



OUR OCEAN: FISH OVERFISHED

Objectives: Students will be able to explain why overfishing is happening and describe the consequences that overfishing has on humans and the environment.

Time: 30 minutes

Materials: Activity sheet, Appendix 1

Suggested materials for the activity: [Note that this activity can be carried out at home or modified by replacing with suitable materials in the class.]

- A variety of large items (to represent fish that are in high demand) and small items (to represent fish that are low in demand), like paper clips, erasers, marbles.
- A tool that lets you pick up one thing at a time like chopsticks
- A tool that lets you pick up more things at once, like a spoon
- A tool that lets you pick up a huge number of things at once, like a cup
- A timer
- A bowl or container to hold the items

Key question: What is the effect of overfishing on people and the environment?

Purpose of activity: Overfishing and its effect on people and the environment is complex and sharing this with students can be overwhelming. This hands-on activity is designed for students to analyse the relationship of various species in an ecosystem. Through this activity, students are encouraged to be responsible consumers by recognising that their dietary choices have an impact on our planet's natural environment. To enrich learning, students can look at the extension section in the activity sheet and apply critical thinking skills by considering where the fish consumed in Singapore comes from while reflecting on their diets.

Background: Fish play an essential part in balancing the ocean's ecosystems, where all species are interdependent. While our food supply from the vast ocean may seem limitless, this is not true. Modern industrial fishing methods use fishing vessels that can trawl the ocean floor to catch a larger quantity of fish than before. But this fishing method often means that non-target species (known as bycatch) are also caught and discarded, depleting their populations dramatically. This practice ultimately puts pressure on fish populations that cannot recover fast enough from this destructive method. Healthy fish populations are essential for the ocean's health, which drives many elements of our environment - the air we breathe, the food we eat, the water we drink, and even where we learn and play! Taking care of the ocean and its inhabitants means taking care of ourselves and future generations too.



Suggested discussions for video:

Recall

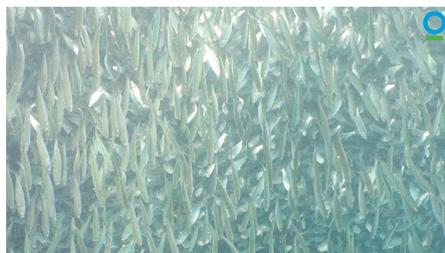
- What is the approximate fraction of the world's fish species that are overfished? [About one-third.]
- What is bycatch? [Marine animals with little or no consumer demand that are accidentally caught using the same fishing methods targeted at other fish species that have high consumer demand.]
- As individuals, what can we do to protect the fish supply? [Consume only what you need and be curious about the origin, sustainability, and quality of fish that you eat.]

Explain

- Why would fewer fish in the ocean lead to catastrophic effects for people, marine life, and the ocean's ecosystem? [Economic, environmental, educational, cultural, psychological impacts. Examples: loss of income, species extinction that has rippling effects on ocean food webs, loss of culture and scientific knowledge.]
- Why is it important to monitor and protect the ocean from unsustainable and illegal fishing? [To ensure that fish are caught using sustainable methods.]

Infer

- Why does Jo encourage each of us to find out where our seafood comes from, such as whether it is from a sustainable source? [To be a responsible consumer and to encourage companies to turn to sustainable fishing methods.]
- Coastal communities will be impacted the most if the ocean runs out of fish. So, if you were an individual living in that region, what message would you have for a Singaporean who loves seafood?





What to do:

1. Watch the video. Use the suggested discussion questions above to find out what students have learnt, such as:
 - a. Why overfishing is happening
 - b. The effects of overfishing
2. Ask students the key question: What is the effect of overfishing on people and the environment? Gather initial feedback from students through vocal or written opinions. Then, write these opinions on the board.
3. Get students to follow the instructions on the activity sheet: A total of 3 rounds will be played with each round lasting around 30 seconds to 1 minute. Use different tools to 'fish' out as many of the larger items as possible. Imagine that the larger the item, the higher the consumer demand for it. The smaller items have no consumer demand at all. Students record the total number of large and small items collected for each round on the activity sheet. Before starting a new round, return the items to the bowl to ensure the same amount of 'fish' before the 'fishing' begins.
4. Conduct a class discussion:
 - a. Which tool ('fishing method') caught the most number of items ('fish')? Students should be able to recognise that the use of the largest tool (i.e. cup) as a fishing method would remove the greatest number of items. Show students Appendix 1: Different fishing methods on how these various fishing methods catch fish species.
 - i. Ask: Why would the cup, that represents the long-line trawler, be able to scoop out more fish than the traditional hook method, represented by the chopsticks?
 - b. Which tool ('fishing method') caught the most number of small fish? Students should realise that the largest tool removed not only the most number of large items, but small items too.
 - i. Using Appendix 1, ask students: Why do you think more untargeted fish are caught using this method? Finally, share with students that in fishing for species with high consumer demand, the non-targeted species known as bycatch often die due to injuries suffered while being caught in the net.
 - c. What do you think are other effects of overfishing in the ocean? Relate this final question to the key question: What is the effect of overfishing on people and the environment? Refer to the next point for more ideas.
5. Differentiated discussion strategies:
 - a. For Lower Primary – Get students to consider how having no fish in the sea affects their daily lives. [Suggested answer: Fewer seafood choices, lower diversity of fish in the ocean and at the beach.]
 - b. For Upper Primary – In addition to the above point, get students to consider the impacts of the absence of fish on humans and other marine life. [Suggested answer: Besides having no seafood to eat, many coastal and fishing communities would also lose their jobs and source of income. People who rely on seafood as a main source of protein may face malnourishment or hunger. Entire food webs would be disrupted. This would mean a loss of other marine life that depend on fish to survive.]
 - c. For Secondary – In addition to the above, get students to consider how they can find out if the fish they are buying is sustainable. Conduct a class debate: Knowing more about sustainable seafood changes my consuming habits. Do you agree? What are the challenges in determining the sustainability of food? Students conduct their research to support their arguments.
6. Conclude: Highlight to students that this lesson is a reflection on where our food (including seafood) comes from. Have students reflect on: How can each of us play a part to protect the fish in our ocean?
7. With the understanding of overfishing and its impacts, students are encouraged to put themselves in the shoes of various characters such as:
 - (a) A person who relies on seafood as their main source of protein.
 - (b) A fisherman who relies on catching and selling seafood to earn a living.
 - (c) A Singaporean who loves seafood.



Appendix 1: Different fishing methods

[adapted from <https://cimioutdoored.org/fishing-methods-for-a-sustainable-future/>]

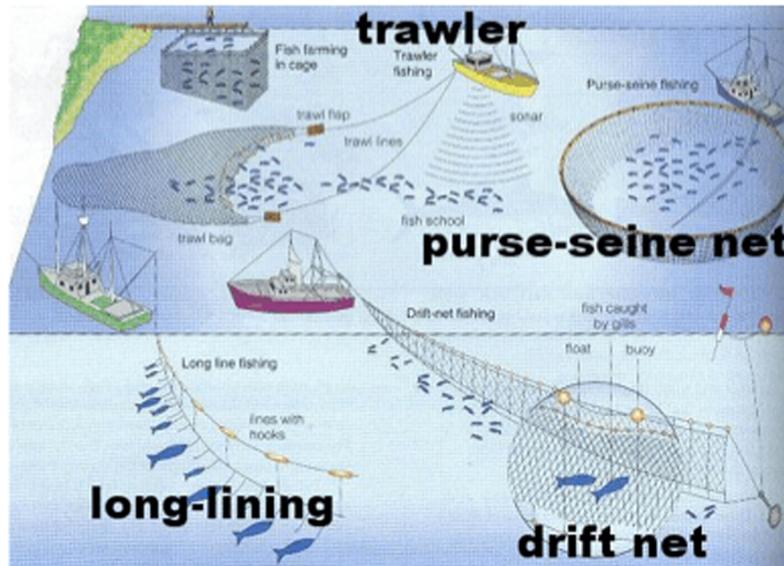


Fig 1: Illustration of different commercial fishing techniques.

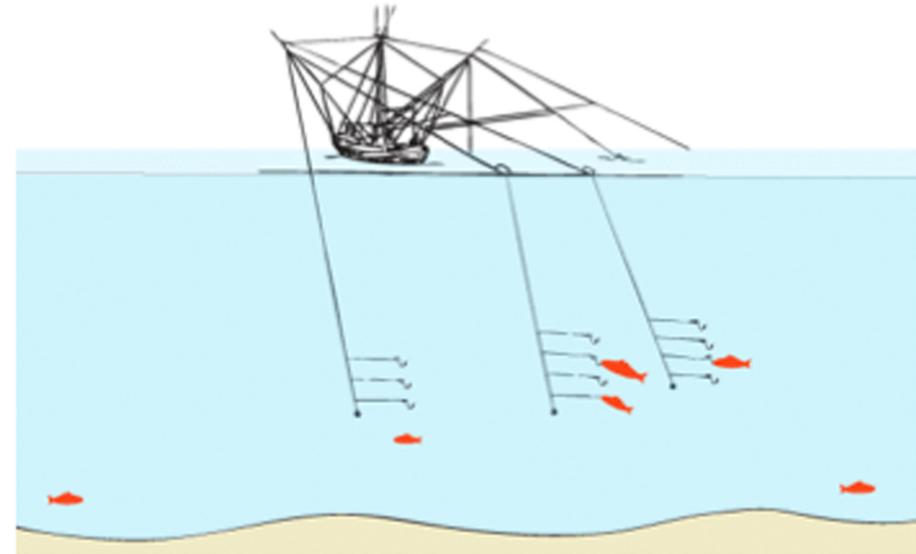


Fig 2: An example of Trolling, a very sustainable form of commercial fishing.

Dive deeper: Explore some of these resources to learn more about our ocean.

- Demystifying the seafood label: Where your seafood actually comes from, by Conservation International:
<https://www.conservation.org/blog/demystifying-the-seafood-label-where-your-seafood-actually-comes-from>
- Singapore Seafood Guide, by WWF:
http://d2ouvy59p0dg6k.cloudfront.net/downloads/wwf_seafoodguide2016.pdf
- Climate crisis threatens access to nutrients in fish, study finds, by The Guardian:
<https://www.theguardian.com/environment/2021/jul/20/climate-crisis-threatens-access-to-nutrients-in-fish-study-finds>



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Suggested materials

-  Small items, like 40 small paper clips
-  Large items, like 20 large paper clips or marbles
-  A bowl
-  A pair of chopsticks
-  A spoon
-  A cup
-  A timer

Instructions:

1. In this activity, imagine that you belong to a fishing community that sells fish to make a living. The small items represent smaller fish that people do not often buy in supermarkets and restaurants. In comparison, the larger items represent bigger fish that people often buy in supermarkets and restaurants. As an individual who needs to support their family, you would want to catch more and bigger fish since that is what people prefer to eat.
2. Pour the small and large items into the bowl (represents the ocean).
3. A total of 3 rounds will be played where you will use different materials to “catch” the items, focusing on the larger items. For each round, you have a total of 30 seconds. After each round, record the number of items caught in the table below.
 - a. Round 1: Use a pair of chopsticks (represents a hook) to pick up as many items as possible.
 - b. Round 2: Use a spoon (represents a fishing net) to pick up as many items as possible.
 - c. Round 3: Use a cup (represents a trawler) to pick up as many items as possible.

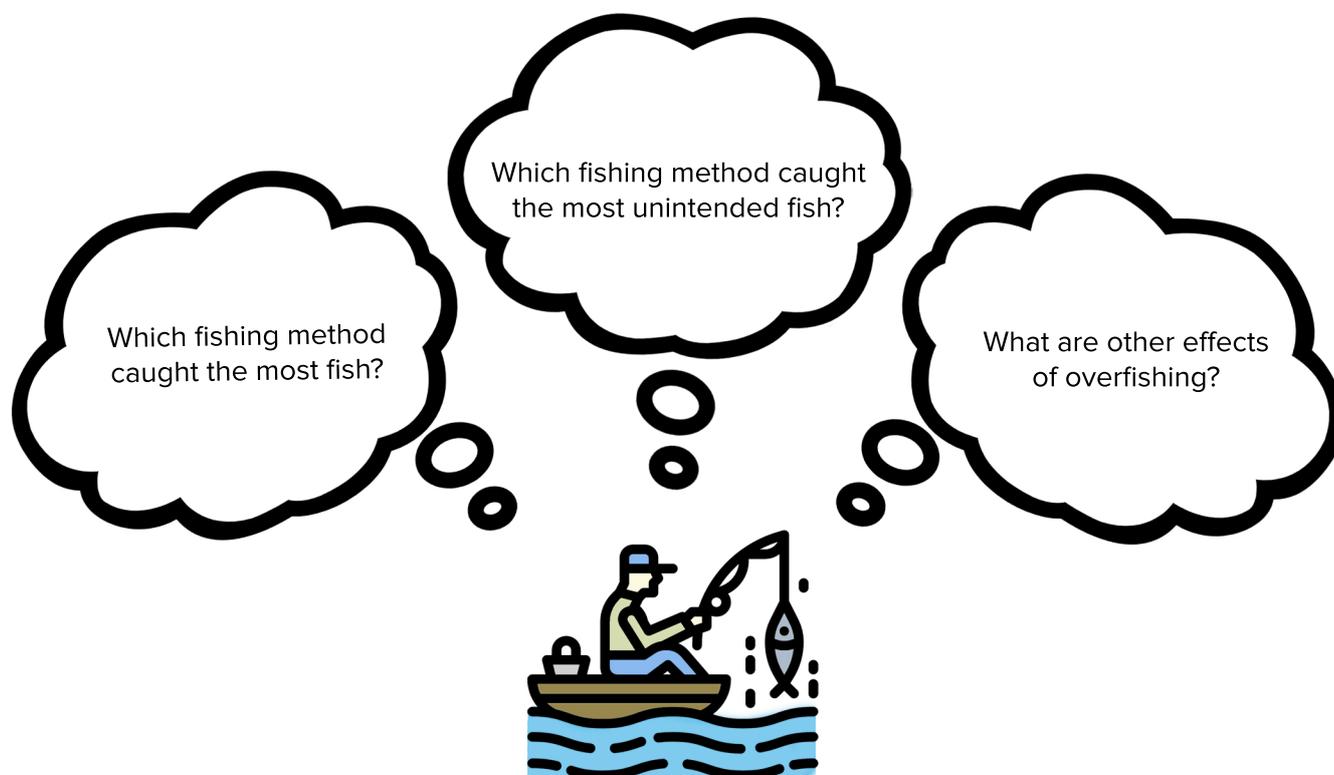


How many did you catch?

| | Number of small items caught | Number of large items caught |
|---------|------------------------------|------------------------------|
| Round 1 | | |
| Round 2 | | |
| Round 3 | | |



Reflect: How can each of us play a part to protect the fish in our ocean?



Dive Deeper: Note when you consume seafood. Consider where your seafood comes from. How is seafood obtained from the ocean?

Vocabulary

| | |
|-------------------------|---|
| Sustainable fishing | Obtaining fish at a rate that meets the needs of the present without affecting the ability of future generations to meet their own needs. |
| Fisheries | An area where fish or other marine life is caught or reared for commercial and human consumption. |
| Sustainable fishery | Fishing activity within this area has healthy and productive populations of fish. |
| Extinction | The state of the population of an organism when the last individual of a species no longer exists. |
| Bycatch | Any fish/marine organism unintentionally caught by commercial fishing practices. |
| Responsible consumerism | A consumer who buys, eats, and supports activities that has minimal to no-impact harm or exploitation of humans, animals and the environment. |