

Climate Change: prepare today, live well tomorrow

Huringa Āhuarangi

WHAKARERI MAI KIA HAUMARU ĀPŌPŌ

A LEVEL 4 LEARNING PROGRAMME
FOR AOTEAROA NEW ZEALAND SCHOOLS

User guide

HURINGA ĀHUARANGI: WHAKARERI MAI KIA HAUMARU ĀPŌPŌ

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User guide

The term 'wicked problem' is used in science, planning and education to describe problems that are extremely complex in nature. Anthropogenic climate change is one such problem. Because there is no one-size-fits-all solution, no quick fix, climate change can be difficult to get your head around, let alone teach or respond to. This resource aims to help teachers/kaiako and their learners to understand the immediacy and complexity of this 'wicked problem'. It offers a range of practical and proactive strategies for responding to the challenges.

A collective and inclusive response is needed to mitigate and adapt to the predicted impacts of climate change. This response asks that we recognise the interconnectedness of all life on earth, as the impacts of climate change will be widely and diversely felt by all living things. Also essential to this response is the ability to communicate, listen to and respect varying perspectives and ideas. We are all in this together and can all be part of the solution.

'Huringa Āhuarangi: whakareri mai kia haumarū āpōpō | Climate Change: prepare today, live well tomorrow' is a science-based, integrated learning programme. It focuses on Earth's systems, the interconnectedness of the living world, and the impacts of anthropogenic climate change. It encourages learners to interpret, analyse and engage with science, and to understand that science knowledge changes over time.

There is opportunity to consider a mātauranga Māori perspective in the learning programme, particularly around the interconnectedness of life on earth as expressed through the relationship between Papatūānuku and Ranginui. Other indigenous knowledge bases will contribute to a broader understanding of the interconnectedness of life on earth and help to inform possible responses. To support this, a mātauranga Māori perspective is woven throughout the learning programme.

The programme builds understanding of climate change through an exploration of critical global, national, and local responses aimed at mitigating and adapting to predicted impacts. It is critical to consider indigenous responses, and – in particular for Aotearoa New Zealand – to include those of whānau, hapū and iwi.

In exploring the challenges of climate change, ākonga are encouraged to develop and apply key competencies. They are prompted to think beyond themselves, to tautoko | support others, and to connect with the intergenerational community responding to the problem.

Most importantly, the resource supports and empowers all learners to have a voice, to take action, and to play their part in a larger, systematic response.

Teaching and learning modules

'Huringa āhuarangi: Whakareri mai kia haumarū āpōpō | Climate change: Prepare today, live well tomorrow', is a Level 4 learning programme consisting of eight modules. Each module includes learning intentions and success criteria, background information for teachers and kaiako, teaching and learning sessions, and extension activities and supporting resources.

Module one Climate change and the living world: systems, climate and weather

Module two A changing climate: understanding how we got here

Module three How do we know? The role of science and indigenous knowledge systems

Module four Responding to change, planning for action

Modules five to eight are being developed to align with the refreshed social sciences learning area.

The modules can be applied in sequence or independently, depending on learners' existing awareness of climate change. For those who have limited prior learning it is suggested that the programme be followed in its entirety, and in the order set out here. This will encourage a sound understanding of climate change science and explore potential responses to the challenges of climate change, whilst also supporting learner wellbeing.

Climate change wellbeing guide

When kaiako/teachers and learners confront the challenges of climate change they can experience strong emotions such as anxiety, confusion, helplessness and anger. Background information and activities to support wellbeing for kaiako/teachers and ākonga are included in this resource. Throughout the resource look for  to connect to the 'Climate Change Wellbeing Guide', a companion resource to the learning programme.

Key icons

The modules use the following icons to quickly identify what the content is about.



Suggestions about how to apply the modules



Connection to the 'Climate Change Wellbeing Guide'



Additional resources



Click on the referenced worksheet to access it in the module



Indicates the resource is intended to be printed



Indicates the resource is intended to be shown on screen



Indicates an hyperlink to open a web page



**“We created this,
we can stop it.”**

MIKA

Additional learning resources

There are many resources and approaches available to support our understanding of climate change and enable engagement with the challenge. Following is a snapshot of useful Aotearoa New Zealand resources.



National resources

Approaches to Social Inquiry: Through social inquiry ākonga ask questions, gather information, and examine the background to important societal ideas and events. They are able to explore and analyse values and perspectives relating to these ideas and events. They develop an understanding of the issues, and of the ways in which people make decisions and participate in social action. [Find out more about social inquiry on the TKI website.](#)

Pūtātara: This resource supports schools and teachers to develop learning opportunities that are place-based, inquiry-led, and focused on participation for change. [Visit the Pūtātara website.](#)

Civics and Citizenship Education Teaching Guide: A comprehensive resource that supports primary and secondary school teachers to develop their understanding and practice in relation to effective civics and citizenship education in Aotearoa New Zealand. [Civics and Citizenship Education Teaching Guide on the TKI website.](#)

Aotearoa NZ Histories and Te Takanga o te Wā: This resource, written for teachers in Aotearoa New Zealand primary schools, has an emphasis on local history and on building collaborative relationships with iwi and hapū. Although this framework is written for years 1–8, many of the ideas presented will work in a secondary context, especially for those ākonga with limited prior knowledge. [Visit the Māori History: Māori History in the NZ Curriculum website.](#)

NIWA Taihora Nukurangi (n.d.): Build on your understanding of the science of climate change. The things we can do to combat climate change, individually, and alongside our whānau, school and community, can and will make a difference. [Visit the NIWA climate solvers website.](#)

The Science Learning Hub Pokapū Akoranga Pūtaiao (n.d.a): Linking Aotearoa New Zealand scientists with school ākonga, teachers, and community audiences. This initiative includes climate change science. [Visit the Science Learning Hub website.](#)

MetService New Zealand Te Ratonga Tīrorangi (n.d.): Useful information on daily weather, and on understanding climate and weather in general. This includes past climate and weather patterns. [Find out more on the MetService learning centre website.](#)

Parliamentary Commissioner for the Environment (2019): In March 2019, the Commissioner produced a report ‘Farms, forests and fossil fuels: The next great landscape transformation?’, exploring a different approach to framing New Zealand’s long-term climate change targets and policies, and what that could mean for our landscapes. An animation summarising aspects of the report can be viewed online. [View the animation: ‘Farms, forests and fossil fuels – A policy perspective’.](#)



Regional resources

Each region and iwi rohe are different, but most will provide useful, placed based resources to support climate change learning and collective action. See below for starting points for your regional journey.

Local Government New Zealand Te Kāhui Kaunihera o Aotearoa (n.d.):

Many councils have their own dedicated LEOTC (Learning experiences outside the classroom) and/or education teams. You can connect with your local council on the [Local Government New Zealand Te Kāhui Kaunihera o Aotearoa website](#).

Department of Conservation (n.d.): All life on earth is interconnected and anthropogenic climate change impacts all living things. The Department of Conservation provides resources to support conservation teaching and learning as well as DOC supported education programmes you can get involved in. [Visit the Department of Conservation website](#).

Mountains to Sea (2021): The Mountains to Sea Conservation Trust is a charitable umbrella and support organisation for the Experiencing Marine Reserves (EMR) marine education and Whitebait Connection (WBC) freshwater education programmes. These are leading models in education for sustainability in Aotearoa New Zealand.

[Visit the Mountains to Sea website](#).

Enviroschools (n.d.): Enviroschools is an environmental action-based programme that empowers young people to design and lead sustainability projects in their schools, neighbourhoods, and country.

[Visit the Enviroschools website](#).

Sustainable Coastlines (n.d.): Enabling people to look after the coastlines and waterways they love, Sustainable Coastlines offers some valuable opportunities and resources. [Visit the Sustainable Coastlines website](#).

Climate change education: approaches

Being such a complex issue, climate change education requires a holistic approach that equips ākonga with knowledge and agency and supports thinking, wellbeing, identity, and worldview.

Engaging with mātauranga Māori

It is important for teachers and kaiako to elevate mātauranga Māori from folklore, myths, and legends to a legitimate and living knowledge system. This means that mātauranga Māori is considered as a credible knowledge base in itself to be regarded alongside a western science knowledge base. This is the key to any approach in the classroom.

Mātauranga Māori can inform and extend the knowledge base of all ākonga. For example, supported by ngā kōrero tuku iho o ngā tūpuna, the concept of whakapapa informs the understanding that in te ao māori, there is an interconnectedness associated with te moana, te whenua and te rangi.

For more information, please refer to this kōrero from Rereata Makiha (2020):

[Maramataka and the science of living by the moon video on YouTube](#).

On one level, mātauranga Māori knowledge and information is discoverable by all, found in ways other knowledge bases are discovered and understood. Kaiako and ākonga who already engage with mātauranga Māori will be guided by what they know, in order to add to their knowledge base.

An important consideration to be aware of in a bi or multi-cultural learning situation is that not all Māori ākonga and their whānau have access to this knowledge in their lives. Some ākonga and whānau will privilege the use of mātauranga Māori to inform their daily lives in some way. Some, however, do not have the opportunity or the knowledge base to do so. Teachers and kaiako need to be aware of their expectations of ākonga Māori.

Bicycle model of climate change education

(Cantell et. al., 2019)

The bicycle model provides an approach that respects the complexity and interconnections of climate change learning, action, and place. The climate change education model is presented as a bicycle because climate change education, like a bicycle, requires all component parts to function together. Furthermore, a bike is not meant to stay still, but rather, needs a user to be in constant motion. The model is based on recent climate change education research literature. [View the bicycle model on the Sirene website.](#)

SEEDS model of ecological citizenship

(Hayward, 2021)

The SEEDS of citizenship education model encourages ākonga to develop skills for social agency, environmental education, embedded justice, decentred deliberation, and self-transcendence. This approach to citizenship supports young citizens' democratic imaginations and develops their 'handprint' for social justice. [Read more about the SEEDS approach on the Ako website.](#)

Nurturing hope: from climate-change worriers to eco-warriors

(Birdsall, 2020)

Young people are worried about the impacts that climate change will have on their lives. Educators need learning programmes that can support ākonga to manage challenging emotions and develop a positive outlook. Including emotions in climate change education is now considered crucial. Hope, in particular, has been identified as a motivating force that can help young people to become more positive and proactive in their response to the climate emergency.

[Read the full article on the NZCER website.](#)

Climate change and sustainability in primary and intermediate schools

(Bolstad, 2020)

How does climate change and sustainability feature in primary and intermediate school classrooms and whole-school practices? NZCER asked teachers and principals a few questions about climate change and sustainability as part of the 2019 NZCER national survey of English-medium primary and intermediate schools. [Key findings infographic on NZCER website.](#)



**“You might think your
everyday actions and
decisions don’t matter,
but they DO!”**

SYLVIE

The New Zealand Curriculum

The New Zealand Curriculum gives strong support to inquiry-based learning and to involving ākonga in current and future-focused issues.

Science planning

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Level four

Main ideas

- Relationships between hydrosphere, biosphere, atmosphere, and geosphere (and their alignment with Te Ao Māori and mātauranga Māori).
- Relationships between atmosphere and biosphere; weather and climate.
- Heat trapping gases (greenhouse gases) are natural and are part of the atmosphere.
- Human behaviours (anthropogenic) are increasing the amount of heat trapping gases released into the atmosphere, causing the climate to change.
- Reducing anthropogenic heat trapping gases can mitigate the impact of anthropogenic climate change.

Science strand

- Living World
- Planet Earth and beyond
- Physical World

Assessment

Please refer to individual modules for learning intentions and success criteria.

Overarching learning outcomes

Through learning about the interrelated, interdependent, or interacting parts of Earth's systems, ākonga will:

- explore the complexity of these processes; understand that these processes happen continually though their effects are not always obvious; understand that other knowledge systems, e.g. mātauranga Māori and other indigenous knowledge, can help broaden that understanding
- investigate the relationship between the atmosphere and the biosphere, and between climate and weather
- understand that scientific knowledge can be used to help living things mitigate and adapt to the impact of a changing climate.

In studying the link between heat trapping gases and human behaviour, ākonga will explore:

- the nature of individual heat trapping gases, relationships between each gas and human behaviour, the impacts of heat trapping gases on other living things
- the impact that increases in heat trapping gases in the atmosphere have on Earth's systems
- the nature of experimentation: making predictions, observing, recording results, and drawing conclusions.

Through studying how human behaviour increases the amount of heat trapping gases in the atmosphere, ākonga will:

- learn how increases in heat trapping gases in the atmosphere impact Earth's systems
- investigate how living things can adapt to the impact of climate change and explore how humans can mitigate that impact
- learn how scientific knowledge about climate change can inform our behaviour, responses, and actions.

Conceptual learning outcomes

Ākonga will understand that:

- ecosystems are a balance of living and non-living elements, that interact with each other
- heat trapping gases are part of the atmosphere
- human behaviours are releasing heat trapping gases, changing the climate and impacting all life on earth.

Procedural learning outcomes

Ākonga will be able to:

- explain cause and effect
- generate and identify questions that are suitable for an investigation
- confidently make predictions
- carry out a procedure by following a sequence of simple steps
- record and analyse results appropriately.

Nature of science outcomes

Ākonga will understand and appreciate that scientists:

- make categories so they can understand what they see
- make predictions, then test them
- use observation and describe what they see
- change their ideas over time as they find and make sense of new discoveries.

Technical learning outcomes

Ākonga will be able to:

- label observational drawings
- label test equipment
- develop technical skills.

The learning programme across the curriculum

Key competencies

Using language, symbols, and texts: Learners explore and apply a variety of methods for communicating information, experiences, and ideas. Through their inquiry they select the most appropriate way to present information and ideas about climate change to their target audience.

Thinking: Learners explore a range of concepts and related questions about Earth's systems, climate and weather, climate change causes and impacts, and responses to reduce and adapt to those impacts. They are encouraged to develop and apply critical thinking and literacy skills, and to bring this knowledge to an inquiry into one aspect of climate change. This inquiry will explore how behaviour change, innovation and creativity can be employed to reduce the impact of climate change.

Participating and contributing: Learners have the opportunity to actively engage with others to explore climate change. The opportunity for enquiry-based learning acknowledges that young people's voices and actions play a crucial part in a larger, systematic response. The resource encourages learners to think beyond themselves and to access support from other young people, and from other generations and communities.

Social sciences

Ākonga will gain knowledge, skills, and experience to help them understand:

- how exploration and innovation create opportunities and challenges for people, places, and environments
- that events have causes and effects
- how formal and informal groups make decisions that impact on their communities
- how people participate individually and collectively in response to community challenges.

The Arts

Dance

Developing ideas: Express images, ideas, and feelings through dance, using a variety of choreographic processes.

Communicating and interpreting: Prepare and present dance, with an awareness of the performance context; describe and record how the message is expressed through the movement.

Drama

Developing ideas: Initiate and discuss ideas with others to plan and develop drama.

Communicating and interpreting: Present and respond to drama, identifying ways in which elements, techniques, conventions, and technologies create meaning in their own and others' work.

Music/Sound Arts

Developing ideas: Express, develop, and refine musical ideas using the elements of music, instruments, and technologies in response to sources of motivation; represent sound and musical ideas in a variety of ways.

Communicating and interpreting: Prepare, rehearse, and present performance of music using performance skills and techniques; reflect on the expressive qualities of their own and others' music, both live and recorded.

Visual Arts

Developing ideas: Develop and refine visual ideas in response to a variety of motivations, including an exploration of work by other artists.

Communicating and interpreting: Explore ways in which meanings can be communicated and interpreted in their own and others' work.

English

Speaking, writing, and presenting processes and strategies: Integrate sources of information, processes, and strategies with developing confidence to identify, form and express ideas.

Purposes and audiences: Show an increasing understanding of how to shape texts for different purposes and audiences.

Technology

Technological practice: Planning for practice. Undertake a plan that includes reviewing the effectiveness of past actions and resourcing; explore implications for future actions and accessing of resources; consider stakeholder feedback to enable development of an outcome.

Education for Sustainability

Education for Sustainability (EfS) encourages learners to think and act in ways that will safeguard the future wellbeing of people and planet. Central concepts that ākonga can develop understanding of through EfS include sustainability (the ability of individuals, groups and communities to meet their needs and aspirations without compromising outcomes for future generations), equity (respect for all life, social justice, intergenerational equity, and finite resources), interdependence (biodiversity, community, cultural diversity, democracy, globalisation), and responsibility for action through informed decision-making (citizenship, consumerism, enterprise, resilience, and regeneration).

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- University of South Pacific
- Forest and Bird Te Reo o Te Taiao

Technical glossary

Anthropogenic

Caused by humans or their activities.

Atmosphere

The layer of gases that surrounds the earth.

Adaptation

Actions that can help people or natural systems adjust to the actual or expected impacts of climate change.

Biogenic methane

Methane emissions resulting from biological processes in the agriculture and waste sectors.

Climate

Weather conditions averaged over a period of time.

Climatologist

A scientist who researches and attempts to explain the impacts of climate so that society can plan its activities, design its buildings and infrastructure, and anticipate the effects of adverse conditions.

Climate change

Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates. These changes have a broad range of observed effects that are synonymous with the term.

Deforestation

The conversion of forest land to another use such as growing food for farmed animals.

Ecosystems

An ecosystem is made up of animals, plants and bacteria as well as the physical and chemical environment they live in (Science Learning Hub, n.d.b). [visit the Science Learning Hub, Ecosystems page.](#)

Emissions

Heat trapping gases released into the atmosphere.

Erosion

Erosion is the process of parts of earth or clay being worn away and transported by natural forces such as wind or water.

Fossil fuels

A natural fuel such as oil, coal or gas, formed in the geological past from the remains of living organisms.

Heat trapping gases

Also known as greenhouse gases are gases in the atmosphere that absorb heat energy (known as infrared radiation). Such gases may be described as “long lived” or “short lived”.

Long lived heat trapping gases

Heat trapping gases that persist in the atmosphere for a long time (many hundreds of years) without breaking down. The main long lived gas of concern is CO₂.

Maladaptation

Unable to adjust adequately or appropriately to the environment or situation.

Mitigation

Human actions and behaviours to help reduce harmful emissions.

Representative concentration pathways (RCPs)

The RCPs are a set of standard concentration pathways, each representing a trajectory to a different climate future, depending on the volumes of heat trapping gases emitted in the future. The RCPs, which were developed by the IPCC, help ensure consistency in climate change modelling and research.

Short lived heat trapping gases

Heat trapping gases (primarily biogenic methane) that have relatively short atmospheric lifetimes compared to carbon dioxide.

Tipping Points

The point at which a series of small changes or incidents becomes significant enough to cause a larger, more important change. Some tipping points may be irreversible.

Weather

Day-to-day conditions: sunny, windy, cloudy, rainy, snowy, and so on. For example, a rainstorm can quickly turn into flooding over just a day or two.

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