



Teacher resources



Marine Food Webs and Overfishing

Lesson plan



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LESSON:

Marine Food Webs and Overfishing

We all need to eat! How do ocean animals and plants get their energy? What impacts can our food have on the world around us? What does making a sustainable choice mean for us?

This 35-45 minute lesson is suitable for learners aged 10+ and starts by asking them to think about what makes us select particular fish to eat, and the impact this can have on the ocean ecosystem.

They then look at a key concept in ecology: food chains and food webs. Learners will be able to understand scientific terms to categorise marine animals in a food web, and apply their knowledge to make their own chains or webs.

They'll then watch a film clip which examines the challenge of overfishing and its impact on the marine ecosystem. Finally, learners can reflect on the sustainable choices people can make to conserve our ocean and its resources.

Learning objectives

- Learners make links between our food and the ocean ecosystem
- Learners understand that organisms in the marine ecosystem are linked through food webs that start with a plant, and that these can be drawn to represent the feeding relationships between them
- Learners examine the impact of human interaction with the ocean, including rising fishing levels and declining fish stocks

You will need

- The Marine food webs and overfishing PowerPoint
- Printed and cut up copies of the Food Webs Worksheet (one set per group of learners)
- Access to the film - My Dad the Fisherman - or film clip – Overfishing

Key questions

- What impacts can our food have on the world around us?
- How do ocean creatures and plants get their energy?
- How do food chains and food webs work?
- Why are global fish stocks going down?
- What is overfishing and what is its impact?
- What can be done in response to overfishing?
- What does making a sustainable choice mean for us?

Key terms

- Species
- Farmed / wild caught fish
- Fish production / stocks
- Food web
- Energy transfer
- Primary producer / predator / consumer / decomposer



Starter (10 mins)

Start by writing the names of some popular seafood on the board and asking learners which one they see most often in the kitchen at home.



Ask learners:

Which is the most popular in this class?

Does anyone often eat other types of seafood?

Do you know if these species are farmed, caught in the ocean, or both?

Explain that different fish and seafood are popular in different places around the world. In South Africa, sardines and hake are popular, while in the USA it's shrimp. In Northern Europe herring is often eaten, while in Japan tuna is popular. In the Southern Ocean, krill may be caught to make food for farmed fish, and health supplements like fish oil capsules. Ask learners:

Can you think of any reasons why this might be?

Learners might think about what tastes good, what people eat at different times of year, what's cheap, available, or that there are particular fish living in the ocean waters nearby. Their answers may reflect the cultural, economic, environmental and social factors that help determine what we eat. Ask learners:

Can you think of any consequences of this for our oceans, for fishers and for us?

Learners might think about overfishing, health, or the positive or negative impacts on fishers' livelihoods if we all want to eat the same things.

Main activities (20-25 mins)

Activity One

It's not just people who need to eat – animals do too. Use the Marine Food Webs and Overfishing Powerpoint [[hyperlink to final resource](#)] to introduce the concepts of energy transfer, food chains and food webs to learners.

Activity two

Then, using the Food Webs Worksheet, groups of learners to work together to arrange some of the species into food chains. Some learners might be able to create a more complex food web. Learners could share their chains and webs by taking photos or displaying them on a board.

The Food Webs Worksheet has two options – for each group, use either a marine food web based on species living in the Arctic Ocean or Southern Ocean (both these are on the PowerPoint for reference).

Once learners have created a chain or web, ask them about the Arctic Ocean:

What would happen to other species if all the cod were caught?

What would happen to other species if there were fewer herring?

Or the Southern Ocean:

What would happen to other species if all the krill were caught?

What would happen to other species if there were fewer Baleen whales?

If all the krill were caught, this would have a devastating impact on the Southern Ocean food web. Krill are a keystone species, on which many other animals rely.

Plenary (5-10 mins)

Show learners the film clip [Overfishing](#) (you can also use the [whole film](#), starting at 6:26 and ending at 8:23). Ask learners:

Are there any links between some of our favourite fish and the impact we have on the marine environment? What are they? Can you explain them?

Learners might mention overfishing as a key impact, affecting the ocean ecosystem because species rely on each other for their food, in a food web. They might mention choosing a sustainable source of our favourite fish - or trying a different fish that is sustainably sourced - as a way to help global fish stocks recover. Ask learners:

What else do you think would improve the situation?

Extension or homework ideas

How much do learners know about marine food webs and overfishing? Test their knowledge with this [Kahoot](#).

Now that learners have examined the problem of overfishing, and some of its causes and consequences, they could work together or individually to create a [Consequences Kelp](#) to illustrate their ideas.

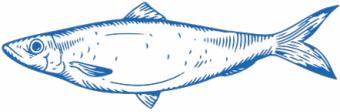
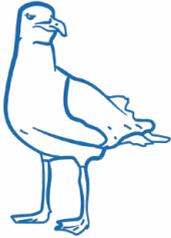
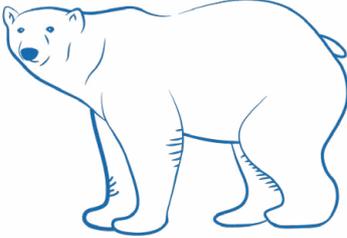
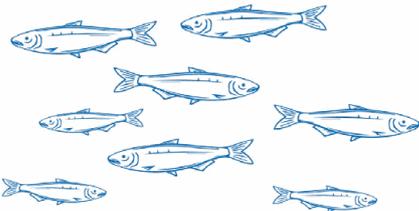
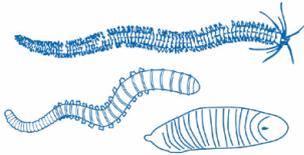
To further examine how food webs can be impacted by human activities such as overfishing and climate change, use the [String Game](#).



FOOD WEBS WORKSHEET

Cut up a set of sea creatures for each group, either Arctic Ocean marine food web, or Southern Ocean marine food web.

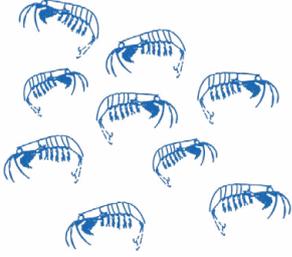
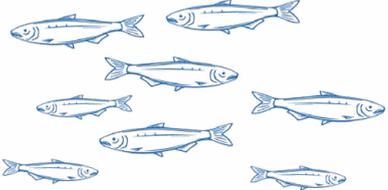
Arctic Ocean marine food web

 <p>Herring (secondary consumer)</p>	  <p>Shrimp (primary consumer)</p>	 <p>Human (apex predator)</p>
 <p>Seal (secondary consumer)</p>	 <p>Cod (secondary consumer)</p>	 <p>Phytoplankton (primary producer)</p>
 <p>Sea bird (apex predator)</p>	 <p>Polar bear (apex predator)</p>	 <p>Finfish (primary consumer)</p>
 <p>Marine worm (decomposer)</p>		



FOOD WEBS WORKSHEET

Southern Ocean marine food web

 <p>Krill (primary consumer)</p>	 <p>Penguin (secondary consumer)</p>	 <p>Orca (apex predator)</p>
 <p>Seal (secondary consumer)</p>	 <p>Squid (secondary consumer)</p>	 <p>Finfish (secondary consumer)</p>
 <p>Phytoplankton (primary producer)</p>	 <p>Patagonian toothfish (secondary consumer)</p>	 <p>Sea bird (secondary consumer)</p>
 <p>Baleen whale (apex predator)</p>	 <p>Human (apex predator)</p>	