

What is plastic and why is it a problem in the ocean?



Age 11-14



60 minutes

Curriculum links

- Analyse why plastic can be a problem in the ocean
- Evaluate the level of harm caused to marine life by plastic

Resources



Slideshow 2:

What is plastic and why is it a problem in the ocean?



Student Sheet 2a:

Plastic starters

Student Sheet 2b:

What is plastic and why is it a problem in the ocean?

Student Sheet 2c:

Plastic and turtles

Student Sheet 2d:

Plastic action vote

Lesson overview

With plastics being ubiquitous in modern life, students examine what has made this material so popular. Students then learn what happens to litter when it enters the ocean. Finally, the lesson looks at how plastics affect turtles, and whether we have enough information to take drastic action on plastics, or whether we need to wait for more research to be conducted.

Lesson steps

Learning outcomes

1. The best thing about plastic (10 mins)

The lesson starts with students considering what makes plastic such a great material by looking at common plastic items.

- Consider how the properties of plastic make it so popular

2. What happens to litter in the ocean? (15 mins)

Students plot the time it takes for different types of marine litter to biodegrade and discuss how this should influence our choice of materials.

- Rank how different types of litter biodegrade in the ocean

3. Plastics and turtles (10 mins)

Turtles are one of the species where there is a good body of evidence for the impact of plastics. Students create statements on the harm caused by plastics using sentence segments.

- Suggest how plastics can harm turtles

4. Do we know enough? (20 mins)

Action on plastics is being implemented by many cities and countries. Students need to evaluate the current evidence and decide whether drastic action is now required.

- Evaluate whether there is enough scientific evidence to take drastic action on plastics

5. The worst thing about plastic (5 mins)

As a plenary, return to the starter and decide what the worst thing about plastic is.

- Consider how the properties of plastic make it so harmful

TEACHER GUIDANCE 2 (page 1 of 3)

WHAT IS PLASTIC AND WHY IS IT A PROBLEM IN THE OCEAN?

Step Guidance

Resources

1
10
mins



This lesson develops students' knowledge of marine plastic pollution and the harm it causes.

- Share the learning objectives for the lesson.
- Show students a small display of everyday plastic objects and ask students to answer the question 'What is the best thing about plastic?'
- Students can note their thoughts on Student Sheet 2a or in their books.
- Conduct a whole class discussion to review the activity and use the material properties on slide 4 as support.



If you have not had time to bring in plastic items, you can use the images on slide 3 instead.



The starter activity for this lesson requires bringing in examples of plastics. These could include a plastic drinks bottle, item of synthetic clothing, food container, packet of crisps, sweets or chocolate wrapped in plastic, plastic bag, or plastic toy. Try to have a good selection of six to eight items.



Ensure that all plastic waste is fully clean or unopened, and that any used packaging does not present sharp edges.

Slideshow 2:
Slides 1-4

Student Sheet 2a:
Plastic starters

2
15
mins



One of the properties that students may have observed for plastics is durability. In Step 2, students develop insights into why the durability of plastic is creating environmental problems.

- Introduce this lesson step by reviewing the scale of single-use plastic consumption with slides 5-7.
- You may want to ensure that students understand what is meant by single-use.
- Hand out copies of Student Sheet 2b for students to complete in pairs.
- Slide 8 shows a copy of the infographic. Use this to model the first activity with your class.
- Conduct a mini-plenary to review answers with your class, focusing again on the strangeness of using a highly durable material for single-use.



There can be some confusion over whether plastic is biodegradable. Plastic can break down in the environment forming smaller and smaller pieces, but this is not through biological processes. In the ocean, floating plastic is exposed to UV light from the sun. This tends to make plastic bottles and other flexible plastics more brittle. Wave action then breaks up this brittle plastic into smaller particles.

Slideshow 2:
Slides 5-8

Student Sheet 2b:
What is plastic and why is it a problem in the ocean?

TEACHER GUIDANCE 2 (page 2 of 3)

WHAT IS PLASTIC AND WHY IS IT A PROBLEM IN THE OCEAN?

Step Guidance

Resources

3

10
mins



Step 3 moves students onto considering the harm that plastics in the environment cause marine life. This starts with looking at turtles.

- Slides 9-11 show the harm that plastic can cause to turtles.
- Student Sheet 2c provides students with information about the potential impact of plastics on turtles in the form of sentence starters (the issue), sentence middles (the impact) and sentence ends (the harm).
- Challenge your students to create as many sentences as possible that they think describe the harm caused by plastics to turtles using a starter, middle and end. Set a time limit of four minutes.
- Review this activity using slides 12-14.



Depending on the age of your class, consider whether some of the photos are too graphic.

Slideshow 2:
Slides 9-14

Student Sheet 2c:
Plastics and turtles

Subject Update:
Learn more: Sources of marine plastic pollution

4

20
mins



Step 4 broadens out the study of the harm that plastics can cause in the ocean. There are some things that we do know, such as animals becoming entangled in plastic and larger items of plastic blocking and filling the stomachs of animals such as sharks, whales and turtles. However, there is still research to be done to confirm the impact of microplastics on smaller animals and also the chemical harm that plastics can cause marine life. This lesson step asks students to assess whether action should be taken to tackle marine plastic pollution given the current knowledge base.

- The slideshow leads students through the current level of knowledge about the harm caused by plastics in the marine environment. Further information is available in the Subject Update.
- Slides 17 and 18 describe the ubiquity of plastics in the environment.
- Slide 19 describes how species can become entangled in plastic debris including fishing nets. This is well documented.
- Slide 20 describes how large pieces of plastic can fill or block the stomachs of marine animals leading to reduced energy, starvation and death.
- Slide 21 cautions against the fear that the seafood we eat could be a source of plastics, whereas it has been shown that we consume more plastic from our domestic environment.
- Slide 22 introduces microplastics and the fact that they are small enough to be eaten by more species.

Slideshow 2:
Slides 15-26

Student Sheet 2d:
Plastic action vote

Subject Update:
Learn more: How does plastic harm the marine environment?

TEACHER GUIDANCE 2 (page 3 of 3)

WHAT IS PLASTIC AND WHY IS IT A PROBLEM IN THE OCEAN?

Step Guidance

Resources

- Slide 23 looks at smaller sea creatures, plankton. There are laboratory studies have shown harm to plankton in terms of reduced growth and reproduction, but this has been hard to observe in the natural environment.
- Slide 24 introduces the idea of toxins as part of the plastic problem. Toxins in the ocean do adhere to plastic particles, but the jury is still out as to whether this transfers toxins to marine life more effectively.
- Slide 25 looks at nanoplastics, which are particles small enough to cross the cell membrane. This is a worrying development, but particles are currently too small to detect in the open ocean, so this area remains an unknown.
- Students will then work in groups to decide whether there is enough evidence to support drastic action, some action or whether we should wait until more information is available.
- Ask a spokesperson from each group to present the group's choice, justifying their decision.



The work of the photographer Chris Jordan (<http://www.chrisjordan.com/gallery/midway/>) and the Blue Planet II clip of the dead pilot whale calf (<https://www.bbc.co.uk/programmes/p05nslnh>) are useful in providing a more emotive view of the impact of plastics.



This is a complex issue and an area of current study by the international science community. An assessment of the research on the harm that plastic causes marine life is presented in Learn more: How plastic harms the marine environment. Some NGOs have used misleading statements that exaggerate what we know about the harm that plastics cause. This is unhelpful in the long term as it can erode public trust in environmental reporting. However, the precautionary principle – assume the worst, until there is proof of no harm – steers us towards taking action on plastics, before a deeper understanding of the harm caused by plastics is reached.

Subject Update:

Learn more: How plastic harms the marine environment

5
5
mins



End this lesson by revisiting the starter activity, and asking students 'What is the worst thing about plastic?'

Slideshow 2:
Slide 27