**ACTIVITY: Using He reo nō te puehu – A voice from the dust**

**Activity idea**

In this activity, students use a 360-degree browser-based virtual reality experience to explore changes to Lake Moawhitu through time while building an understanding of the mātauranga and scientific evidence that underpin the virtual experiences.

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

* navigate the virtual worlds within He reo nō te puehu
* use media and text to explore how human impacts can change lakes within a short time period
* discuss/consider how mātauranga and science knowledge are used as evidence of the changes
* discuss/consider how the evidence is used to engage and inform people.

**For teachers**

***Introduction/background***

[He reo nō te puehu – A voice from the dust](https://lakes380.com/he-reo-no-te-puehu/) is a 360-degree browser-based virtual reality experience in which users can visit Lake Moawhitu at different points in time: Pre Human, Māori Settlement, Present Day and Future 2122.

He reo nō te puehu – A voice from the dust is a collaborative project between Ngāti Koata Trust, the Department of Conservation and [Lakes380](https://www.sciencelearn.org.nz/resources/3207-lakes380-our-lakes-health-past-present-future) using both mātauranga and scientific data. The virtual worlds illustrate how much the lake and catchment have changed and inspire hope through the restoration and reconnection of whānau to the whenua. Learn more about this initiative in the article [He reo nō te puehu – A voice from the dust](https://www.sciencelearn.org.nz/resources/3220-he-reo-no-te-puehu-a-voice-from-the-dust).

Although this project uses Lake Moawhitu as the specific context for exploration, the central issues explored in the virtual world – the degradation of a valued [mahinga kai](https://www.sciencelearn.org.nz/resources/3174-mahinga-kai) site and the aspirations for restoration – will be common for many roto in Aotearoa.

This activity helps users navigate He reo nō te puehu. It includes questions to deepen student understanding of how evidence gained from [sediment cores](https://www.sciencelearn.org.nz/resources/3210-lake-sediment-cores-exploring-the-past) combines with local mātauranga to create a robust picture of the past. It also provides opportunities for students to explore several of the science capabilities and to more deeply consider human impacts on lake ecosystems, mātauranga-ā-iwi from Ngāti Koata on Lake Moawhitu and lake restoration.

***What you need***

* Access to the articles [Lakes380 – Our lakes’ health: past, present, future](https://www.sciencelearn.org.nz/resources/3207-lakes380-our-lakes-health-past-present-future), [Lake sediment cores – unlocking mysteries](https://www.sciencelearn.org.nz/resources/3210-lake-sediment-cores-exploring-the-past) and [He reo nō te puehu – A voice from the dust](https://www.sciencelearn.org.nz/resources/3220-he-reo-no-te-puehu-a-voice-from-the-dust)
* Access to [Lake Moawhitu](https://lakes380.com/lakes/moawhitu/) (Lakes380 research profile)
* Access to the Lakes380 virtual experience [He reo nō te puehu – A voice from the dust](https://lakes380.com/he-reo-no-te-puehu/)
* [Handout: Using He reo nō te puehu – A voice from the dust](#_heading=h.26in1rg)
* Access to [Lake Moawhitu](https://www.youtube.com/watch?v=J5egag7_wA8&ab_channel=Lakes380) (YouTube video)

***Teaching suggestions***

There are numerous ways to make use of the virtual [He reo nō te puehu – A voice from the dust](https://lakes380.com/he-reo-no-te-puehu/). Rather than offer a prescriptive pathway, the following notes offer suggestions. It will be helpful for educators to read the Hub articles [Lakes380 – Our lakes’ health: past, present, future](https://www.sciencelearn.org.nz/resources/3207-lakes380-our-lakes-health-past-present-future), [Lake sediment cores – unlocking mysteries](https://www.sciencelearn.org.nz/resources/3210-lake-sediment-cores-exploring-the-past) and [He reo nō te puehu – A voice from the dust](https://www.sciencelearn.org.nz/resources/3220-he-reo-no-te-puehu-a-voice-from-the-dust) and to become familiar with the information in the Lakes380 research profile [Lake Moawhitu](https://lakes380.com/lakes/moawhitu/).

***What to do***

1. Introduce the activity with the Lakes380 research profile [Lake Moawhitu](https://lakes380.com/lakes/moawhitu/). Begin by using the Google Maps option to locate the lake on Rangitoto ki te Tonga D’Urville Island.
2. Use the prompting questions below to analyse the text and images and the data they provide.

Gather and interpret data

* Where is Lake Moawhitu located?
* What can you observe in the images of the lake? Begin your observations with the words ‘I see’.
* What inferences can you draw? Begin your inferences with the words ‘I think’.
* What can you observe in the images of the sediment core? What inferences can you make about these?
* What information can you gain from the text?

Interpret representations

* What type of representations are these? (Sediment core and area graph showing changes over time.)
* What purpose do the representations serve?
* Are there components to help you interpret the representations? What are they?

Critique evidence

* How was the mātauranga collected?
* How was the science data collected?
* How do we know the science data is reliable?

Use evidence

* How are mātauranga and science knowledge used as evidence?
* Who might be interested in using this evidence?
* How might the evidence help them?

Engage with science

* How important is this information?
* How can this information influence people’s decisions or actions?
* What new ideas do you have about lakes and lake catchments that you did not have before?
* How do you think people’s connection/whakapapa to a lake influences the actions they make to protect it?
* How might you use what you’ve seen and/or experienced to take action for a local lake or waterway?
1. Discuss the Lakes380 research profile:
* How does it communicate the information about Lake Moawhitu?
* Who do you think the intended audience might be?
* How effective is it in making the information engaging and understandable?
1. Introduce students to the virtual experience [He reo nō te puehu – A voice from the dust](https://lakes380.com/he-reo-no-te-puehu/). Begin the experience by discussing the title:
* How does puehu/dust have a voice?
* How do scientists ‘hear’ the voice?
* What has the puehu/dust told us?
1. If desired, use the [Handout: Using He reo nō te puehu – A voice from the dust](#_heading=h.26in1rg) to aid navigation and to note what’s on the site so that information is not missed.
2. Use some of the prompting questions listed below (and those listed previously) to take a deeper look at the information provided by the virtual experience itself:
* In the terrestrial environment (above the water), what changes between the four different time periods?
* In the aquatic environment (under the water), what changes between the four different time periods?
* What changes in the terrestrial environment might have led to changes in the aquatic environment?
* From the information provided in the videos and the pop-ups, how did Ngāti Koata make use of the resources from Lake Moawhitu and the surrounding whenua?
* Focusing on the Present Day and Future 2122 worlds, how are Ngāti Koata and the Department of Conservation working together to restore Lake Moawhitu?

***Extension ideas***

1. Watch [Lake Moawhitu](https://www.youtube.com/watch?v=J5egag7_wA8&ab_channel=Lakes380) (Lakes380 YouTube video). It is a flyover of the Lake Moawhitu catchment. Discuss:
* the type of information the video provides
* how it compares to information provided during the 360-degree browser-based virtual reality experience.
1. Read the article [The lakes of Aotearoa New Zealand](https://www.sciencelearn.org.nz/resources/3211-the-lakes-of-aotearoa-new-zealand) to learn about the country’s extensive lake systems. Use the activity [Exploring my local lake](https://www.sciencelearn.org.nz/resources/3213-exploring-my-local-lake) to become more familiar with a roto near you. The activity [Ake Ake – forever and ever](https://www.sciencelearn.org.nz/resources/458-ake-ake-forever-and-ever) uses cultural indicators to explore changes in the local environment from a Māori perspective.

### Handout: Using He reo nō te puehu – A voice from the dust

**Navigating the home page**

The home page is the gateway for exploring the virtual 3D experience. It begins with a video of the area’s pepeha:

*“Ko Tainui te waka, ko takapo taka ko te maunga, ko te o miti o tai nukunuku a pani, ko Rangitoto ki te Tonga te mototapu, ko Moawhitu te wai u.”*

Users can then choose from four virtual worlds:



**Exploring the virtual worlds**

Icons are used to navigate between and within the virtual worlds:

|  |  |
| --- | --- |
| **Icon** | **Experience** |
| Home icon for He reo nō te puehu – A voice from the dust | Navigate back to the home page. |
|  | Navigate between the virtual worlds by clicking the arrows. |
| Roto icon for He reo nō te puehu – A voice from the dust. | Explore the roto – aquatic environment. |
| Whenua icon for He reo nō te puehu – A voice from the dust. | Explore the whenua – terrestrial environment. |
|  | Click for additional information. |
|  | Click to watch a video. |
| Mutes background sound for He reo nō te puehu – A voice from the dust. | Mute the background soundtrack; go full screen. |

### Icon for exploring Lake Moawhitu before humans arrived.The four virtual worlds

**Pre Human**

Audio sets the scene: *“Before humans set foot on the shores of Lake Moawhitu, this place was a pristine oasis of native flora and fauna. The landscape was dominated by forest giants – tōtara, mataī and rimu. The streams feeding the lake were pristine allowing freshwater species such as tuna to thrive.”*

**Videos**

*Looking back in time*: Professor Rewi Newnham explains how sediment cores are able to tell us about te ao tuatahi – the land before human arrivals – and what was in the Lake Moawhitu catchment.

*Gift from the gods*: “Tuna are an ancient gift from the gods. It was Ihorangi – the atua who personifies rain – that ushered tuna into our fresh waterways since the beginning of time. The whakapapa of tuna is widely regarded, and their narrative has been passed down through time. But above all, tuna possess their own mātauranga and have their own voice.”

**Pop-ups**

On the whenua:

* Wharariki – flax
* Tōtara
* Rimu

In the roto:

* *Myriophyllum triphyllum*

**Māori Settlement**

Audio sets the scene: *“When our tūpuna arrived at Lake Moawhitu, it was teeming with tuna and quickly became a significant mahinga kai site. Harvesting sustainably was vital for our ancestors’ survival. Some of the forest on the lakeshore was cleared to gain access to the food basket. The cleared vegetation was used for clothing, shelter and protection.”*

**Videos**

*Utilising nature’s gifts*: Ngāti Koata kaumātua Tiro Paul (nee Elkington) speaks of the abundance of mahinga kai provided by Rangitoto ki te Tonga and Lake Moawhitu.

*Tuna harvest*: Ngāti Koata kaumātua speak of their experiences with mahinga kai – fishing for tuna was seasonal and sustainable. Preferred harvesting methods involved handlines and hooks rather than hīnaki.

**Pop-ups:**

On the whenua:

* Raupō
* High pā

In the roto:

* Tuna

**Present Day**

Audio sets the scene: *“Over the past 100 years, farming and the removal of native trees has significantly impacted Lake Moawhitu’s water quality and the native species that once flourished within the lake. However, all is not lost. Ngāti Koata, Lakes380 and DOC have been working hard to uncover Moawhitu’s history to understand what the lake's ecosystem was once like. This understanding will then be used to restore the mauri of this once thriving mahinga kai.”*

**Videos**

*Weaving knowledge*: Professor Rewi Newnham briefly explains some of the differences between conventional science and mātauranga Māori and how one can enhance the other when the two knowledge streams overlap.

*Working together*: Alice Woodward, Dan Moore and Russleigh Parai discuss how Lake Moawhitu got to its present state and plans for its restoration.

**Pop-ups**

On the whenua:

* Moa bone
* Tī kōuka – cabbage tree

In the roto:

* Water quality decline

**Future 2122**

Audio sets the scene: *“Guided by those who once lived here and weaving together the findings from western science, our aspiration is to restore the mauri of Moawhitu so that Ngāti Koata can once again practise their customary and sustainable tuna harvest. This multi-generational project will become a place for the rising generations to reconnect to their tūpuna, who once called this place home.”*

**Video**

*Future vision:* Matt Hippolite and Noela McGregor explain their vision and hopes for the Lake Moawhitu restoration project.

**Pop ups**

On the whenua:

* Whare

In the roto:

* Large tuna populations
* *Potamogeton ochreatus*