

## The invisible plastic problem – can you find what the eye can't see? Finding microplastics in the local environment using simple separation techniques

Microplastics are small plastic particles less than 5 millimetres in size. They come from larger plastics that have broken down or from fibres released by synthetic materials such as clothing. These particles are found in rivers, lakes, soils and even human bodies around the world. Microplastics can affect ecosystems by changing how sediments behave and by being ingested by wildlife. Microplastics have recently been found in human blood, lungs and even brain tissue. This activity allows pupils to explore how scientists detect microplastics in their own local environment using a simple method based on density.



Fig 1. An overflowing litter bin in a public park. (BBC News, 2020. Edinburgh litter bin overflowing after Covid lockdown restrictions eased). Image ©Sheila Masson/BBC.: [https://ichef.bbci.co.uk/ace/standard/680/cpsprodpb/12B96/production/112949667\\_edinshellamasson.jpg](https://ichef.bbci.co.uk/ace/standard/680/cpsprodpb/12B96/production/112949667_edinshellamasson.jpg)

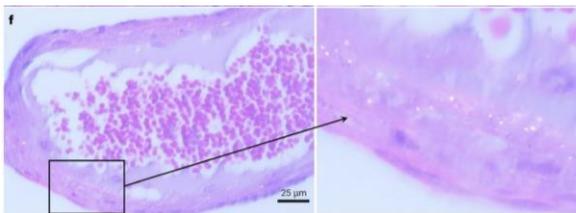


Fig 2. Microscope image of human brain tissue showing embedded microplastic particles (bright pink spots). Researchers are investigating how these plastics reach the brain and whether they may affect neurological health. EcoWatch (2024).

### Instruction

Tell pupils that they are going to collect samples of mud and soil from their local environment, which may be polluted by microplastics. Encourage pupils to consider human activity nearby, for example, paths, bins, or water run-off areas and how this might affect the amount of plastic present.

### Before the activity:

Ask pupils to discuss and record their predictions:

- What do you already know about pollution in this area?
- Why have you chosen this particular site to collect samples?
- Where do you think the most microplastics will be found, and why?

### Activity and data analysis

Ask pupils to collect small samples of soil or pond mud and test them for microplastics using a saltwater separation technique, as follows:

1. Collect a small sample of soil, pond mud or puddle sediment. (about 60g per group) Choose a safe location such as beside a path, near a bin or at the edge of a pond. Pupils should wear gloves to prevent contamination.
2. Prepare a saturated salt solution by mixing 250–500 grams of table salt with twice the quantity of warm tap water in a large clean container. Stir the mixture until some salt remains undissolved at the bottom, which shows that the solution is fully saturated.
3. Place the soil or sediment (60 grams) into a 500 ml beaker and add approximately 300 ml of salt solution. Stir slowly for two minutes to mix the sediment and break up clumps.
4. Leave the mixture to stand for one hour so that heavier materials such as sand and organic matter settle to the bottom. Plastics that are less dense than salt water will float to the top.
5. Pour the upper layer of water carefully through a funnel lined with filter paper or a coffee filter with a pore size between 15 and 20 micrometres.
6. Leave the filter paper to dry on a clean surface.
7. Examine the dried filter using a 10x magnifying lens or a dissecting microscope. Pupils should look for small, coloured fibres or fragments that do not resemble natural materials.

Pupils record the number, colour and type of particles they find. They can compare results from different sampling sites and discuss how human activity influences where microplastics accumulate. The activity helps pupils see how everyday litter can break down and travel through the environment.



Fig 3. A pupil filtering muddy water.

**After the activity:**

Guide pupils to interpret their findings and reflect on their results.

- Why do you think your results showed these patterns?

- Were your results what you expected? What might explain any surprises or differences between sites?
- What actions could individuals or the community take to reduce microplastic pollution in this area?

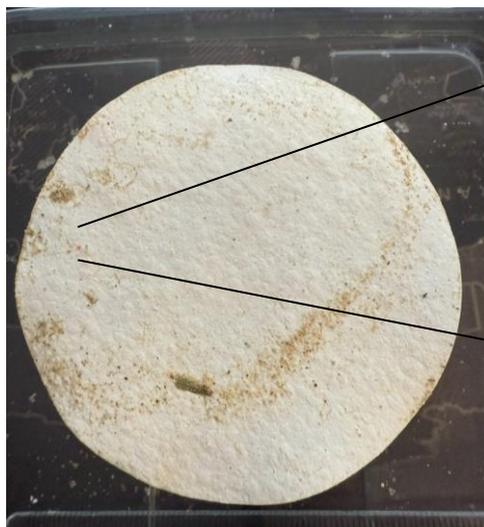


Fig 4a. Filter paper showing sediment residue collected from Delapré Park Lake, Northampton, after saltwater density separation.



Fig 4b. Red polypropylene fragment (~1.0 mm) from DP1 filter, visible under 10x handheld magnifier. Images adapted from the Delapré Park Lake Microplastic Survey Report by Lema Ashrafe (2025)

**The back up**

**Title:** The invisible plastic problem – can you find what the eye can't see?

**Subtitle:** Finding microplastics in the local environment using simple separation techniques

**Topic:** This activity introduces pupils to environmental sampling and density separation. It demonstrates how a saturated salt solution can be used to isolate microplastics from soil or sediment and shows how pollution can be studied using simple materials.

**Age range of pupils:** 12 years and above

**Time needed to complete activity:** About 60 minutes, plus drying time for the filters, and time to collect samples outdoors.

**Pupil learning outcomes:** Pupils can:

- carry out a microplastic separation using salt water density methods;
- observe and record the appearance of fibres and fragments under magnification;
- compare samples from different environments and interpret the results;
- explain how plastic pollution can move through soil and water systems;
- show how the concept of density may be used in scientific separation techniques.

**Context:** This investigation links to topics in Geography, Chemistry and Environmental

Science. It supports learning about pollution, human impact on ecosystems and how scientists collect and analyse samples. The method is adapted from a real survey of Delapré Park Lake in Northampton, which identified microplastic fibres and fragments using the same approach. The work connects local observation with global awareness. National Geographic has published several reports on how microplastics spread through rivers and oceans, showing that local litter can contribute to a worldwide issue.

**Following up the activity:**

- Plot results on a school plan or online map.
- Compare areas near paths and bins with cleaner less-used spaces such as gardens or ponds.
- Repeat the investigation after rainfall, to observe how runoff may influence plastic movement.
- Discuss how fibres from clothing and packaging enter the environment.
- Design posters or campaigns to encourage the school and community to reduce plastic waste and prevent litter reaching waterways.
- Laundry of clothing made from synthetic fibres contributes significant quantities of microplastics into water courses and then to the sea and into food chains. Investigate new sources of filters for the family washing machine to prevent microplastics entering the water cycle.

### Underlying principles:

- Plastics are less dense than water and can be separated using a saline solution.
- Microplastics can persist for many years and may be transported by wind, rain and surface water.
- Environmental sampling and density separation are essential tools for pollution monitoring.
- Observation and analysis help pupils understand the link between human activity and environmental change.

### Thinking skill development:

- Construction - Pupils think about where they expect to find more plastics and plan how they will carry out sampling
- Metacognition: Pupils identify and describe the fibres and fragments they see and discuss the problem of microplastics in the environment
- Cognitive conflict: Pupils may find plastics even in apparently clean areas.
- Bridging: Pupils relate their simple experiments to the world-wide problem of finding plastics in human and animal bodies. This highlights the global scale of pollution and encourages personal action.

### Resource list:

- sediment or soil samples of about 60 g each
- 250–500 g of table salt (sodium chloride)
- 2 litres of warm tap water
- beakers or jars of 500 ml.
- filter paper or coffee filters with pore size 15 - 20 micrometres
- funnels
- plastic spoons or trowels
- gloves
- magnifying lenses or simple microscopes

- clean surface or tray for drying filters
- labels and notebooks for observations

Note: For a class of 30 pupils working in groups of 3 (10 groups), prepare at least 3 litres of saturated salt solution (about 1 kg of table salt and 2 litres of warm water, topped up as needed). This provides ~300 ml of solution per group. This method mainly recovers low-density plastics such as polyethylene and polypropylene (e.g. many packaging films and fibres). Denser plastics, such as some bottle plastics, may remain in the sediment and not be seen on the filter. The teacher may prepare one “control” sample by adding a few known plastic fibres or shavings to a sediment sample in advance. This guarantees at least one group will observe microplastics even if environmental concentrations are low.

### Useful links:

<https://www.nationalgeographic.com/environment/article/microplastics>

Mapping techniques: <https://qgis.org>

<https://www.ecowatch.com/microplastics-human-brains.html>

World Health Organization (2022). *Dietary and inhalation exposure to nano- and microplastic particles from the environment*. Geneva: WHO. <https://foodpackagingforum.org/news/who-report-on-potential-human-health-implications-of-mic>  
*Accumulation of Microplastics in Human Brain Tissue Rising Rapidly: Study*. Image from Huang et al., *Environmental Science & Technology Letters* (2024).

<https://www.ecowatch.com/microplastics-human-brains.html#microplastics>

**Reference:** Frias, J.P.G.L. and Nash, R. (2019). “Microplastics: Finding a Consensus on the Definition.” *Marine Pollution Bulletin*, 138, pp. 145–147. DOI: 10.1016/j.marpolbul.2018.11.022.

**Source:** Written by Lema Ashrafe, University of Northampton, adapted by the Earth Learning Idea team) from the Delapré Park Lake Microplastic Survey Report by Lema Ashrafe (2025) (In Press).

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