**Are you eating plastic for dinner?**

*(food chains, habitats)*

# What it’s about

Recent research from oceanic studies has highlighted the impact of plastic waste, including tiny plastic microbeads found in some toiletry products, on life in the oceans. These microbeads and other microplastics are finding their way into **food chains** – and possibly onto our dinner plates!

The UK government, along with several other countries, is planning to ban the use of microbeads. But will this ban be adequate in preventing the build-up of these microplastics in the oceans?

This project will provide a bridge between two related Year 4 NC units (see below) and will highlight a real live current scientific issue of international interest and importance. It links materials used in pupils’ everyday lives to their wider environmental impact: children’s scientific literacy will be developed by considering scientific evidence to make informed decisions about buying products.

***Note: the unit includes an \*optional\* introduction to food chains for classes that haven’t covered this topic yet.***

# Where it fits (England)

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| Lower KS2 (ages 7-9) Year 4Animals, including humans  * construct and interpret a variety of food chains, identifying producers, predators and prey   **Living things and their habitats**   * recognise that environments can change and that this can sometimes pose dangers to living things |

# What pupils will learn

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| By the end of this activity children should be able to:  * identify producers and consumers in food chains from different environments, including oceanic * construct simple food chains and recognize the complexity of food webs * talk about how plastics such as microbeads can enter the food chain * talk about the danger of plastic pollution to marine life and environments |

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| **Working scientifically**   * asking relevant questions and using different types of scientific enquiries to answer them * reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions * identifying differences, similarities or changes related to simple scientific ideas and processes * using straightforward scientific evidence to answer questions or to support their findings |

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| **Progression**  This unit builds on previous work in Key Stage 1 (identifying animals as herbivores, carnivores and omnivores in Year 1; simple food chains in Year 2). In Year 3 pupils will have considered nutrition and different diets.  Later in Key Stage 2 children will study properties and changes of materials (Year 5 children consider the uses of everyday materials, including plastic). |

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| Key vocabulary |  | pollution plastic microbeads microplastics microfibresproducer consumer predator prey energy carnivore   herbivore omnivore food chain food web plankton |

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| The big questions |  | What is a food chain? What are microbeads?How does plastic get into food chains? Are you eating plastic for dinner? |

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| ***This first section is******optional*** *and contains a number of ideas for you to introduce or revise the topic of food chains. Children will need an understanding of food chains for the next section about microbeads.*  What is a food chain?  * Use the **Food Chains** **PowerPoint** tointroduce or revise the vocabulary ‘predator’ and ‘prey’; ‘herbivore’, ‘carnivore’, ‘omnivore; ‘ consumer’ and ‘producer’. Play a matching game with the words and their definitions (**Slides 1-13**). * Play KS2 Bitesize Food chain game (Sea and land – top predators) <http://www.bbc.co.uk/bitesize/ks2/science/living_things/food_chains/play/> * Use **Slides 14-18** to help children construct simple food chains. Children may need to have the meaning and direction of the arrow clarified:      **is eaten by**      It represents the transfer of energy from one organism to another.    What is a food web?  * Food chains are a simplification, representing only a single feeding chain. **Slides 19-21** introduce the idea of **food webs.** In reality, an organism is usually part of several food chains. Together these form a food web. How many different food chains can the children find in each food web? * Role play food chains using pictures of plants and animals from **different** **habitats** (eg. woodland/ocean/pond). Each child has a picture label and they go round the class to find something they can eat. Card arrows can be used to link the different parts of the food chain and to reinforce the idea of energy flowing through the food chain from producers to consumers. The energy which drives the vast majority of food chains on Earth comes from the sun. * Role play: **the woolly worm game**. Cut the same number of 5 or 6cm lengths of different coloured wool (red, yellow, blue, green, brown). Prior to the activity the teacher scatters all of these randomly within a defined area outside (eg. of grass, on soil in the woodland, draped over shrubs and bushes in the garden). The children work in small groups each representing a nest of birds. They have to find as many woolly ‘worms’ as they can in 5 minutes. Rules for the game might include only one ‘bird’ out of the nest at a time, only collecting one ‘worm’ at a time. After the time is up, children look at the numbers of different coloured ‘worms’ they have found and think about why some colours were easier to spot. This leads onto camouflage and why this helps animals survive, thus providing an introduction to adaptation. |
| What are microbeads?  * Watch the short BBC Newsround video: <http://www.bbc.co.uk/newsround/37172573> * Ask the children to bring in everyday toiletry products (e.g. toothpaste, shampoo) which might contain microbeads. If you have any at home, bring in a product containing microbeads. Mircobeads are usually listed in the ingredients as **polyethylene** or **PET** (the type of plastic they are usually made of). Sometimes they can be seen with the naked eye. * The **Are you eating plastic for dinner?** PowerPoint **Slide 3** shows the surprising amount of plastic microbeads found in some products.  Are you eating plastic for dinner?  * Use the clues on **Slide 4** on the PowerPoint to help children work out how microbeads could get into their food via oceanic food chains. * Show the National Geographic video <http://video.nationalgeographic.com/video/short-film-showcase/are-you-eating-plastic-for-dinner>  Ban the microbead!  * News media in summer 2016 was full of calls for a legal ban on microbeads. This is fast-moving issue; reports which are current at the time of writing may be superseded by more up to date developments. The UK government has proposed a legal ban on microbeads in toiletry products, rather than a voluntary ban by manufacturers. However, organisations such as Greenpeace are urging a **total** ban to include products like detergents where microbeads can also sometimes be found. This is a good example of the changing nature of ideas in science as new evidence becomes available.   ***Extension…***  **Could your jumper be harming marine life in the oceans?**   * Show the children some fleece jumpers. Do children know what they are made of? Look at the label inside. They may be surprised to see that they are made of **polyester** – a type of plastic! * If the school has a digital microscope get the children to observe fibres in different materials and fabrics, including fleece. (See **Slide 11**) * Plastic fibres from fleeces (**microfibres**) can get into the ocean in a similar way to microbeads when the fleeces are washed. * Other plastic litter in the ocean is gradually worn down into smaller and smaller pieces (in the same way rocks are ground into sand) and can end up as **microplastics**. * What do the children think? Should there be a total ban on microbeads? What about other forms of microplastics such as the fibres from fleeces? How can we prevent the build-up of other plastic litter in the ocean? |

## Some links on banning microbeads:

<http://www.bbc.co.uk/news/science-environment-37161479> [August 216]

<http://www.greenpeace.org.uk/blog/oceans/uk-government-plans-outlaw-microbeads-banning-some-products-and-not-others-makes-no-sense-here%E2%80%99s-why-20160906> [September 2016]

<https://www.gov.uk/government/news/microbead-ban-announced-to-protect-sealife> [September 2016]

The Seawatch Foundation has produced a short film: ‘Plastic soup: A micro-problem’ <http://www.seawatchfoundation.org.uk/plastic-soup-a-micro-problem/>

The Story of Stuff project ‘Let’s ban the bead!’: <http://storyofstuff.org/movies/lets-ban-the-bead/>

<https://www.beatthemicrobead.org/en/product-lists> Website provides a list of products with varying amounts of microbeads

How your clothes are poisoning our oceans and food supply: [www.theguardian.com/environment/2016/jun/20/microfibers-plastic-pollution-oceans-patagonia-synthetic-clothes-microbeads](http://www.theguardian.com/environment/2016/jun/20/microfibers-plastic-pollution-oceans-patagonia-synthetic-clothes-microbeads) [June 2016]

## Common misconceptions

* Direction of arrows in food chains – children may think the arrow means ‘eats’ rather than ‘is eaten by’
* Top predators eat everything below them in the food chain, rather than only organisms in the adjacent level
* Children don’t have to worry about eating their fish fingers! Although scientists are still trying to work out how much plastic and other toxins are being passed up oceanic food chains, there has been no human health threat declared. But this might change if we keep polluting the ocean with plastic!

## Classroom Resources

Magnifying glasses

Digital microscope if one is available

Naylor, S. & Keogh, B. (2000) *Concept Cartoons in Science Education,* Millgate House: Sandbach. Chapter 7 ‘Living things and their environment’ has some useful scenarios for discussion concerning children’s ideas about food chains, rotting, recycling and compost.