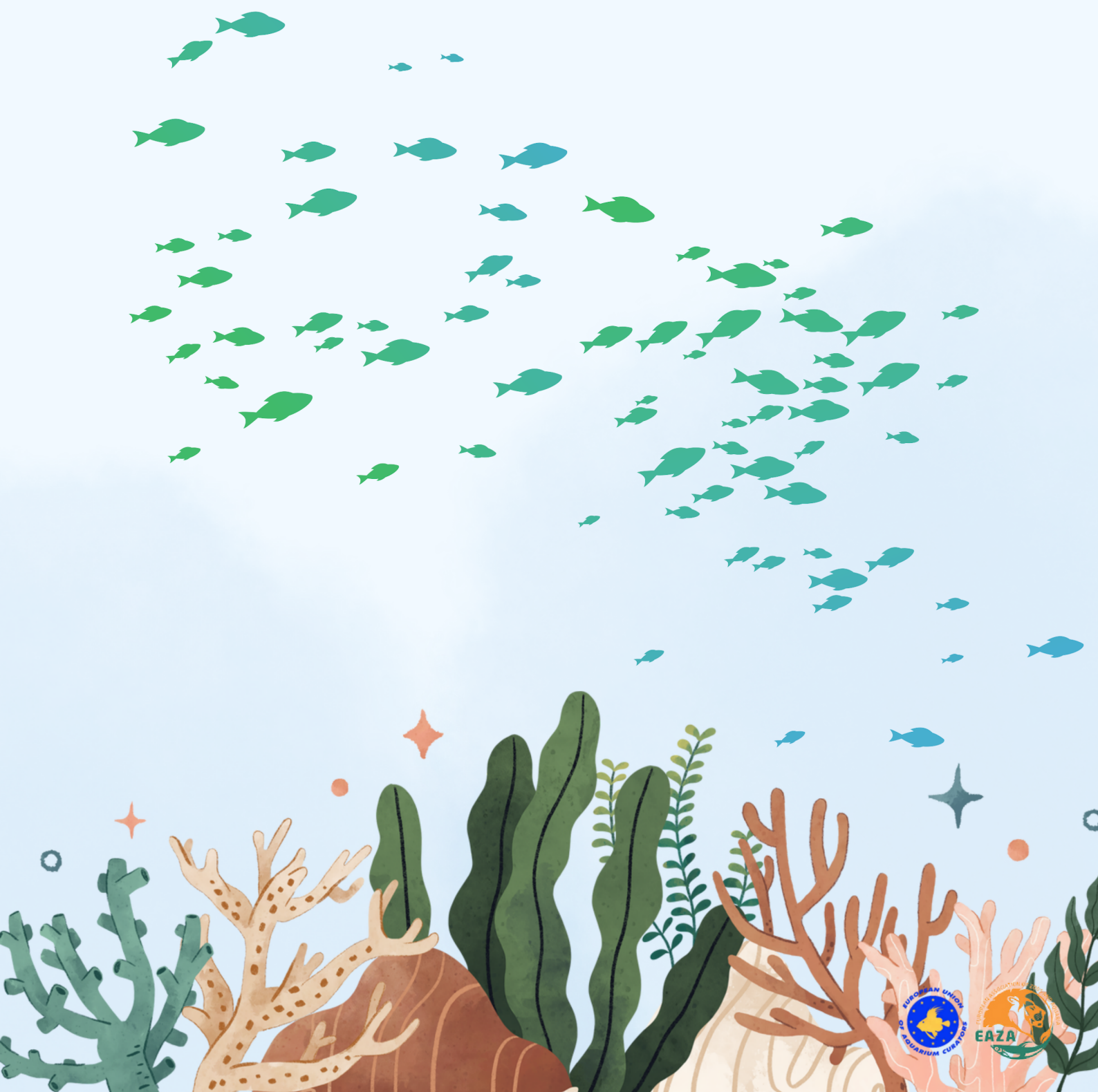


Overfishing

Activity 2 : Collaboration ?





FÉDÉRATION
WALLONIE-BRUXELLES

This activity was created by the Aquarium-Museum of the University of Liège thanks to the financial support of the Federation Wallonia-Brussels.



The sustainable exploitation of resources represents one of the greatest challenges we will have to face in the upcoming years. The oceans are full of riches, but if we are not careful, they could quickly disappear...

This activity aims to understand the issues and possible causes of overfishing.



Prisoner's dilemma

The prisoner's dilemma characterizes in game theory a situation where two players would benefit from cooperating, but where, in the absence of communication between the two players, each one will rather choose to betray the other than to cooperate. The main reason is that if one cooperates and the other betrays, the cooperator is heavily penalized while the traitor wins big. However, if both players betray, the outcome is less favorable to them than if both had chosen to cooperate.

Why is it called "prisoner's dilemma"?

This theory is based on a story:

Two suspects are arrested by the police. But the agents don't have enough evidence to charge them, so they interrogate them separately and make the same offer. "If you betray your accomplice and he does not denounce you, you will be released and he will receive 10 years in prison. If you report him and he does too, you will both get 5 years in prison. If no one reports the other one, you will both get 6 months in prison."

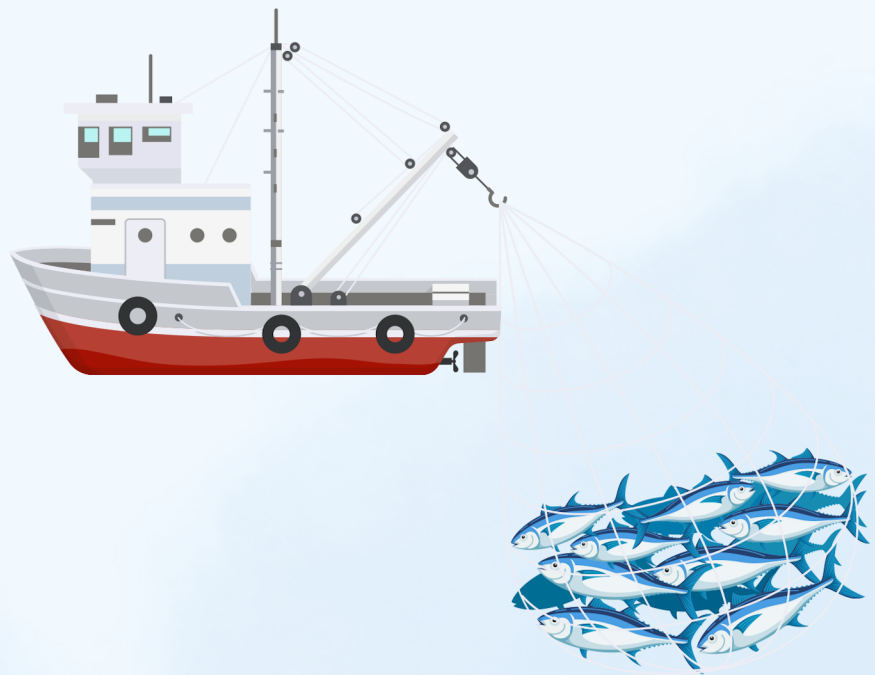
If each of the accomplices acts without consultation, the two will probably choose to report each other, being the most rational choice. In conclusion, they will therefore be sentenced to 5 years in prison each. However, if they had both remained silent, they would have been only sentenced to 6 months each. As a result, when everyone acts on their own self-interest, the outcome is not ideal.



Prisoner's dilemma in regard to overfishing

A prisoner's dilemma is a situation where two or more decision-makers have interest in cooperating, but an even stronger interest in not doing so if the other does, and no way of coercing each other.

Overfishing is a perfect example for one of these principles. Indeed, this dilemma irremediably incites players to cheat and trick in order to gain more points than the adversary. In the same way as it pushes certain illegal fishermen to take as many fish as possible, sometimes beyond the authorized quotas. This causes detriment to the fishermen who follow the rules.



Game Rules

 The activity is a variant based on the principle of the prisoner's dilemma.

 The game is played by two people, facing each other. They will represent two fishermen who go to sea for a fishing session. Once at sea, they will have two options:

- “**Collaborate**”: respect the allowed fishing quotas
- “**Cheating**”: not respecting quotas and taking as many fish as possible.

 Each player receives a “collaborate” and “cheat” card.

 The game is played by two players during twenty rounds. In each round, each player chooses one of the two cards without showing it to the other and then places it uncovered on the table.



Game Rules



The particularity of this game is that the number of points obtained by each player will depend on what the other player has decided to do.

Depending on the cards played by the two people, the points obtained will be different:

- If a "collaborate" card is played against a "cheat" card, the player who collaborates gains 1 point and the one who cheats 9 points;
- If both players play the "collaborate" card, both gain 4 points;
- If both players play the "cheat" card, both gain 6 points.

		Player 2		
		Collaborate	Cheat	
Palyer 1	Collaborate	4 – 4	1 – 9	
	Cheat	9 – 1	6 – 6	



After each round, each player must note the number of points earned during that round on a scoring sheet.



At the end of the 20 rounds, each player adds up the number of points obtained during each round. The player with most of the points is the player who caught most of the fish and will therefore be able to make the biggest net profit.



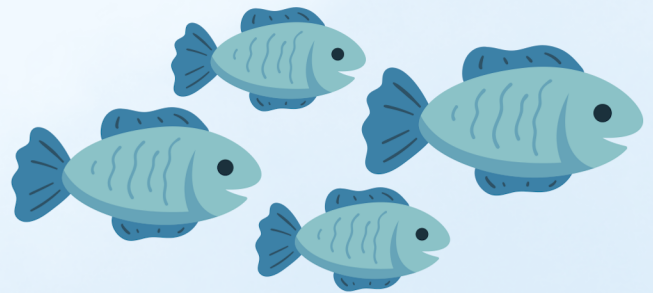


Overfishing?

The main challenge of this activity is revealed when the principle of available resources comes into play.

At the end of the activity, the pairs of players can be asked to add their two totals. If this number exceeds 170, the available resource (in this case the fish stock) would have been overexploited.

They will thus be able to know whether they have exceeded the exploitation limit of the resource or not, by playing without paying attention to it.



Conclusions

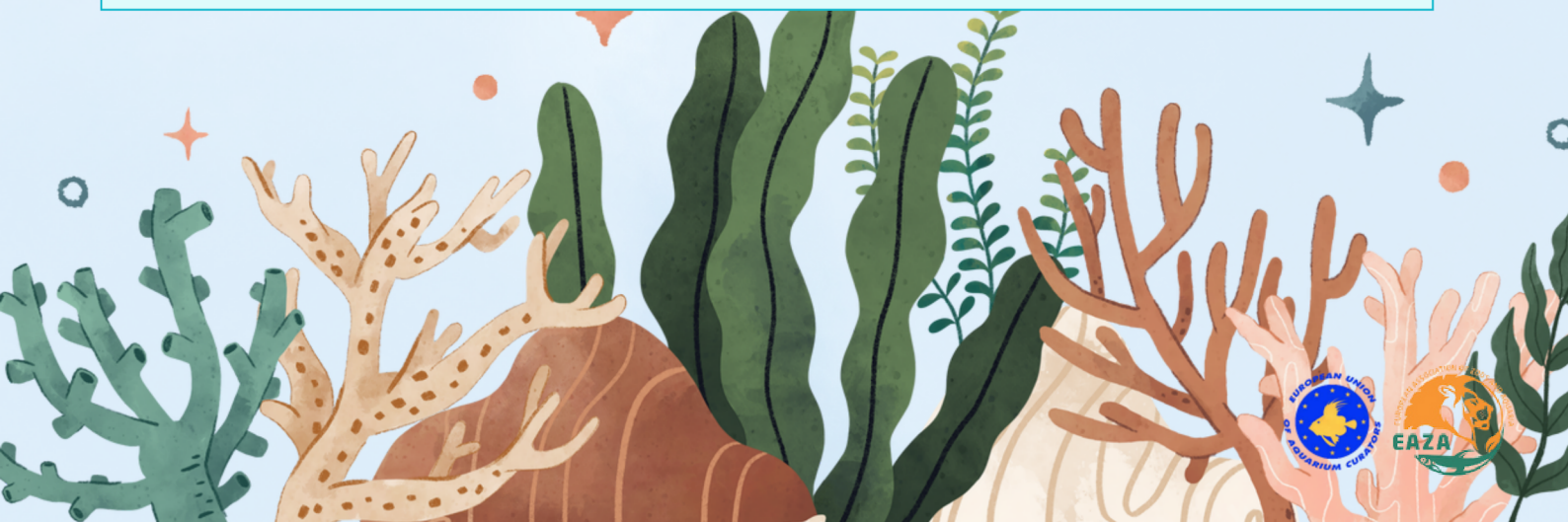
Unlike the classic "prisoner's dilemma", initially and in the short term, **both players are leaning to cheat** since they will **both benefit from it**.

It's only at the end of the activity that they will realize that the resources have been **overexploited**, therefore there won't remain enough for the future: in consequence they will be **penalized afterwards**.

Another interesting fact is that the available stock (170) authorizes small variances: if one of the two players cheats from time to time while the other is collaborating, he will get a bigger profit while respecting the global fishing quotas.

It also incites players at the collaborative start to allow themselves variances, in order to increase their profits.

Therefore, this situation will allow players to start the discussion about overfishing: if each fisherman acts just for his self-interest, his short-term benefits will be higher. It is only later, when stocks have decreased, that he'll realize the consequences. As opposed to a fisherman who overfishes, a fisherman respecting the fishing quotas will be affected from the beginning, in a very short term, since he will make lower benefits. Thus, the game shows how beneficial it is to cheat while other try to collaborate: it perfectly represents the current problems of overfishing in the world on an economic level.



Scoreboard

Round :	Player 1	Player 2
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
Total		



Cheat



Collaborate