**ACTIVITY: Interpreting lake sediment data**

**Activity idea**

In this activity, students observe and interpret text and visual data from Lakes380 information sheets. The activity includes discussion questions to help students consider how the data was collected and how the information is presented via text and visual representations.

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

* develop literacy and numeracy skills for interpreting information from area graphs
* identify the components of a graph
* discuss the data provided by the graph
* discuss the purpose of the graph
* discuss the origins of the data.

**For teachers**

***Introduction/background***

This activity uses the Lakes380 information sheets to build student understanding of the nature of science and the science capabilities.

Scientists depend on empirical evidence – and the interpretations/inferences they draw from it – to produce scientific knowledge. The science capability ‘Critique evidence’ encourages students to consider how data is collected and interpreted and how we know it is reliable.

Scientists present this data in a variety of ways. The science capability ‘Interpret representations’ encourages students to think about how data is presented, what the representation tells us and how it gets the message across. Visual representations contain literacy and numeracy components that students may need support to understand.

This activity uses questioning techniques to develop skills needed to:

* consider how the data was collected
* consider its reliability
* interpret written and visual representations
* consider how the representations get the message across.

## What you need

* Access to these articles:
  + [Lakes380 – Our lakes’ health: past, present, future](/resources/3207-lakes380-our-lakes-health-past-present-future)
  + [Lake sediment cores – exploring the past](https://www.sciencelearn.org.nz/resources/3210-lake-sediment-cores-exploring-the-past)
  + [Lakes380 – what does the data tell us?](https://www.sciencelearn.org.nz/resources/3208-lakes380-what-does-the-data-tell-us)
* Access to the video [Looking back in time – Lake Moawhitu](https://www.sciencelearn.org.nz/videos/2163-looking-back-in-time-lake-moawhitu)
* Access to these Lakes380 information sheets and webpages:
  + [Lake Kahuparere – Northland](https://www.sciencelearn.org.nz/system/documents/files/000/001/212/original/Lakes380_Kahuparere_info_sheet.pdf?1675198042) – PDF
  + [Lake Kahuparere – Northland](https://lakes380.com/lakes/kahuparere/) – Lakes380 webpage
  + [Lake Pupuke – Auckland](https://www.sciencelearn.org.nz/system/documents/files/000/001/214/original/Lakes380_Pupuke_infosheet.pdf?1675185847) – PDF
  + [Lake Pupuke – Auckland](https://lakes380.com/lakes/pupuke/) – Lakes380 webpage
  + [Kaweka/Kuripapango Lakes – Hawke’s Bay](https://www.sciencelearn.org.nz/system/documents/files/000/001/213/original/Lakes380_Kaweka_Kuripapango_Lakes_infosheet.pdf?1675186363) – PDF
  + [Kaweka/Kuripapango Lakes – Hawke’s Bay](https://lakes380.com/lakes/kaweka-lake-1/) – Lakes380 webpage
  + [Lake Wiritoa – Manawatū Whanganui](https://www.sciencelearn.org.nz/system/documents/files/000/001/215/original/Lakes380_Wiritoa_infosheet.pdf?1675185890) – PDF
  + [Lake Wiritoa – Manawatū Whanganui](https://lakes380.com/lakes/lake-wiritoa/) – Lakes380 webpage
  + [Lake Moawhitu – Marlborough](https://www.sciencelearn.org.nz/system/documents/files/000/001/210/original/Lakes380_LakeMoawhitu_infosheet.pdf?1675185337) – PDF
  + [Lake Moawhitu – Marlborough](https://lakes380.com/lakes/moawhitu/) – Lakes380 webpage
  + [Lake McRae – Marlborough](https://www.sciencelearn.org.nz/system/documents/files/000/001/219/original/Lakes380_McRae_infosheet.pdf?1675186583) – PDF
  + [Lake McRae – Marlborough](https://lakes380.com/lakes/lake-mcrae/) – Lakes380 webpage
  + [Lake Marion – Canterbury](https://www.sciencelearn.org.nz/system/documents/files/000/001/217/original/Lakes380_Marion_infosheet.pdf?1675186414) – PDF
  + [Lake Marion – Canterbury](https://lakes380.com/lakes/lake-marion/) – Lakes380 webpage
  + [Lake Kāurupātaka – West Coast](https://www.sciencelearn.org.nz/system/documents/files/000/001/212/original/Lakes380_Kaurupataka_infosheet.pdf?1675185428) – PDF
  + [Lake Kāurupātaka – West Coast](https://lakes380.com/lakes/kaurapataka/) – Lakes380 webpage
  + [Tomahawk Lagoon – Otago](https://www.sciencelearn.org.nz/system/documents/files/000/001/211/original/Lakes380_Tomahawk_Lagoon_inforsheet.pdf?1675185391) – PDF
  + [Tomahawk Lagoon – Otago](https://lakes380.com/lakes/tomahawk-lagoon-1/) – Lakes380 webpage
  + [Skelton Lake – Southland](https://www.sciencelearn.org.nz/system/documents/files/000/001/220/original/Lakes380_The_Skeleton_Lakes_infosheet.pdf?1675186633) – PDF
  + [Skelton Lake – Southland](https://lakes380.com/lakes/skeleton-lake/) – Lakes380 webpage

***Teaching suggestions***

There are two ways to access and examine the data. The PDFs focus mostly on the sediment core and data from it. The Lakes380 webpages have additional information about the lake, iwi/representative groups, images and Google Map locations. The webpages also provide some context regarding the present lake conditions. It may be useful to introduce a lake via the Lakes380 webpage but use the PDF when exploring the data.

***What to do***

1. Use the articles to build content knowledge about the Lakes380 project and how and why sediment cores are collected and analysed.
2. Watch the video [Looking back in time – Lake Moawhitu](https://www.sciencelearn.org.nz/videos/2163-looking-back-in-time-lake-moawhitu). The transcript that accompanies the video contains discussion questions and content vocabulary. Consider using the questions prior to watching the video to help focus student attention.
3. Discuss the quote from Dr Marcus Vandergoes found in [Lake sediment cores – exploring the past](https://www.sciencelearn.org.nz/resources/3210-lake-sediment-cores-exploring-the-past):

“Sediments can be likened to the pages of a history book, continuously layering on top of one another recording environmental history, 24 hours a day, 7 days a week, year after year, for thousands of years. Everything that happens in or around the lake leaves a trace in the sediment.”

1. Choose one of the information sheets to explore the text and data. Consider using the Lakes380 webpage to set the scene and then use the PDF to explore the information.
2. Choose from the following questions to deepen student understanding:

* What type of information is presented? (text and visual)
* Is there a source that says where the information comes from?
* How can you find out if the source is reputable?
* Looking at the text – what information is provided?
* What evidence was used as the source of this data? (Evidence samples from the sediment cores.)
* How did scientists use this evidence to support their interpretations? (Changes in the abundance of particular indicators are evidence of changes to the lake catchment, usually caused by human activities.)
* Looking at the sediment core – what do the numbers represent? (A numerical scale marked by intervals. The units of measurement – in centimetres – provide information about the depth down the core – samples from greater depths are older than samples from closer to the top.)
* Looking at the sediment core – what does the text represent? (An indication of pre-human and post-human settlement.)
* Looking at the area graph/representation – what does the title say? (The title summarises the purpose of the representation.)
* Looking at the area graph/representation – what does the legend say? (The legend is below the representation. It provides information to further aid interpretation and understanding.)
* Looking at the area graph/representation – what does the data say? (The data is the information presented in the representation, which notes changes to various indicators through time.)
* How is colour used to present information? (It shows changes within the sediment core. Colour is used to show how evidence from the soil core correlates with the data in the area graph. Colour is also used to represent pollen, charcoal and algae.)
* What conclusions can you draw from the data?
* How does the combination of text and sediment core and area graph representations get the message across?
* Would you have been able to draw these same conclusions if the text/explanations of the sediment core results had not been included?
* What has been (or might have been) left out of the text and/or visual representations?
* What other information might you need to understand the text and/or visual representations? (For example, how pollen or charcoal gets into the lake.)
* Where can you find the information that might fill in these gaps?

## Choose another information sheet and compare the data from one lake to another.

***Extension idea***

The article [Lakes 380 – what does the data tell us?](https://www.sciencelearn.org.nz/resources/3208-lakes380-what-does-the-data-tell-us) says:

For a small country, Aotearoa has an amazing diversity of lakes. The country’s unique geography is responsible for this diversity, and it's also helping to protect lots of our lakes. Many of the alpine and highland lakes are in locations that are difficult to access. Although sediment cores show evidence of human settlements in the wider regions, a good number of these lakes continue to be surrounded by native forest and are in pristine condition.

Lowland and coastal lakes … are often in poorer condition than high country or alpine lakes. These lakes are often shallow and are located in catchment areas modified for agriculture or urban developments.

Use the data from one or more lakes to discuss whether these statements/generalisations are backed up by evidence or why the lake might be an outlier.