video.
- Play the video, pausing if needed to facilitate understanding and note-taking.
- Review and discuss answers to the Viewing Guide using Answer Key as a guide.
- Use Discussion Questions to spark class discussion, or assign these questions as homework.
- As a class or in small groups, complete the Who Chooses Activity.
- Replay the video as preparation for the Quiz.
- Administer and grade the Quiz using Answer Key as a guide.
- Optional: Assign one or more Enrichment Activities as homework.

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Preview Questions

(These are meant to be read aloud by the teacher.)

1. What is ownership?
2. Why do people take care of things they own?
3. Who owns the ocean?
4. Who owns the fish in the ocean?
5. What is property? What are property rights?
6. What is sustainability?

Preview Activity

Play the first two rounds of the [Tragedy of the Commons simulation](#) on page 10 of this guide.

Save the variations on pages 11-12 until after the video.

Sustainable Oceans and Seas

Key Terms and Definitions

Allotted – given

Dinghy – a small boat

Ecosystem – all of the living and nonliving things that make up an environment and affect each other

Indigenous – native; aboriginal

Mandate – to give an official order or command

Maori – the indigenous people (or first settlers) of New Zealand.

Mortgage – v. To obtain a loan using a piece of property as collateral.

Property right – ownership; the right to use, control, dispose of and obtain the benefits of a good

Quota – a limited or fixed number of things

Sovereignty – supreme power to rule over a country; freedom from outside control

Sustainability – involving methods that do not completely use up or destroy natural resources

Tragedy of the Commons – when something is owned by everyone (held “in common”), it’s owned by no one. It often leads to the common good being mistreated. Think about a public rest room. Do people treat it the same way they treat their own rest room at home? Also defined as a situation within a shared-resource system where individual users acting independently according to their own self-interest behave contrary to the common good of all users by depleting that resource. Classic example: A pasture that is not owned by an individual but shared (held in common) by members of the community. In this scenario, each individual reaps the benefit of letting his or her animals graze on the pasture, but the community as a whole bears the cost if there are so many animals grazing that the grass is depleted or destroyed.

Name: _____

Date: _____

Sustainable Oceans and Seas **Viewing Guide**

1. 30 years ago, New Zealand's...fish populations were _____ due to overfishing.
2. The 1840...Treaty of Waitangi...granted the British sovereignty, but...recognized Maori rights to their ancestral lands and their _____ grounds.
3. In 1982, when the U.N Convention on the Law of the Sea formalized the 200 mile limit... _____ fishing zone became one of the largest in the world.
4. New Zealand's government had been regulating the fishing industry...but there were no conservation limits on total _____.
5. In 1986, the government, scientists, and the fishing community worked together to come up with a new system called the _____ Management System, or QMS.
6. Each individual fisher or fishing company was allotted a percentage of the total harvest...that could be sold or leased like any other _____.
7. With quota ownership, fishers gained a direct benefit from _____ the fish population and the ocean environment.
8. You actually have a very strong conservation ethics built in [to the QMS], because conservation is good for _____, because sustainability is good for business.
9. In 1989, Maori were granted _____ of the total allowable commercial catch.
10. New Zealand decided to scientifically calculate fishing limits that would optimize fish populations, and then let the _____ decide how best to manage the catch.

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Discussion Questions

1. Why were New Zealand's fish in such high demand by the early 1980s?
2. When a resource isn't owned by anyone – or belongs to everyone in common – why do people race to get or use as much of that resource as they can? Why don't they always do this with resources they own?
3. Why do people tend to take good care of things they own?
4. New Zealand is the 75th largest country in the world by land area. If all nations are subject to the same 200-mile offshore limit for fishing, how can New Zealand have one of the largest fishing zones in the world?
5. How did New Zealand regulate fishing prior to 1986? Why didn't these regulations prevent depletion of fish populations?
6. What is the Quota Management System (QMS)? How does it work?
7. Why did New Zealand's fishers often ignore regulations before the QMS? Why don't they ignore the QMS regulations?
8. How does the QMS prevent overfishing without attempting to make it hard for people to fish?
9. How are individual fishers' incentives different under QMS than they were before?
10. Why did the fisherman in the video want to buy five tons of quota? What did this mean? How much was it worth at the time he bought it? How was he able to get the money to buy it? How much is his investment worth now? How would you calculate his return on investment?
11. What are property rights? How is a fisher's allotted share of the total catch like a property right? How is owning fishing quota similar to owning a farm?
12. Under the QMS, why is conservation good for each individual fisher's business? Why wasn't that the case before?
13. How does the QMS enable fishers to fish all year around if they want to? Why couldn't they do so before?
14. List three techniques fishers are using now that improve conservation and sustainability.
15. If wiping out the fish population would have eventually put them out of business, why couldn't the fishers have just decided amongst themselves to have a quota system? What would have happened if anyone cheated or refused to abide by the agreement? How does the QMS avoid these problems?

16. How could the QMS reduce the risks of fishing? (Think about how it would change the incentives to fish during stormy weather, for example.)
17. Why are the fishermen in the video so careful about the way they handle the fish once they are caught and on board the boat? Why do they care about preserving the quality of the fish?
18. Who are the Maori? Why is fishing such an important part of Maori culture?
19. When were the Maori brought into the QMS? How did this come about?
20. Who signed the Treaty of Waitangi? (Which two entities were parties to the agreement?) Who currently has sovereignty over New Zealand? How do you think the Maori were able to press their Treaty claims against the New Zealand government? Come up with legal arguments for and against the Maori position.
21. How did the Maori eventually gain control over 30% of the fishing industry in New Zealand?
22. If the Maori migrated to what is now New Zealand 1,000 years ago, should they be considered indigenous, or the first immigrants? Can any people be truly indigenous in the same way plants and animals can? Explain.

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Activity: Who chooses? Who benefits? Who pays? What's fair?

[These four questions can be a useful tool for evaluating any policy or system. Posing the questions is a great way to stimulate critical thinking.]

As a class, or in small groups, discuss the following:

(For each question, think broadly about all the possible people or groups of people who may be affected, and remember there may be non-monetary costs and benefits.)

1. Under a system without any government regulation, who makes choices about fishing? Who benefits? Who bears the cost of these choices?
2. When the government regulates fishing but there is no limit on the total catch, what kind of choices can fishers make? Who decides where, when, and how people can fish? Are fishers always able to choose how many fish to catch? Who benefits from these choices? Who bears the costs?
3. Under the quota system, who makes choices about fishing? Who benefits and who bears the costs?
4. Suppose a person owns a pond that is stocked with fish. Who decides who is allowed to fish there? Who decides how many fish people are allowed catch? Who chooses how and when people can fish there? Who benefits from fishing? Who pays?
5. Are some of the above scenarios fairer than others? Explain.

Name: _____

Date: _____

Sustainable Oceans and Seas Quiz

- How many people live in New Zealand?
 - 450,000
 - 4,500,000
 - 45,000,000
 - 450,000,000
- The Treaty of Waitangi recognized Maori rights to _____.
 - sovereignty over New Zealand
 - manage the quota system
 - their ancestral lands and fishing grounds
 - 20% of the allowable commercial catch of fish
- Before the QMS, _____ in New Zealand.
 - the government did not regulate fishing
 - only the Maori could fish commercially
 - the government limited the total catch
 - the government tried to constrain fishing by regulating how fish could be caught
- In 1989, the Maori were granted _____ of the total allowable commercial catch.
 - 10%
 - 50%
 - 75%
 - 100%
- New Zealand's fishing zone _____.
 - is not subject to the 200-mile limit
 - is one of the largest in the world
 - is one of the smallest in the world
 - extends 12 miles offshore in all directions

6. The QMS _____.

- A) is good for fishers but bad for fish stocks
- B) is good for fish stocks but bad for fishers
- C) is good for both fish stocks and fishers
- D) is bad for both fish stocks and fishers

7. Unlike previous government attempts at regulating fishing, New Zealand's QMS _____.

- A) gave fishers property rights and an incentive to conserve fish populations
- B) mandated the type of fishing gear that could be used
- C) restricted commercial fishing to those with Maori ancestry
- D) no longer tried to limit how many fish could be caught

8. How did the fisherman in the video increase his quota of fish by five tons?

- A) He bought a bigger boat.
- B) He bought a faster boat.
- C) He mortgaged his house and bought more quota.
- D) He petitioned the government.

9. Which of the following happened last?

- A) The Treaty of Waitangi recognized Maori rights to fishing grounds.
- B) The Maori were granted a percentage of the total allowable commercial catch.
- C) The New Zealand government established the Quota Management System.
- D) The United Nations formalized the 200-mile limit.

10. The Treaty of Waitangi was an agreement between _____.

- A) the United Nations and New Zealand
- B) the Maori and the United Nations
- C) the Maori and the commercial fishers of New Zealand
- D) the Maori and the British

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Enrichment and Integration Activities

Activity: Tragedy of the Commons Simulation

Note: This activity can be done with the entire class participating (split into groups of 4-6) or with one group of 4-6 at the front of the room and the rest of the class observing.

Supplies: stopwatch, large bag of Hershey's Kisses (or other small, individually wrapped, identical candy), one index card per person, log sheets (copied from the page following the activity instructions)

Setup: Place a table in front of the room (or several tables around the room if entire class is participating). Invite 4-6 students to gather around the table. Instruct all students that there is to be no talking from this point on, and they are to listen very carefully to your instructions. Spread Hershey's Kisses around in the middle of the table, two for each student participating.

Instructions: "Listen carefully. There will be two rounds of play, each lasting 15 seconds, in which you may pick up candy from the table. Round 1 will start on my signal and end when I say stop. Any candy you have picked up is yours to keep. After Round 1, whatever number of candies remain on the table, I will double that amount. Then we will play round 2."

Say, "Go," and start the stopwatch. After 15 seconds, say, "Stop." Have each student record how many candies they collected.

If any candies are left on the table (unlikely), place an equal number of additional pieces on the table and play round 2 and have students record how many candies they each collect.

Calculate: Ask students how many total candies were picked up by the group through both rounds. Ask students to calculate the maximum number the group could have collected. (With five students, you would have placed 10 pieces of candy on the table initially, and if they had all waited until round 2 you would have added 10 more so there would have been 20 pieces available.) Have students compare their total with the maximum possible.

Discuss:

What were the rules of the game?

What was each person's strategy in the game?

Why didn't you collect the maximum number of candies?

Writing prompt: How did the rules of the game affect your incentives?

Tragedy of the Commons Simulation, continued

Play at least one of the following variations, but be sure any candy collected by students in the previous rounds of play has been eaten or put away before starting each variation.

Variation 1 – Private property

Setup: Have students gather around the table (or tables) in groups of 4-6 as before. Announce that there is to be no talking for the duration of the game. Hand each student an index card. Explain that the index card represents private property, owned by each student. No other student may touch another student's property or anything on that property. Place two Hershey's Kisses on each student's index card and none in the middle of the table.

Announce that there will be two 15 second rounds, as in the original version of the game. After the first round, you will double the number of candies remaining on each index card (so like fish, they "reproduce"), then you will start round 2.

Play both rounds of the game.

Have students log the number of candies each collected and add them up to find the group total. Now have them calculate the maximum their group could have collected, and compare their actual total with the maximum. (Typically in this version of the game the actual will match the maximum as all students will wait until round 2 to pick up their candies.)

Discuss:

What was your strategy in this version of the game?

How did this compare with your strategy in the original version?

Why did your strategy change?

Writing prompt: How are people's incentives different when resources are held in common compared to when resources are privately owned?

Variation 2 – Managed Resource

Use the same setup as in the original version, but this time, allow students to talk to each other and strategize. Play two rounds as before and have students record their totals as before. Compare actual totals with maximum possible totals. Compare actual totals to actual totals in the previous rounds.

Discuss:

Did being able to communicate improve your group's total compared to the original version of the game?

How well did people work together to maximize the candy collected?

Was there any cheating?

Did anyone in your group try to enforce cooperation? If so, was this effective?

Compare the rules in the different variations of the game.

In which variation of the game did you collect the highest total?

Why do you think this is the case?

How does this activity relate to the quota management system shown in the video?

Writing prompt: How can people work together to avoid the tragedy of the commons and maximize the yield of a commonly held resource? What makes cooperation difficult?

Extension

Play the managed resource version, but with a larger group – the whole class gathered around one large table or sitting on the floor in a circle. Is it harder or easier to coordinate? Does the actual total come as close to the maximum as it did in the smaller groups?

Try adding an enforcement component to the managed resource variation. Have students strategize and come up with a plan they all agree on, including fines or expulsion from the group for those who violate the agreement.

Writing prompt: What would happen if a shared resource (such as fish in the ocean) didn't have clear boundaries, or there was no way to exclude people from outside the local community?

Tragedy of the Commons Log

Student Name	# Caught Round 1	# Caught Round 2	

Tragedy of the Commons Log

Student Name	# Caught Round 1	# Caught Round 2	

Critical Thinking / Essay Writing: Consider the following idea. Since fishing quotas can be bought, sold, and leased just like other property, we can expect that over time, those fishers who can get the most value out of a ton of quota are going to end up with it, and less efficient fishers will go out of business. (Why?) Does it matter, then, how the government allocates the initial quota? What if the government had just granted the right to a certain percentage of the catch to each person in New Zealand, and let people who weren't fishers sell their shares to the highest bidding fishers? How, if at all, would you expect the outcome to be different from what actually happened under the QMS? Write a one-page essay in which you answer these questions in detail and fully explain your reasoning.

Critical Thinking / Constructed Response: Since fishing quotas can be bought, sold, and leased just like other property, we can expect that over time, those fishers who can get the most value out of a ton of quota are going to end up with it, and less efficient fishers will go out of business.

Why? Does it matter, then, how the government allocates the initial quota?

What if the government had just granted the right to a certain percentage of the catch to each person in New Zealand, and let people who weren't fishers sell their shares to the highest bidding fishers?

How, if at all, would you expect the outcome to be different from what actually happened under the QMS?

Write a constructed response in which you answer these questions in detail and fully explain your reasoning.

Essay Writing: Tragedy of the Commons: Research the definition of tragedy of the commons. Why is it a problem? In your essay, explain the concept in your own words using examples from your own perspective. Why is it a problem? Then explain how the tragedy of the commons applies to fishing. Finally, think of other examples of situations in which the tragedy of the commons can happen.

Essay Writing: Ownership: What does it mean to own something? What all can you do with something you own? How can people own something that isn't physical, such as a percentage of the fish catch? What can they do with this property? Consider other things people can own, such as stock in a company or another person's debt. How can owning these things benefit people? How does the ability to own such property benefit our economy? What makes it possible to own

things that don't exist physically, but only in people's minds and as a legal arrangement? How is this similar to the way ownership of physical things works?

Research and Writing Activities – For each of the following, working individually or in small groups, conduct research to learn more about the topic. Create a report detailing your findings. Include visual aids such as charts, graphs, maps, and photographs. Be sure to cite your sources.

Common Pool Resources: Elinor Ostrom, the only woman to have won the Nobel Prize in Economics, studied the way people in local communities have worked together to manage common pool resources. What conditions did she conclude were necessary in order for these arrangements to work, to avoid exploitation of the resource? What was the public's reaction to her work?

Quota Management System: Study the details and history of New Zealand's QMS. What authority manages QMS? How was it initially set up? What limits, if any, were placed on who could receive quota? What ownership rights did quota recipients get? How has the system changed over time? Which species of fish were included at the beginning? How were other species eventually brought into the QMS? Initially, quota meant a fixed tonnage of fish. How and why was this later changed to a percentage of the total catch? How do fishers know how many tons their percentage translates to? How are quotas set? How does leasing quota work? How has the fishing industry evolved under the QMS? (See izzit.org for links to useful resources.) How has the system changed over time? Are the changes mutually beneficial for the fishers and society?

Maori Fishing Rights and the QMS: Research the Maori, their role in the fishing industry, and how the QMS affected them. What does it mean to say the Maori were left out of the original QMS? Were they free to fish as much as they wanted before QMS? Did QMS prohibit them from fishing? Why would they want to be part of a system that limited their total catch? Was there a big controversy about what their share should be? How was the issue resolved and how long did it take? What is the current status of the Maori in the fishing industry? (See izzit.org for links to useful resources.)

Catch Shares: Catch shares refers to a fishery management system that allocates a secure privilege to harvest a specific area or percentage of a fishery's total catch to individuals or groups. Individual transferable fishing quotas such as those in New Zealand are one type of catch share system. Find out which other countries or regions have catch shares systems in place. Which ones are most similar to the quota system in New Zealand? Which types of fish are managed under these systems? How long have the systems been in place? How are the quotas set and distributed? Which of the systems have proven successful at stabilizing fisheries? Do you think this system would be effective in your geographic area?

New Zealand History and Culture: Divide the class into small groups, each of which can focus on a particular area of interest. Be sure to include Maori, the first European immigrants, and later immigrant groups, as well as the country's system of government, major industries, customs and

traditions. You may wish to research if imperialism directly affected the Maori and the economic growth of New Zealand. How has cultural identity provided a sense of pride in the Maori people, especially in Maori fishers?

Other Management Systems: Is there any other location in the world that has established a quota system for catching fish, wildlife, etc.? How does that system compare to the QMS in New Zealand? Does that system allow for the individual to exercise property rights? (i.e. Can shares be bought and sold as in the QMS?) How does that impact their results?

Sustainable Oceans and Seas **Viewing Guide Answer Key**

1. declining
2. fishing
3. New Zealand's
4. catches
5. Quota
6. property right
7. protecting
8. business
9. 10%
10. fishers

Quiz Answer Key

1. B) 4,500,000
2. C) their ancestral lands and fishing grounds
3. D) the government tried to constrain fishing by regulating how fish could be caught
4. A) 10%
5. B) is one of the largest in the world
6. C) is good for both fish stocks and fishers
7. A) gave fishers property rights and an incentive to conserve fish populations
8. C) He mortgaged his house and bought more quota.
9. B) The Maori were granted a percentage of the total allowable commercial catch.
10. D) the Maori and the British

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