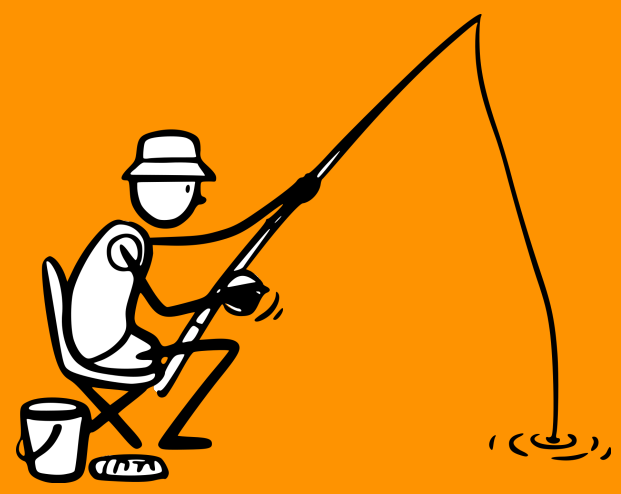
Tragedy of the Commons

… a game about the overuse of common goods

In-depth: Emotions in ESD



The materials presented here were developed as part of the OERLe BNE project. The aim of the project is to promote the participatory design of Open Educational Resources (OER) and Open Educational Practices (OEP) in the second phase of teacher training.
The focus is on education for sustainable development (ESD), which is being established as an integral part of modern teacher training in Saxony-Anhalt. The materials are the result of close cooperation between the geography education department at Martin Luther University Halle-Wittenberg (MLU) and the State Institute for School Quality and Teacher Training Saxony-Anhalt (LISA).
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Bundesministerium für Forschung, Technologie und Raumfahrt

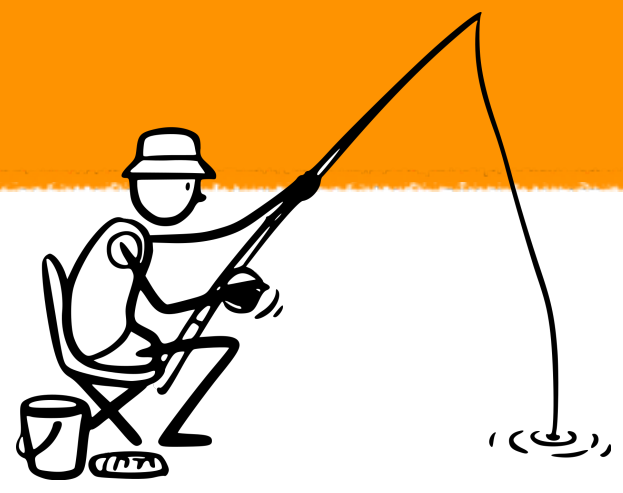
OERLe BNE

MARTIN-LUTHER-UNIVERSITÄT HALLE-WITTENBERG

DIDAKTIK DER GEOGRAPHIE

Tragedy of the Commons

… a game about the overuse of common goods



Objective: Through the game, participants can experience the challenges of shared resource use, reflect on their emotional reactions, and understand sustainable solutions for common pool resources based on Elinor Ostrom's principles.

Contents: Common goods and emotions in ESD

Materials required: Worksheet for reflecting on emotions (p. 6), event cards (p. 7), calculators, notepads and pens, blackboard or flip chart for visualising the course of the game.

Time: 60 minutes

In summary

The game is based on the so-called tragedy of the commons, a classic problem of shared resources. When a resource - such as fish stocks, forests or water - is used by several actors, there is a risk of overuse if individuals prioritise short-term gains over long-term goals. The management of common goods is a key area of tension in ESD. On the one hand, the question arises as to what extent (political) regulations are necessary to ensure the protection of such resources. On the other hand, there is discussion as to whether collective action and responsible behaviour can ensure sustainable use. This touches on central principles of ESD, such as critically questioning power relations, reflecting on responsibility, and negotiating solutions.

1

Common goods-game (plenary session)

The participants play the Common goods-game Game together. Once the ocean has been fished empty, a second round can be played in which the participants work together to come up with rules that they can use to influence the course of the game.

30 min

2

Exploring emotions (small group)

Participants reflect on emotions that arose during the game and explore the extent to which these also play a role in everyday situations.

15 min

3

Transfer: Emotions in ESD (plenary discussion)

Participants are briefly informed about common pool resources, the "tragedy of the commons," and the findings of Elinor Ostrom (see handout: common pool resources). This is followed by a plenary discussion on how Ostrom's principles are reflected in the commons game.

15 min

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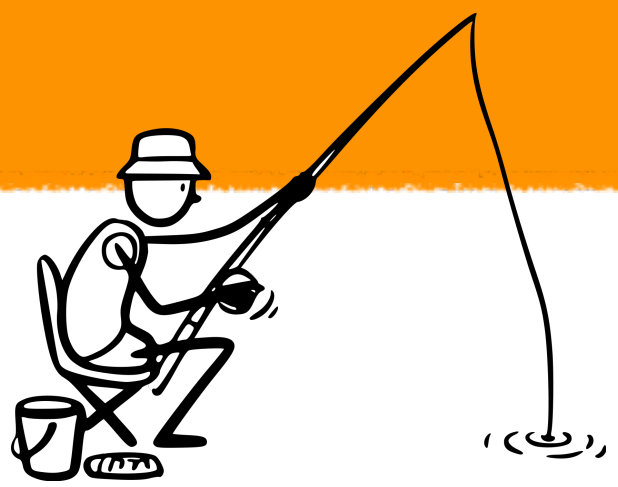

Suggested procedure

1

Common goods-game (plenary session)

30 min

Group division and introduction to the game setting

The participants are divided into five groups.
First, the game leader introduces the setting:
The participants are fishermen and fisherwomen; fish stock at the start of the game: 10,000 tons; fishing takes place in each round, so the fish stock changes in each round; one round corresponds to one year (start of the game, e.g., in 2030).
The goal is to catch as many fish as possible.

Before the game begins, the task sheet for reflecting on emotions is handed out. p. 6

Game play

Several rounds are played, with each round consisting of:

1) Consultation: The groups discuss the catch for 2 minutes. A maximum of 20 % per group may be fished. At the end of the consultation period, the result is written on a piece of paper and handed over to the game leader face down.
2) Total catch: The game management calculates the total catch and the stock and announces the total catch. e.g. Round 1: 10 % + 5 % + 8 % + 7 % + 10 % = 40 %; 10,000 t - (10,000 t x 0.4) = 6,000 t
3) Event: The game master draws an event card (e.g., due to a tanker accident, many fish have died or their reproduction has been impaired. The stock declines by 20 %) and calculates the fish stock (6,000 t x 0.8 = 4,800 t). p. 7
4) Fish stock: The game management announces the fish stock for the next round and records it in writing (e.g., on the board: Fish stock 2031 - 4,800 t).

The rounds are repeated until the ocean has been fished empty or until the fish population has stabilised. If all event cards have been drawn, the event card deck can be shuffled and turned over, or the game can be ended.

Game variation

- Participants can consider which rules could be changed to produce a different outcome (e.g., changing the goal; introducing conferences to set maximum catch limits; allowing agreements between groups; introducing penalties for non-compliance with maximum catch limits ...) and play the game with the changed rules.
- The game variation can also occur directly in the first round if the participants ask specific questions (e.g., "We have to agree, otherwise the ocean will be empty in no time.").

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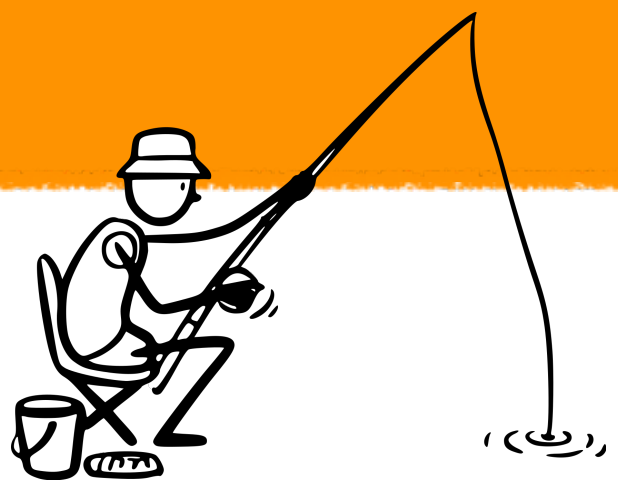

Suggested procedure

2

Exploring emotions (small group)

15 min

The aim of this phase is for participants to reflect on their emotions and then relate them to everyday situations in the context of sustainability.

Possible tasks:

Reflect together on the emotions you experienced during the game, considering the following questions.

- Which emotions influenced your decisions?
- How did your emotions change during the game?
- How did group interactions influence your emotions?

Reflect on specific experiences to identify everyday situations in which the emotions experienced in the game arise, and discuss possible connections between emotions and actions.

Background: The importance of emotions

Emotions are an important part of education for sustainable development, as they influence learning processes and deepen engagement with complex challenges. Sustainability issues are often associated with ethical and scientific uncertainties. Consciously allowing, discussing, and reflecting on one's own emotions helps to develop different approaches and better understand one's own reactions. This not only enables the acquisition of knowledge, but also promotes critical thinking processes.

Various emotions can arise during the course of the game - from enthusiasm about initial successes to frustration when fish stocks decline and decisions become increasingly difficult. The question of which strategies are more effective can cause uncertainty, especially when individual advantages have to be weighed against collective interests. Understanding the complexity of systems can also be challenging because it can trigger feelings of being overwhelmed. At the same time, gradual understanding can open up new perspectives and reveal starting points for action, which in turn can generate hope and motivation.

These emotional reactions reflect real situations in the context of sustainability: joy about positive developments can manifest itself in environmental movements or political changes, while feelings of being overwhelmed arise when the scope of global challenges is perceived as overwhelming. Similarly, frustration or anger can arise when changes to unjust structures fail to materialise or are perceived as too slow.

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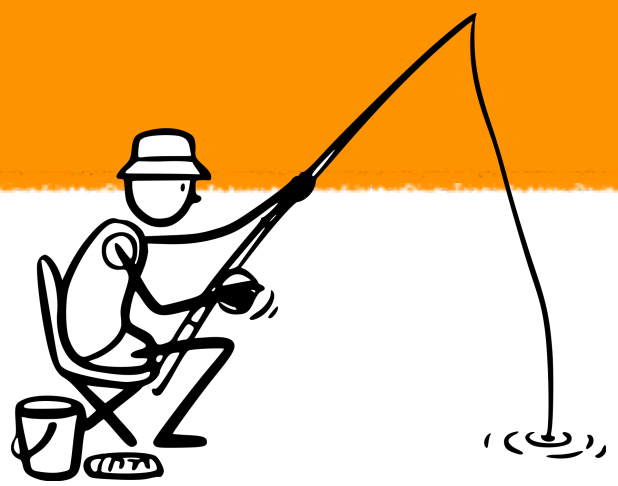

Suggested procedure

3

Transfer: Emotions in ESD (plenary discussion)

15 min

The aim of this phase is for participants to bring together their findings from the group discussion in the plenary session. These findings are then related to research on ESD.

1) How did emotions change over the course of the game? What differences emerged between the individual players?

During the course of the commons game, the emotions recorded for each participant show how individual and changeable feelings can be in the context of sustainability. Schrader (2022) also emphasises how relevant emotional processes are for participation and negotiation in sustainability: Feelings such as concern, powerlessness, but also hope and motivation shape decision-making processes and behavioural changes. Research findings by Chapman, Lickel, and Markowitz (2017) illustrate that emotions relating to sustainability issues cannot be consciously triggered - rather, everyone brings their own emotional experiences and attitudes into play. The challenge for teachers is to create a space that encourages reflection and discussion about these emotions, rather than deliberately evoking specific feelings.

2) To what extent did emotions influence decisions?
Emotions during the commons game directly influence decisions, as feelings such as frustration, fear of loss, or even hope control risk-taking and cooperative behaviour (Kanske, 2015). Empirical studies show that around 75 % of young people surveyed are pessimistic about the future. This is mainly explained by the discrepancy between the desired and expected future (Brock & Grund, 2018). Such a pessimistic attitude leads many people to engage less with the future or even avoid it altogether (Ojala et al., 2021). The future and emotions are closely linked (Waldow-Meier, 2022), which is why ESD should specifically promote positive visions of the future and hope. This can be supported by the following measures:

- Highlighting success stories and inspiring examples of best practice,
- Participation in authentic learning environments that already successfully implement sustainable practices,
- Promoting a positive and hopeful outlook for the future (Brock & Grund, 2018; Grund & Singer-Brodowski, 2020).

The concept of "real hope" means that learners recognise that they themselves can find or contribute to a solution with the resources they have (Schrader, 2022, p. 265). This perspective is central to counteracting excessive demands and resignation and strengthening the ability to act.

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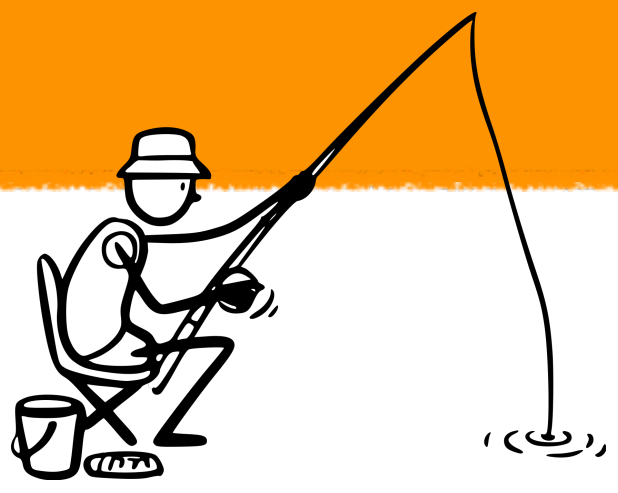

Suggested procedure

3

Transfer: Emotions in ESD (plenary discussion)

15 min

3) In which everyday situations do the emotions experienced in the game occur?

The tragedy of the commons allows players to experience emotions that also play a role in everyday life in the context of sustainability. Research shows that educational contexts often focus heavily on the cognitive level (Buddeberg et al., 2024). However, sustainability issues are particularly emotionally charged due to their complexity, the involvement of different interest groups, and inherent conflicts of interest (Grund & Singer-Brodowski, 2020, p. 30).

This has important implications for emotion-sensitive ESD: in particular, emotions should be actively taken into account when dealing with crisis situations (Waldow-Meier, 2022). A key task for teachers is to create spaces for experience in which learners can feel and express their emotions. This promotes a deeper understanding of sustainability issues that goes beyond mere knowledge.

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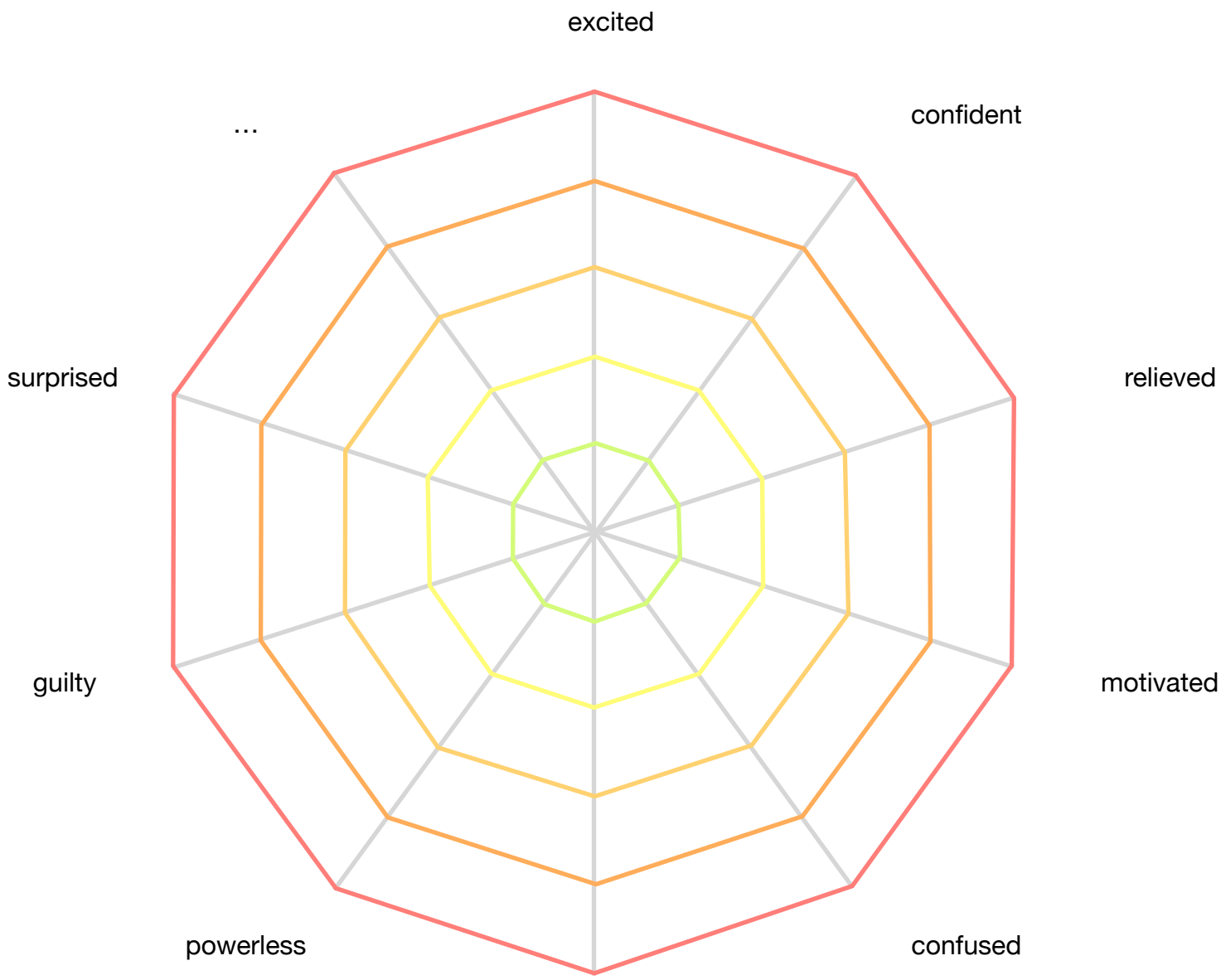
Reflection on emotions in a spider web diagram



During the game, you have the opportunity to record your emotions so that you can later reflect on how your feelings changed over the course of the game.

Before the game starts

Look at the spider web diagram showing the different emotions. Think about how you feel before the first run. Enter the number "0" in the places that correspond to your current emotions. The stronger you feel a particular emotion, the further out you can place the mark.

After each round of play

After each round, take a moment to think about how you feel. Enter the corresponding round number ("1," "2," etc.) in the areas of the diagram that reflect your current emotions. It is possible to feel several emotions at the same time - mark all applicable areas.

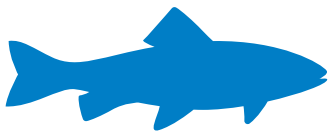
Reflection in small groups

Discuss the following questions:

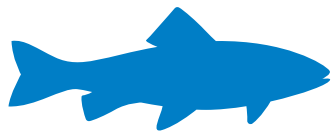
1) How did emotions change over the course of the game? What differences emerged between the female and male players?

2) To what extent did emotions influence decisions?

3) In which everyday situations do the emotions experienced in the game occur?



The fish reproduce and the population increases by 30 % (x 1.3).



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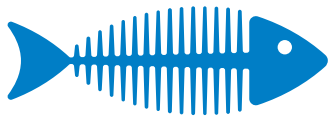
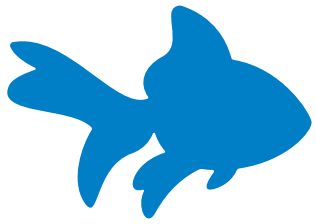
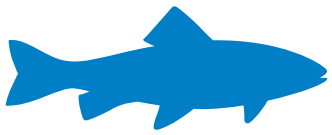


The absence of El Niño leads to the migration of parts of the population. The population declines by 30 % (x 0.7).



New species have migrated as a result of climate change. However, due to competition for food, the population is only increasing by 10 % (x 1.1).



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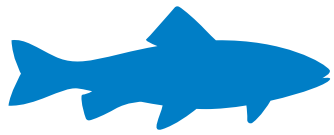

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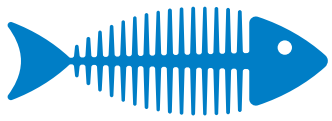
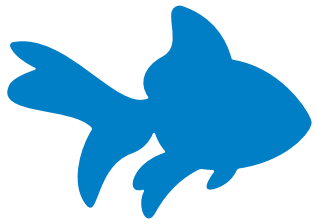
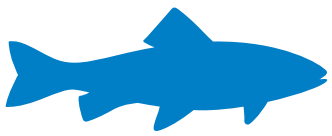


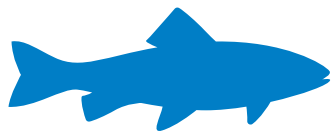
Due to a tanker accident, many fish have died or their reproduction has been impaired. The population is declining by 20 % (x 0.8).



New fish!
Due to climate change, new species are migrating to the area. Fish stocks are increasing by 20 % (x 1.2).



The fish reproduce and the population increases by 30 % (x 1.3).



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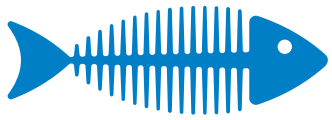
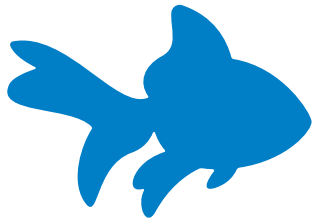
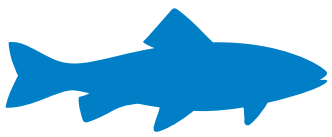


The increase in microplastics in fish bodies leads to death and reduced reproduction.
The population declines by 20 % (x 0.7).



A good year for fish - compared to recent years, it is rather cool and there is less chemical discharge. Fish stocks are up 40 % (x 1.4).



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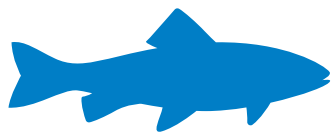

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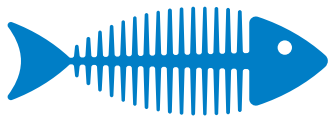

Due to particularly high summer temperatures, part of the fish population migrates.
The population declines by 20 % (x 0.8).

Event cards for printing

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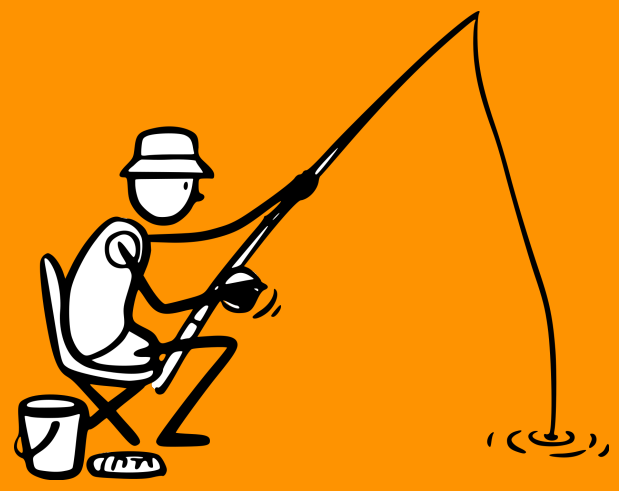
In-depth: Emotions in ESD



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OERLe BNE

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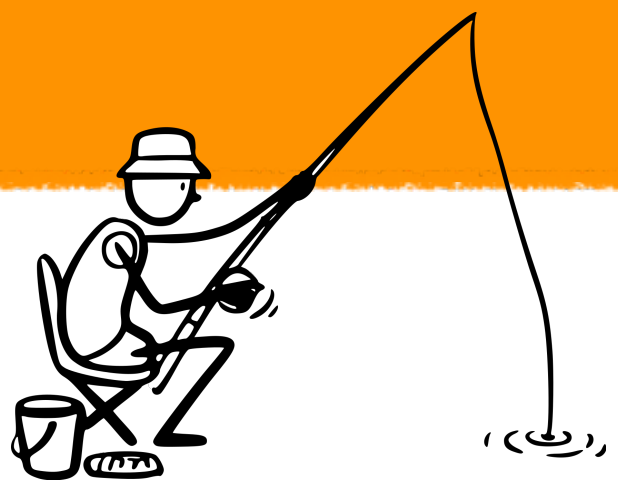

Objective: Through the game, participants can experience the challenges of shared resource use, reflect on their emotional reactions, and understand sustainable solutions for common pool resources based on Elinor Ostrom's principles.

Contents: Common goods and emotions in ESD

Materials required: Handout „Common goods“ (p. 5), event cards (p. 4), calculators, notepads and pens, blackboard or flip chart for visualising the course of the game

Time: 50 minutes

In summary

The game is based on the so-called tragedy of the commons, a classic problem of shared resources. When a resource – such as fish stocks, forests or water – is used by several actors, there is a risk of overuse if individuals prioritise short-term gains over long-term goals. The management of common goods is a key area of tension in ESD. On the one hand, the question arises as to what extent (political) regulations are necessary to ensure the protection of such resources. On the other hand, there is discussion as to whether collective action and responsible behaviour can ensure sustainable use. This touches on central principles of ESD, such as critically questioning power relations, reflecting on responsibility, and negotiating solutions.

1

Common goods game (plenary session)

The participants play the Common goods game together. Once the ocean has been fished empty, a second round can be played in which the participants work together to come up with rules that they can use to influence the course of the game.

30 min

2

Provide information about common property (individual work)

Participants learn about common-pool resources and Elinor Ostrom's research, e.g., with the handout on p. 5.

5 min

3

Transfer: Emotions in ESD (plenary discussion)

Participants are briefly informed about common pool resources, the "tragedy of the commons," and the findings of Elinor Ostrom (see handout: common pool resources). This is followed by a plenary discussion on how Ostrom's principles are reflected in the common goods-game.

15 min

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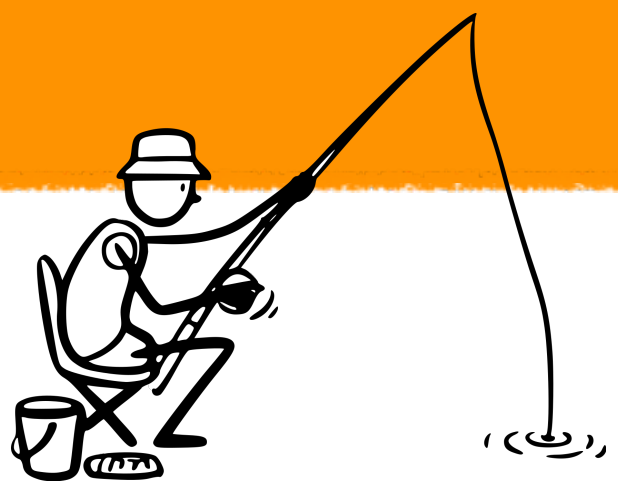


Suggested procedure

1 Common goods-game (plenary session)

30 min

Group division and introduction to the game setting

The participants are divided into five groups.
First, the game leader introduces the setting:
The participants are fishermen and fisherwomen; fish stock at the start of the game: 10,000 tons; fishing takes place in each round, so the fish stock changes in each round; one round corresponds to one year (start of the game, e.g., in 2030).
The goal is to catch as many fish as possible.

Game play

Several rounds are played, with each round consisting of:

1) Consultation: The groups discuss the catch for 2 minutes. A maximum of 20 % per group may be fished. At the end of the consultation period, the result is written on a piece of paper and handed over to the game leader face down.
2) Total catch: The game management calculates the total catch and the stock and announces the total catch. e.g., round 1: 10 % + 5 % + 8 % + 7 % + 10 % = 40 %; 10,000 t - (10,000 t x 0.4) = 6,000 t
3) Event: The game master draws an event card (e.g. due to a tanker accident, many fish have died or their reproduction has been impaired. The stock declines by 20 %) and calculates the fish stock (6,000 tonnes x 0.8 = 4,800 tonnes).
4) Fish stock: The game management announces the fish stock for the next round and records it in writing (e.g., on the board: Fish stock 2031 - 4,800 t).

p. 5

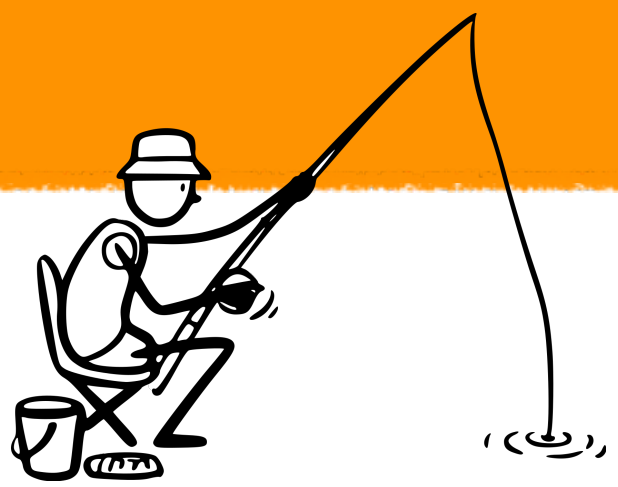
The rounds are repeated until the ocean has been fished empty or until the fish population has stabilised. If all event cards have been drawn, the event card deck can be shuffled and turned over, or the game can be ended.

Game variation

- Participants can consider which rules could be changed to produce a different outcome (e.g., changing the goal; introducing conferences to set maximum catch limits; allowing agreements between groups; introducing penalties for non-compliance with maximum catch limits ...) and play the game with the changed rules.
- The game variation can also occur directly in the first round if the participants ask specific questions (e.g., "We have to agree, otherwise the ocean will be empty in no time.").

Tragedy of the Commons

… a game about the overuse of common goods



Suggested procedure

2 **Provide information about common property (individual work)**

5 min

Participants learn about common-pool resources and Elinor Ostrom's research, e.g., with the handout on p. 5.

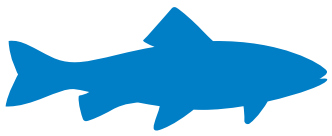
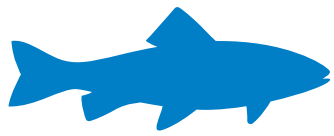
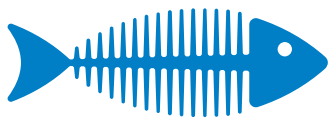
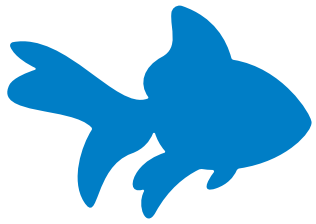
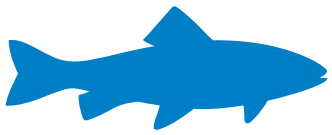
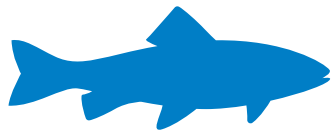
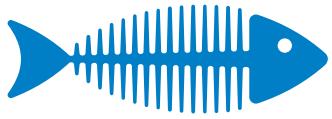
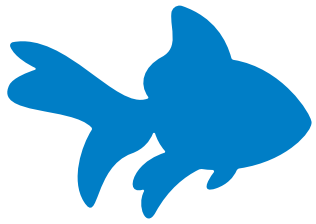
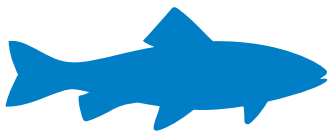
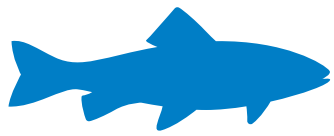
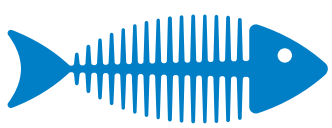
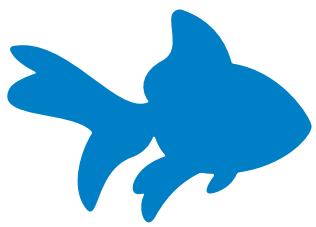
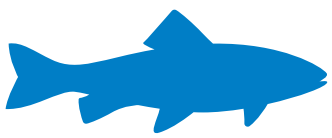
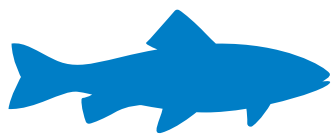
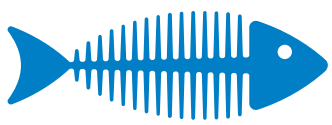
3 **Implementation of the use of common goods in the game (group discussion)**

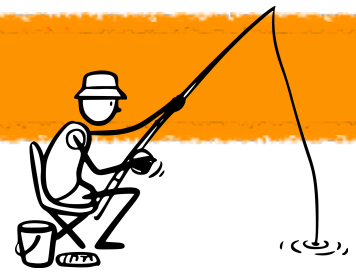
15 min

Participants discuss in small groups how Ostrom's principles are reflected in the Commons Game, which principles were incorporated through changes to the game, and how the game can be adapted to take further principles into account.

Possible answers:

Principles for the sustainable use of common goods	**Implementation of the principles in the game**
[1] Clear delineation of the resource and its users	The fish stock is clearly defined in the game, and participants know that they have access to it as fishermen.
[2] Rules must be adapted to local conditions	The 20 % catch limit per group is a rule designed to protect stocks, similar to sustainable fishing regulations in reality.
[3] Co-determination of those affected in the formulation of rules	The game variation allows participants to develop new rules, reflecting Ostrom's principle of participatory decision-making.
[4] Community monitoring of the resource	The game master announces the fish stock after each round. In addition, participants could introduce a rule that catch quantities may not be submitted anonymously.
[5] Graduated sanctions for rule violations	If new rules are introduced in the game, penalties for excessive fishing could be imposed.
[6] Conflict resolution mechanisms must be in place	The opportunity to consult in groups and develop new rules creates space for conflict resolution and negotiation.
[7] Recognition of self-government by external authorities	If the game introduces a higher authority (e.g., a "government" or "international organisation"), this could simulate the recognition of local regulations.
[8] Integration into larger networks	If groups begin to coordinate or develop overarching rules, this principle becomes apparent in the game.

 The fish reproduce and the population increases by 30 % (x 1.3).	 The fish reproduce and the population increases by 30 % (x 1.3).	 The absence of El Niño leads to the migration of parts of the population. The population declines by 30 % (x 0.7).	 New species have migrated as a result of climate change. However, due to competition for food, the population is only increasing by 10 % (x 1.1).
 The fish reproduce and the population increases by 30 % (x 1.3).	 The fish reproduce and the population increases by 30 % (x 1.3).	 Due to a tanker accident, many fish have died or their reproduction has been impaired. The population is declining by 20 % (x 0.8).	 New fish! Due to climate change, new species are migrating to the area. Fish stocks are increasing by 20 % (x 1.2).
 The fish reproduce and the population increases by 30 % (x 1.3).	 The fish reproduce and the population increases by 30 % (x 1.3).	 The increase in microplastics in fish bodies leads to death and reduced reproduction. The population declines by 20 % (x 0.7).	 A good year for fish - compared to recent years, it is rather cool and there is less chemical discharge. Fish stocks are up 40 % (x 1.4).
 The fish reproduce and the population increases by 30 % (x 1.3).	 The fish reproduce and the population increases by 30 % (x 1.3).	 Due to particularly high summer temperatures, part of the fish population migrates. The population declines by 20 % (x 0.8).	**Event cards for printing**



Common goods: Shared resources and their challenges
Common goods, also known as public goods, are resources that are used collectively and do not belong exclusively to any one actor. They are characterised by limited availability and are at risk if there are no sustainable rules for their use. Classic examples include fish stocks, pastureland, forests, and clean water.

Common goods between sustainable use and overuse
One example of sustainable use is the traditional management of irrigation systems in many regions of the world. In parts of India and Mexico, local communities have been coordinating water distribution for centuries through jointly agreed rules in order to prevent overuse and conflicts.
At the same time, there are numerous cases of overuse that show how unregulated use can lead to long-term damage. One example is the deforestation of tropical rainforests, particularly in the Amazon region. Illegal or excessive deforestation for agriculture and timber production is destroying large areas of land, which not only threatens biodiversity but also affects the global climate. Without clear protective measures and sustainable management, these ecosystems are at risk of disappearing in the long term.

The tragedy of the commons?
Elinor Ostrom, the first woman to receive the Nobel Prize in Economics, refuted the theory that common resources are inevitably overused (the so-called "tragedy of the commons") with her research. She used empirical studies to show that local communities can develop successful mechanisms for sustainable resource use - without central government control or privatisation. Their research identified eight principles that contribute to the long-term preservation of common-pool resources, including clear rules of use, mechanisms for conflict resolution, and the gradual adaptation of rules to new challenges.

Ostrom, E. (1990). Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge University Press.
Ostrom, E. (2008). A General Framework for Analyzing Sustainability of Social-Ecological Systems. Science, 325(5939), 419–422. https://doi.org/10.1126/science.1172133

Analyse the extent to which Elinor Ostrom's eight principles for the sustainable use of common resources were implemented in the game and record your findings in the table.

Principles for the sustainable use of common goods	**Implementation of the principles in the game**
[1] Clear delineation of the resource and its users	
[2] Rules must be adapted to local conditions	
[3] Co-determination of those affected in the formulation of rules	
[4] Community monitoring of the resource	
[5] Graduated sanctions for rule violations	
[6] Conflict resolution mechanisms must be in place	
[7] Recognition of self-government by external authorities	
[8] Integration into larger networks	