

NEMA Resilience Fund

House of Science Earthquake Education Kits

East Coast LAB (ECLAB) is a community-focused project which seeks to grow and share Hikurangi Subduction Zone earthquake and tsunami hazard knowledge, and to work alongside communities to build resilience to these hazards through partnership with iwi, hapū, scientists and emergency managers.

ECLAB had funded one of House of Science's "Rock My World" earth science education kits in the past and were approached by the non-profit organization to sponsor and support the development of a new, earthquake science kit. This presented an excellent opportunity to guide the development of this primary-intermediate level education resource, to ensure its learning outcomes included earthquake and tsunami preparedness. For this reason, ECLAB sought funding from the NEMA Resilience Fund to both fund the development of the kit, and the distribution of a kit to each branch within its regions, including Bay of Plenty, Tairāwhiti, Hawkes Bay, Whanganui-Manawatū, and Wellington.

House of Science is an education provider that is highly regarded by schools and kura for their bilingual resources. They have 19 branches and currently reach 160,000 students through 645 schools, and the addition of each new kit to a branch grows this reach. House of Science's work in raising scientific literacy and critical thinking skills among young Aotearoa New Zealanders aligns closely with ECLAB's goals, and with the goals of the NEMA Science Strategy (2020).

Product design

House of Science employs a dedicated resource developer, who developed the learning outcomes and activities within the kits in close consultation with ECLAB. Throughout the process, we explored opportunities to focus in on Aotearoa's plate boundary and include preparedness information about earthquake and tsunami hazard.

House of Science kits are specifically designed for both English-medium schools and Kura Kaupapa Māori, with all resources translated into both English and Te Reo Māori. The resource also features mātauranga Māori, including pūrākau about Rūaumoko, which the teacher will use to support discussion and activities.

Each kit contains activities suited to every learning level from years 1 – 8, as well as extension activities. This means, each kura or school can book the kit every year for the same cohort of students, and always have more activities to build their knowledge.

The kit activities include:

- *What's on the inside?* – Creating clay models to understand the structure of the earth.
- *Puzzle pieces/Action at the edges* – Tectonic plates and our plate boundary.
- *Seismic slinky* – Seismic waves.
- *Shake, Rattle and Roll* – Capturing the motion of an earthquake and earthquake survival.
- *How big? How strong?* – Understanding magnitude and intensity and personal preparedness.
- *Making waves* – Tsunamis, how they happen and what to do.
- *Location, location, location* – New Zealand's faults.

Traditional Story

Every culture has its traditions about how the world was created. Māori have many of them – giants digging out lakes, water creatures rising to form hills, and mountains engaging in a battle for the affections of a beautiful maiden.

These stories and many more have been passed down through the generations, revealing a world in constant change and a deep connection with nature and the land.

The legend of Rūaumoko

Rūaumoko (also known as Rūaumoko) is the god of volcanoes and earthquakes and is the youngest, unborn son of Papatūānuku (the Earth Mother) and Ranginui (the Sky Father). Rūaumoko was still inside his mother's belly waiting to be born when his brothers decided that they would separate their parents. He could feel the battle above between his siblings and the pain of his mother as she was separated from his father.



The anger welled up inside him and he began to kick and stomp inside his mother's belly. This made the earth shake angrily and the land rolled and twisted.

When Rūaumoko sleeps, the earth is peaceful. When he is awake he expresses his anger and this results in volcanic eruptions, earthquakes, and tsunamis.

Kit Contents

- Teacher manual
- 10 student worksheets – What's on the inside?
- 10 student worksheets – Seismic Slinkys
- 5 student worksheets – How Big? How Strong?
- 5 student worksheets – Making Waves
- Concept map
- Start with Science poster
- 10 flip charts
- 2 Tectonica puzzles
- 500mL jug
- 5 sets of clue cards

What's on the inside?

- 10 sets 'Structure of the Earth'
- Inflatable globe
- The Earth's structure poster
- 10 15cm rulers

Action at the Edges

- set of Tectonic Plate Boundary posters
- set of Modelling Plate Boundary
- Movement posters
- Hot Spot poster

Seismic Slinkys

- 10 slinkys
- 1 mega super slinky

Shake, Rattle and Roll Part A: Capturing the motion of an earthquake

- 2 smartphones
- 4 epicenter arrows

Shake, Rattle and Roll Part B: Survive the quake

- Shake table and bricks
- 3 sets of Building Instruction cards

How Big? How Strong?

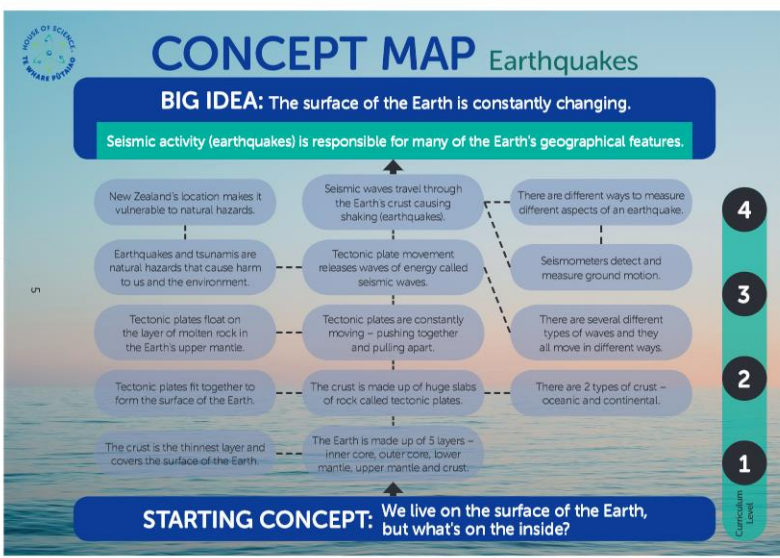
- 10 sets of Earthquake Comparison cards
- 5 Reporting Shaking posters
- 2 Drop, Cover, Hold posters

Making Waves

- 10 containers
- 2 Long or Strong Get Gone posters

Location, Location, Location

- 5 New Zealand Map 1
- 5 New Zealand Map 2
- 5 sets of Fault Systems in New Zealand cards



Engagement and feedback

ECLAB attended the House of Science conference in July 2022 where the activities were trialed and reviewed by House of Science staff and ECLAB to ensure they met the learning goals and were practical for use in the classroom. All attendees had positive and constructive feedback on the kits.

The final draft of the prototype kit was reviewed by ECLAB, as well as external partners from QuakeCoRE and AF8 before it was finalised. This was valuable for ensuring the kit was of high quality and reflected the latest science and risk information, and it also facilitated a commitment of funding from Te Hiranga Rū QuakeCoRE to purchase additional kits for more regions.

Finally, House of Science gave the prototype kit to five ‘test schools’: Matua Primary, Bethlehem Primary, Te Puke Primary, Pahoia School, and Te Kura o Paroa for their feedback. Each school ran the activities with various year levels and had excellent feedback. Students enjoyed the activities, learning both science and preparedness, and were excited to share their knowledge with whānau.

“The kit was a huge success, and I will be booking it when it becomes available!” – *Matua Primary School*

“They enjoyed experimenting with the water tubs and making the water move, only one group asked for the clue cards [...] We had a good talk about what to do in the event of an earthquake/tsunami” – *Bethlehem Primary*

“We had an open afternoon yesterday and the children were very keen to show their parents the layers of the earth models and the tectonic plate globes.” – *Bethlehem Primary*

“My personal highlights included the giant slinky to show the different types of waves. I was teaching in Whakatane during the 1987 earthquake, so I could describe the effect on the school field with the slinky demonstration.” – *Matua Primary*



Budget

<i>Deliverable</i>	<i>Cost</i>
Kit scoping, resource collation, and school testing	\$10,000.00
Translation	\$5,000.00
Compiling additional kits	\$10,000.00
Project leader time	\$3,000.00
Total	\$28,000.00

Benefits to CDEM groups and NEMA

Raising risk literacy and risk awareness, within communities along the east coast, is critical to raising resilience to earthquake and tsunami hazard. Scientific literacy, and understanding the “why” behind preparedness advice, empowers individuals to raise their resilience and navigate complex decisions during an emergency. Raising the scientific literacy and preparedness of tamariki is an essential link to building the resilience of the entire whānau and community.

CDEM group Community Engagement teams regularly engage with kura and schools to raise resilience, however small teams are often stretched across large areas and are limited in their capacity. Partnering with well established and highly regarded educational resource providers, such of House of Science, maximises the reach of earthquake and tsunami hazard and risk knowledge, as teachers are empowered to educate their students on the topic, and practice preparedness with them.

The House of Science model allows many schools to be reached with a single kit. All kits are housed at branches and booked out one week at a time by primary and intermediate schools and kura in the area. This ensures that many schools will benefit from a single Earthquake kit. Each kit also displays the name and brand of its sponsor, raising awareness of ECLAB and Civil Defence among tamariki using the kits.

Future

All five of East Coast LAB’s affiliated CDEM groups, Bay of Plenty, Tairāwhiti, Hawkes Bay, Whanganui-Manawatū, and Wellington will receive a kit to their local House of Science branch. Some CDEM groups with multiple branches within their region have already committed to funding additional kits so that more of their schools can have access to the resource.

Furthermore, through engagement with ECLAB and House of Science, other organisations have also committed to purchasing kits for more regions. For example, Te Hiranga Rū QuakeCoRE, funding kits for Christchurch, Rotorua, and one of the Auckland branches, and the project will be advertised to other CDEM groups who may wish to sponsor kits for their areas as well.

House of Science requires ongoing funding support to ensure they can keep the kits replenished and supply kits to more branches. Through this project NEMA, CDEM groups, the Plate Boundary Network, and other research entities have been connected with House of Science and can continue to grow the reach of their excellent kits, while the kits grow the reach of essential earthquake and tsunami science and preparedness information.