Cold-water corals in danger

Recommended style of activity: Class/group activity.
Suggested age range: 10-15 years
Approximate time : 20 minutes

Background Science:

Corals growing in deep, cold waters are not as visibly affected by human activities as tropical corals but this doesn't mean that they are safe. Various activities pose a threat to these reefs and the creatures which find shelter in them. Countries can protect the seas around them but there are large areas of the ocean which no one country owns, sometimes known as the 'high seas'. These areas are much harder to protect but there are inter-governmental organisations around the world working to decide which activities to limit and by how much.

The threats to a reef are also cumulative, so that a reef damaged or threatened by one activity will be at a greater risk from others. ATLAS scientists are generating computer models which can demonstrate the effects of a particular activity on different deep-sea species including corals. The results of these models can be used to recommend new areas which are in need of protection.

In this activity you can examine the cumulative effects of different human activities on a 'model' coral reef area including oil & gas extraction and deep-sea trawling. By using graph paper you can calculate the total area of the damaged reef. This leads to discussions around whether there is enough healthy reef for it to survive and continue to be a valuable habitat. The percentage or threshold amount of healthy reef needed to maintain the whole habitat is still an unknown quantity for cold-water corals and is something which scientists are working to find out.

The threats chosen for this activity are direct human impacts but the reef may also be at risk due to a warming and more acidic ocean and changing oxygen levels as a result of climate change. There is also one impact which is likely to become a threat in the near future: deep-sea mining. As new technologies make reaching the deep-sea easier, these kind of activities are expected to become a reality. Another possible future impact which hasn't been included here is 'blue biotech' - the development of new medicines or useful resources from chemicals found in deep-sea creatures (particularly sponges).

Scottish Curriculum Links (CfE):

I can explain some of the processes which contribute to climate change and discuss the possible impact of atmospheric change on the survival of living things. **SCN 3-05b**

I can discuss the environmental impact of human activity and suggest ways in which we can live in a more environmentally responsible way. **SOC 2-08a**

I can estimate the area of a shape by counting squares or other methods**. MNU 1-11b**

I can explain how different methods can be used to find the perimeter and area of a simple 2D shape or volume of a simple 3D object. **MNU 2-11c**

Kit List:

- Printed 'threats to cold-water coral reefs' cards (included at the end of this pack).
- Either A3 graph paper or printed 'CoralReefthreatsheet-plain 'sheets (available from https://www.eu-atlas.org/education/education-packs)
- Colouring pencils or pens

Running the activity:

- If using the printed area sheets, you can skip to the next step! If you are using the A3 graph paper, ask participants to draw an irregular shape on the paper which represents their reef area. It should take up most of the paper, with a bit of blank space in one corner.
- Get the participants to calculate the area of their reef by counting grid-squares—this will be useful later!
- Use the 'threats to cold-water coral reef' cards to colour-in areas of the reef which have been damaged by human activities (see example online).
- Add up the total number of squares which have been damaged using the cards and calculate the percentage of the reef area which is damaged.

Geographical Information Systems (GIS) tools have become very useful as they enable scientists to obtain this kind of information without having to work it out manually!

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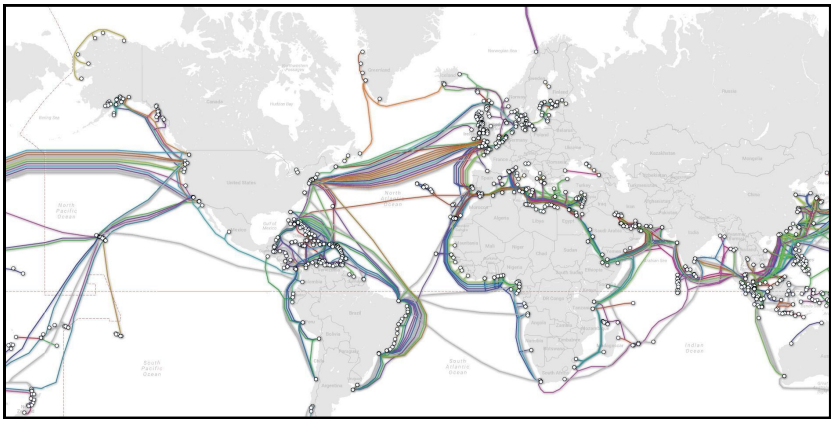
Submarine Telecommunication Cables

Did you know that most of our phone and internet connections go through fibre-optic ‘Telecommunication’ cables (really thick wires) laid on the sea-floor?! 97% of ‘communication’ around the world goes through them!

Cables which are already on the sea-floor don’t seem to be a problem. However, fixing or replacing a broken cable could cause problems. Some of the cables are buried so need to be dug-up then re-buried again. This makes the water dirty which could make life difficult for the creatures living nearby.

Colour-in 12 squares in a line across the Coral Reef to represent a submarine cable.



Map of global Telecommunication cables

Oil & Gas Extraction

A lot of the oil and gas we use to make electricity, plastic and petrol comes from under the sea-floor. Up until recently most of this has come from drilling in shallow water. However, this is running out and with better technology we are looking to drill in deeper water. You have probably heard of how an oil leak can have disastrous effects for local wildlife. A less obvious issue is the 'drill cuttings': a mixture of rock bits, chemical liquids and mud which can smother corals, preventing them from getting food and killing them off.

Colour-in 27 squares from drill-cutting damage.

Surprisingly though, scientists have recently found that the large metal oil platforms in the sea are a great place for new corals to grow!

Draw a new reef somewhere on your page of about 18 squares. But then colour-in 9 squares on it for more drill-cutting damage.

Deep-sea Trawling

With lots of fishing happening in shallow water, it is becoming harder to find enough fish for people to eat. To solve this problem, some fishing boats are fishing in deeper water by 'bottom trawling'. Trawling the sea-bottom involves large nets with heavy rollers and metal 'doors' which keep the net open. This kills or damages anything which is caught in the net, even if it is not a fish we can eat. This can destroy whole areas of a coral reef. It can also stir up sea-floor mud and sand, which buries and kills the corals.

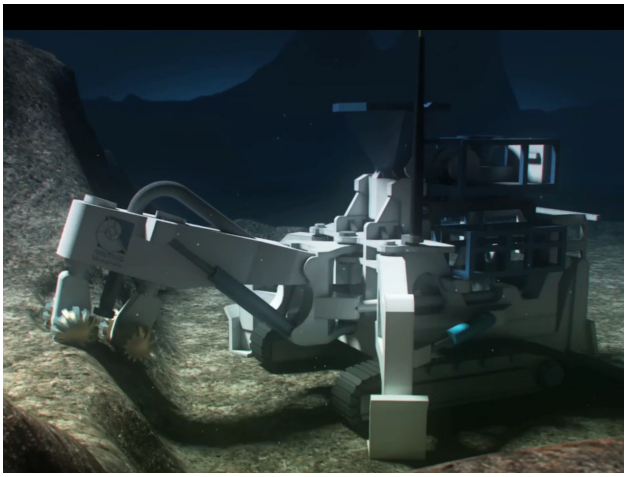
Colour-in 108 squares from deep-sea trawling damage.

Pictures of an undamaged coral area (above) and an area which has been trawled, leaving a strip empty of corals (below). BlueAzores Expedition (Telmo Morato), June2018

Deep-sea Mining Testing

There are lots of useful materials on the sea-floor, including lumps called ‘manganese nodules’ and metals made at hydrothermal vents. With some metals running out on land and new technologies, this is now becoming a possibility instead of just future technology! Most deep-sea mining companies are still only testing the machines. One problem which testing has brought up is the creation of ‘sediment plumes’ - clouds of mud stirred up by mining which can spread over a large area, bury and kill coral colonies.

Colour-in 36 squares from deep-sea mining test-areas.



Artist impression of a deep-sea mining machine

Pollution

Pollution which is damaging to corals could come in many forms including sewage sludge, waste from shipwrecks and oil platforms, radioactive materials and chemical weapons dumped in the sea after World War 2.

Colour-in 27 squares from pollution issues

Photo by Adam Bignell on Unsplash