

COMMON POOL RESOURCES

Commentary for teachers

1 Overview

1.1 Topic and contents

This module deals with common pool resources and the problem of their overuse (tragedy of the commons). Through their own actions during the course of a game, students experience at first hand the major incentives inherent in common pool resources. They discuss possible solutions as well as the difficulties involved in trying to implement them, and they look at the effect of sanctions and conferences. Concepts such as economic types of goods, the tragedy of the commons, externalities, sustainability, the scarcity of resources, the role of the state and social norms are explained. The topic can be – but does not need to be – linked to environmental problems (e.g. CO₂ emissions and global warming).

1.2 Type of iconomix module

The main element of this module is an offline strategy game that can be played in class. Access to computers is not needed. Slides and a projector are required, however.

1.3 Time required

Two to four lessons, depending on the degree of detail with which the topic is addressed.

1.4 Subjects and level of difficulty

Suitable subjects: Economics and humanities, ecology, geography, history, civic education, sociology and psychology.

Level of difficulty: Intermediate. The game can be used in a wide range of contexts. In the evaluation phase, the level of difficulty can be adjusted to the students' knowledge of the topic.

1.5 Learning objectives

The module aims to develop the following economic skills:

Personal skills

Students should be able to:

- ▶ analyse their own behaviour with respect to common pool resources.

Social skills

Students should be able to:

- ▶ discuss solutions for the tragedy of the commons with each other.










Professional skills

Students should be able to:

- ▶ name the characteristics of common pool resources (in comparison with other economic types of goods) and describe them in their own words;
- ▶ explain which incentives may lead to the tragedy of the commons;
- ▶ determine which goods or situations trigger the tragedy of the commons phenomenon;
- ▶ describe economic solutions for the tragedy of the commons using an example from real life.

1.6 Documentation

The module consists of this commentary for teachers and the following documents:

-  Fishpond explained
-  Slides for teachers (rules of game, check sheet, scoring system, overfishing of cod, solutions)
-  Score sheet for players
-  Worksheet 1
-  Worksheet 2
-  Knowledge sheet
-  Knowledge test
-  Advanced question
-  Sample answers

You can order any document from this module by completing the online form at www.iconomix.ch/en/common_pool.

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2 Working with the module

2.1 Overview of module phases

The teaching material is based on a three-phase concept:

1. **Learning by doing:** Offline strategy game (Fishpond)
2. **Learning through dialogue:** Discussion in class, knowledge sheet, transfer task
3. **Learning by applying:** Knowledge test

For information on the educational background, cf. 'Learning with iconomix' at www.iconomix.ch/en/learning. An overview of how to work with the module, including space for notes and individual modifications, can be found at the end of this document.

2.2 Learning by doing

In the first phase, the students play the strategy game – Fishpond – in class. Using a projector and slides, the teacher guides the students through the game. The rules of the game and the different stages of each round are described in a separate document ('Fishpond explained').

In this game, a fishpond serves as the common pool resource. In several rounds, the students anonymously try to catch as many fish (points) as possible. Each player can catch up to three fish per round. If they catch no more than two fish per round on average, the fish population can recover in a sustainable way between the rounds. This means, theoretically, that there would always be sufficient fish in the pond and the game could go on forever. However, since the players are tempted to catch three fish per round, the resource is usually overused or even depleted; an outcome which is bad for everybody. This situation clearly demonstrates the conflict between the temptation to achieve personal gain and the desire to act in the interest of the group as a whole; in other words, a classic case of the tragedy of the commons.

To make sure that decisions are taken anonymously, players should wear masks. These can be ordered at www.iconomix.ch/en/common_pool.

Over the course of the game, penalties for overuse may be introduced. This means that whoever catches three fish in any one round may receive penalty points, which are then deducted from their score. This can only happen if enough other players participate in an effort to punish them and are willing to give up one of their own points. While this

may slow the depletion of the resource, the process can generally not be stopped altogether.

One particularly interesting aspect to the game is the option to call a class conference. The players get three minutes to decide on how to proceed and whether to change something about the way they are playing the game. It is theoretically possible that, after such a conference, the fish population in the pond can be sustained for the duration of the game. The outcome remains to be seen, however. Just like in real life, it is to be expected that not all players will observe the resolutions made in the conference.

Ideally, the game should first be played without the additional options (penalty points, class conference), which means that it will probably only take a few rounds. The game can then be played a second time, this time introducing the penalty option and – if the fish population continues to fall – calling a class conference. This way, the students get to experience both the depletion of the fish stocks (in the first game) and the effect of a conference (in the second game). An alternative approach would be to play just one game, introducing the penalty option after two rounds and, if necessary, calling a class conference at a later round. Although this eliminates the need to play the game twice, the students may not get to witness the fish stock depletion. It also makes it more difficult to compare the different game outcomes, i.e. with measures to counter the problem versus without.

Not all teachers can easily identify with the aim of the game. The aim of the game (to catch as many fish as possible) is distinct from the learning objective (to understand the tragedy of the commons). The game exemplifies a problem that commonly occurs in the real world. While this might call for a discussion on ethical issues, it is recommended to play the game first before doing so. Ensuring the survival of the fishpond may seem like a preferable goal, but this would only result in a tedious, dull game, which would neither spark a discussion afterwards nor reflect reality (e.g. the overfishing of the world's oceans).

Helpful hints

- To motivate the students, the teacher could set realistic goals; for instance, by awarding a small prize to all players who achieve grade 5 or above, and a more substantial prize to those who achieve grade 5.5 or above. If all the students exercise some restraint when playing and only ever take two

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fish, they should theoretically all be able to achieve grade 5 and win the small prize. Without having the possibility to consult with one another, however, this can prove quite difficult in practice. In any case, the big prize is practically unobtainable if there are several players trying to win it. Furthermore, in their attempts to win it, they will render it impossible for anybody to achieve the grade required for even the small prize.

- ▶ The rules of the game should be explained very clearly – if possible with the help of a projector and the slides provided. For example, the players should all aim to catch as many fish as possible. Whether one player catches more than the others is not relevant to the outcome of the game.
- ▶ Calling a conference when the situation is critical but not beyond recovery reaps the best results and is more exciting than calling it too early.

2.3 Learning through dialogue – discussion in class

It is to be expected that the students will begin to see the problem posed by their desire to score as many points as possible. In the review phase, this issue should be identified and addressed. The teacher then asks specific questions to get the students to discuss the characteristics and effects of common pool resources that they discovered during the course of the game.

Some central questions (based on four levels of review):

- ▶ **Observations:** What happened during the game?
- ▶ **Emotions:** How did the students feel? How did they react to seeing the fishpond becoming emptier and emptier as the game progressed?
- ▶ **Explanations:** Why was the fish population in the pond depleted (or why was it not)? Which types of behaviour were rewarded? What mechanisms led to the overfishing? Why did the penalties work (or why did they not)? Why was the conference effective (or why was it not)?
- ▶ **Comparison with real life:** Can parallels to the real world be drawn?

Some possible answers:

- ▶ **Observations:** The fishpond is usually completely emptied. Penalties may slow the depletion, but the process can generally not be stopped altogether. In exceptional cases – small classes that show restraint and solidarity – the pond may not be totally emptied. If a conference is called, the outcome of the game cannot be foreseen; as, very often, a few players will not adhere to the resolutions made.
- ▶ **Emotions:** A combination of emotions can be observed

– anger, glee, enjoyment or frustration (because it is obvious what will happen if the pond is overfished; but some players do not care about the consequences and continue fishing). These emotions can arouse the students' interest and help them to better understand how the system works.

- ▶ **Explanations:** As the game progresses, it will become clear to everyone that they should all be restricting their catch to two fish per round so that the fish population can renew itself indefinitely. On an individual level, however, the act of taking three fish is rewarded, which leads to the depletion of the pond's fish stocks. This phenomenon is the result of two characteristics of common pool resources. Firstly, nobody can be excluded from consumption (everyone is entitled to take three fish). Secondly, rivalry exists between the consumers (whoever overfishes, reduces the stock for everyone). The fact that the players fish anonymously makes the situation all the more complicated. Penalties can act as a deterrent and may help slow the outcome (overfishing). However, those who do not participate in the penalty process also benefit from the exercise (referred to as free riding). It is therefore difficult to get sufficient players to participate. While conferences can be effective, it is not easy to implement the resolutions made. One of the most effective resolutions that can be made is to abolish the anonymity rule.
- ▶ **Comparison with real life:** The teacher can draw a parallel with the real-life example of cod fishing in public waters (using the slide provided), where the outcome was very similar to what generally happens in the game. Global warming and a great many other environmental problems – although not all – are also comparable to the fishpond. Conferences are held regularly to address issues relating to the protection of the environment or endangered species; and the difficulties in achieving binding resolutions are well known.

Theory

Students can read the knowledge sheet either in class or at home. Alternatively, the teacher can tell them the most important points. The knowledge sheet summarises the key aspects and terminology relating to common pool resources.

Transfer task

As an alternative to worksheet 1 – particularly for more advanced classes – worksheet 2 can be assigned as an exercise. Using specific examples of problems in connection

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with common pool resources, the students look at causes and possible solutions. For this purpose, the teacher can display the slide with possible solutions on the projector or distribute the document among the students. Answers may be discussed or reviewed in class. Alternatively, the class (or teacher) can use the internet or other media to obtain information about a conference on overfishing or climate change that actually took place, and analyse any resolutions made.

Were specific resolutions taken? If not, why not? If so, what type of resolutions were they (see the slide on possible solutions)? Why do the measures seem promising (or why do they not)?

2.4 Learning by applying

To round off the module, the teacher can have the students take a short knowledge test. The test aims to secure a minimum knowledge of the topic and check how much the students retained.

In addition to the test, a more difficult question – the advanced question – is available.

An even more demanding question – the challenge question – is also available. Only students who have dealt with the topic in detail should tackle this question. By submitting their answers via the internet, individual students, student groups or entire classes can participate in the iconomix award.

Information on the iconomix award is available at:
www.iconomix.ch/en/award.

3 Additional information

In this section, the German and French versions of the commentary for teachers provide references to textbooks used in Swiss upper secondary schools in the respective language regions and to other recommended resources from the same language regions. Please refer to the corresponding language versions.

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4 Overview of module

	STEPS	DESCRIPTION	MEDIA/MATERIAL	TIME
PHASE 1 Learning by doing 20–45 minutes	Introduction	Introduction to strategy game, Fishpond.	Rules of game (slides) Check sheet for teachers (slide) Scoring system (slide) Score sheet for players Projector	5–10 minutes
	Fishpond game	Play game; possibly more than once.	Check sheet for teachers (slide) Score sheet for participants Masks Projector	10–30 minutes
	Evaluation of results	Record results. Award prizes.	Check sheet for teachers (slide) Scoring system (slide) Prizes Projector	5 minutes
PHASE 2 Learning through dialogue 45–120 minutes	Class discussion and review	Review game using questions provided. Teacher provides explanations and draws parallels to real life.	Commentary for teachers (incl. questions) Overfishing of cod (slide)	5–20 minutes
	Theory	Read knowledge sheet either in class or at home, or the teacher summarises the most important points.	Knowledge sheet	10–15 minutes
	Advanced task	Work through worksheet 1 and/or worksheet 2, either in pairs or small groups. Discuss answers in class.	Worksheet 1 Worksheet 2 Sample answers	20–90 minutes
PHASE 3 Learning by applying 15+ minutes	Knowledge test	Work through knowledge test, either as an exercise or a test.	Knowledge test Sample answers	15–30 minutes
	Advanced question	Answer advanced question. Teacher provides solutions.	Advanced question Sample answers	Open-ended
	Challenge question	Answer challenge question. Participate in award.	Challenge question Information on iconomix award	Open-ended