**ACTIVITY: Observing freshwater macroinvertebrates**

**Activity idea**

In this activity, students collect and observe macroinvertebrates from a local freshwater stream.

By the end of this activity, students should be able to:

* recognise that invertebrates are part of freshwater ecosystems
* safely capture freshwater macroinvertebrates for observation
* group macroinvertebrates according to observable features.

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**Introduction/background**

This activity can be part of a stream study, or it can be a one-off experience to simply observe the range of creatures that live in a local stream or waterway. Asking students to group or classify the macroinvertebrates they find encourages them to observe the creatures more closely.

Younger students can focus on simple surface features such as body shape (i.e. molluscs, worms or number of legs) while older students can use some of the listed resources to more accurately identify creatures based on their physical characteristics.

Although macroinvertebrates, by definition, are creatures that you can see with the naked eye, some magnifying lenses would be useful, along with practice in how to use them. Magnification apps on digital devices are also very useful.

If you have access to a microscope (primary schools can check with their local secondary schools), seeing the range of microscopic organisms in freshwater samples is also a valuable learning experience for students.

You could do this at the investigation site (be sure to set the microscope up somewhere stable – taking a chair and table along might help) or take some samples back to class.

***Helpful resources***

Regional councils do regular macroinvertebrate surveys as part of water quality monitoring. They may have information about the types of macroinvertebrates you are likely to find in your area.

This resource is a guide for [sampling freshwater macroinvertebrates](https://static.sciencelearn.org.nz/documents/files/000/000/813/original/Freshwater_monitoring_%E2%80%93_Macroinvertebrate_-_Bug_-_Sampling_v2.pdf?1598846797) along with an [identification sheet](https://static.sciencelearn.org.nz/documents/files/000/000/814/original/Freshwater_monitoring_%E2%80%93_Macroinvertebrate_Identification_Sheet_v2.pdf?1598846812).

Other handy resources include the Department of Conservation’s [New Zealand’s freshwater invertebrates](http://www.doc.govt.nz/nature/native-animals/invertebrates/freshwater/) and NIWA’s [Invertebrate ID guides](https://www.niwa.co.nz/freshwater-and-estuaries/management-tools/identification-guides-and-fact-sheets/macroinvertebrate-id-guides).

***Safety around water***

Water is inherently dangerous. Check stream banks and water depth prior to a school visit. Some streams are affected by industrial or farm run-off. Check with your local council regarding *E. coli* and/or other water quality concerns.

**What you need**

* Nets with a mesh size of 0.5 mm or large kitchen sieves with a 1 mm mesh
* Buckets
* Several shallow trays or ice cream containers, preferably white
* Hand lenses
* Plastic spoons or small scoops
* Laminated copies of Greater Wellington Regional Council’s [Critter Identification Card](http://www.gw.govt.nz/assets/Sustainable-Schools/Stream-assessment-kits/Critter-identification-card.pdf)
* Paper and pens to record data
* Camera or digital devices

**What to do**

1. Before the visit, read the article [Freshwater macroinvertebrates](http://link.sciencelearn.org.nz/resources/1820-freshwater-macroinvertebrates). Look at the images in the [Freshwater invertebrates guide](https://static.sciencelearn.org.nz/documents/files/000/000/814/original/Freshwater_monitoring_%E2%80%93_Macroinvertebrate_Identification_Sheet_v2.pdf?1598846812) and Manaaki Whenua – Landcare Research’s [freshwater invertebrates guide](https://www.landcareresearch.co.nz/tools-and-resources/identification/freshwater-invertebrates-guide/identification-guide-what-freshwater-invertebrate-is-this/) so that students are aware of what types of creatures they might encounter.

1. Have students safely enter the stream in pairs. One person holds the net or sieve in the water while the other moves immediately upstream and uses their hands or feet to disturb the sediment. Invertebrates may drift into the net/sieve. Repeat this process a few times to partially fill the net.

1. Collect rocks, vegetation, streambed sediment and/or sticks from the stream. In weedy habitats, sweep the net through the vegetation.

1. Collect a bucket of water.

1. Empty the nets, rocks, vegetation and sediment into different trays. Add a shallow layer of water and wait for the contents to settle.

1. Some invertebrates may swim around, while others may hide in the rocks and vegetation. Have students gently examine the rocks and vegetation for elusive or camouflaged creatures.

1. Use the spoons or scoops to move invertebrates to observation trays or ice cream containers. Keep the invertebrates covered with cool stream water and keep them in the shade if possible.

1. Have students use hand lenses or digital devices to examine the creatures in closer detail.

1. Encourage the students to design their own classification systems, for example, group creatures with a shell in one container and those without a shell in another. Continue to classify or group creatures according to observable features. There are no right or wrong classifications, but students must justify their groupings. Other groupings can include worms, legs or habitat (found in the stream bottom, along the bank, under rocks).
2. Younger students can use the[macroinvertebrate identification sheet](https://static.sciencelearn.org.nz/documents/files/000/000/814/original/Freshwater_monitoring_%E2%80%93_Macroinvertebrate_Identification_Sheet_v2.pdf?1598846812) to identify the invertebrates. Record species names and numbers found.

1. Older students can use Manaaki Whenua – Landcare Research’s [freshwater invertebrates guide](https://www.landcareresearch.co.nz/tools-and-resources/identification/freshwater-invertebrates-guide/identification-guide-what-freshwater-invertebrate-is-this/) to identify and classify their findings. Record species names and numbers found.

1. Photograph or record the macroinvertebrates if desired, then return them to the stream.

1. Alternatively, take water and macroinvertebrate samples with you for further observation in the science lab.

**Extension ideas**

* Macroinvertebrates are part of a wider ecosystem. Look at the images on Landcare Research’s [Stream quality](https://www.landcareresearch.co.nz/tools-and-resources/identification/freshwater-invertebrates-guide/stream-quality/) page. What inferences can students make from these images? Think about shading, stream bank vegetation and land use.
* [Monitoring stream health](https://www.sciencelearn.org.nz/resources/2889-monitoring-stream-health) provides step-by-step instructions, protocols, recording sheets and how-to videos for monitoring stream health.
* Read the articles [Students help restore mauri to the Oruarangi Stream](http://link.sciencelearn.org.nz/resources/1688-students-help-restore-mauri-to-the-oruarangi-stream) and [Waikato River ecology and biodiversity](http://link.sciencelearn.org.nz/resources/445-waikato-river-ecology-and-biodiversity) to discover how groups are measuring and improving water quality.
* Older students could consider how to measure the relative number (density) of particular species.