



Freshwater Microplastics

Junior Certificate Science Syllabus

Section: 1C1 Animals, Plants and Micro-Organisms

Main Topic: 1C7 Ecology

Sub Topic: Conservation, Pollution and Waste Management

Two experiments are presented here.

Experiment 1 **requires field work** while Experiment 2 can be **done solely in class**.

Experiment 1:

Title/Research question: Are there microplastics present in your local river or stream?

This experiment is designed to highlight the extent of plastic (both micro and macro) in the environment. To reinforce the extent of microplastics as a pollutant, a local site with a point source nearby would ideally be chosen. Where it is not possible for the students to visit the river themselves then the teacher can collect the samples based on the experimental design which is decided upon in class and carry out the analysis in class.

N.B. where a point source of potential pollution containing microplastics is not within the vicinity then a considerable amount of water would need to be collected or in lieu of this permission sought to leave a small net or sieve with a mesh size <5mm in place over a 24 hour period.

Objectives:

- To identify the potential sources of local plastic pollution
- To highlight issues surrounding microplastics as a pollutant
- To examine the link between macroplastics and microplastics
- To discuss potential local remediation activities

Learning Activities:

1. Site Selection and Experimental Design
 - Sample **Site selection** – choosing a local site is preferable as the student will connect with this. You could compare two sites one from an urban area and a second from a rural site.
 - Microplastic **Collection methods** - Take 5 x 10L buckets from the river/streams edge. net
 - **Safety** considerations (Risk assessment for sampling). Even if the students don't go to the river it is a useful thought process for them to identify all the potential hazards and precautions they would need to take. A sample Risk assessment
2. Reporting and presenting
 - Lab copy report style (TIMRaD) or design a poster
 - Potential for group presentations

Materials:

Materials
Bucket with lid (10L) x 5
Sieve* (<5mm) x1
Buchner Funnel and Flask (or similar)
Notebooks
OSI Map/Computer for google maps
Pencil/eraser
Filter paper(to fit funnel)

*A baking sieve is fine as this will be used to remove the large debris if any.

Methods:

- Choose a local site to collect water using OSI maps and Google maps. Determine from these whether the site is A) accessible and B) safe to collect from.
- Using a bucket collect the water (5 x 10L) from the stream or river chosen from an accessible safe area.
- Make note of environmental conditions surrounding the site
 - Is it an urban area?
 - Can you visibly see rubbish on the banks or in the water?
 - Do many people visit or walk by the site?
 - Is there agricultural ground or houses surrounding/near the site
- On return to the lab the samples will need to be processed.
 - Using the sieve remove any large debris that may have been collected. Note if there is any macroplastic (5mm) in the debris.
 - Now set up a Buchner funnel and flask
 - Place a filter paper on the funnel and proceed to pour the water into the funnel watching not to over fill the flask.
- Examine the filter paper under a binocular microscope
 - Count the number of pieces of microplastics you record
 - Identify whether they are fragments, fibres or beads

Differentiation:

- Higher and lower order questioning
- Differentiate group activities and roles to account for individual needs by support and task choice.
- Mixed ability pairing

Assessment:

- Teacher observation and questioning
- Examine learning outcome before and after
- Evaluate the learning experiences that lead to the outcomes
- Lab copy assessment; group or individual Presentation

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Buchner

Both experiments can have Linkage and Integration with other subjects:

- Geography: Urban development
- Math's: Data handling
- Computers: Presentation skills