Climate Change Adaptation Science Plan

Climate change research to support the Department of Conservation Climate Change Adaptation Action Plan.

Background

New Zealand's climate is changing and will continue to do so for the foreseeable future. These changes are already affecting Aotearoa New Zealand's natural and cultural heritage, and our visitor infrastructure and experiences. Regardless of our efforts to reduce greenhouse gas concentrations in the atmosphere, we will experience some ongoing effects of climate change.

The recent Ministry for the Environment report *Climate change projections for New Zealand*[1] states with the highest atmospheric greenhouse gas concentration pathway (Representative Concentration Pathway: RCP8.5) by 2090 we will experience:

- 90 % fewer colder nights
- 30 fewer snow days per year for mountains in the Southern Alps
- 60 more hot days (i.e. days > 25 °C) on average per year
- A 700 % increase in the number of days with "very high" or "extreme" fire risk at some sites.
- 35 % increase in the intensity of 1-hour long extreme rain events
- A 10 % increase in average wind speeds and stronger, more damaging ex-tropical cyclones
- Sea level rise of at least 0.5 to 1.0 m

As the climate continues to change over the coming decades, adaptation, that is changing our management to either reduce or become resilient to climate change, is key to ensuring the Department of Conservation (DOC) continues to meet its responsibilities.

There are significant gaps in knowledge that limit our ability to both adapt our management and understand how climate change will affect the resources we manage. This is both in terms of current state, but also future risk. Amongst other effects this includes, how climate change will alter native species distributions, timing of phenology, prevalence and distribution of animal and plant pests, as well as how visitor destinations and experience may be impacted (e.g. loss of access to west coast glaciers).

To successfully tackle climate change adaptation, we need to be able to understand the impacts of a changing climate, the effectiveness of our management, and innovate both existing and new tools and techniques.

[1] Ministry for the Environment (2018). Climate change projections for New Zealand: Atmospheric projections based on simulation undertaken for the IPCC 5th Assessment Report, 2nd edition, Wellington: Ministry for the Environment

Department of Conservation
Te Papa Atawhai

New Zealand Government

Purpose

The purpose of the Climate Change Adaptation Science Plan is to provide a framework for determining how and what research is needed over the next five years to successfully start doing climate change adaptation. This Plan underpins the advancement of the DOC *Climate Change Adaptation Action Plan*[2] (CCAAP) and fits under its umbrella for integrating the te ao Māori/the Māori world view of the interconnectedness of people and nature. It aligns with the Aotearoa New Zealand Biodiversity Strategy 2020 "Te Mana o te Taiao" (ANZBS)[3], meeting the goals under objective 13, that biodiversity is resilient to the effects of climate change. It also aligns well with the three principles (connect, protect, thrive) of the Heritage & Visitor Strategy and complements other DOC and central government strategies including the, the Biodiversity Conservation Science Prospectus and the National Climate Change Risk Assessment (NCCRA)[4].

Research Framework

The research actions necessary to progress climate change adaptation in DOC and ensure good conservation outcomes are identified in Table 1. These research actions are adapted from the CCAAP, and include the relevant action plan identification, and are all (including the Heritage and Visitor research actions) fitted into the three Pou (pillars) named in the ANZBS. This framework covers a broad scope of research, so does not go into detail at the project level and research prioritisation will occur at the aggregated level.

Also, because there is no specific climate change adaptation research fund, research will be prioritised at a strategic level and mainstreamed into larger projects.

Pathways to follow to progress this Science Plan include:

1. Prioritise research which benefits conservation outcomes at large spatial scales (e.g. climate pressures), benefits multiples species / ecosystems (e.g. tools), or species / ecosystems are at particular risk from climate change.
2. Influence research projects set up to investigate other research objectives to include a climate change component.
3. Leverage / collaborate with external science funders, procurers, and providers to fill research gaps which are of wider benefit than just to DOC (e.g. ocean temperatures, future fire risk, landslide risk, adaptation planning tools). Do this through: a) DOC Principal Advisors Science Investment (PASIs) strategic relationships with central government science funders (e.g. MBIE, MPI/slmmac), procurers (e.g. MfE, MPI), and providers (e.g. CRIs, Universities, and National Science Challenges, and Regional Councils); and b) existing staff relationships with science providers.

Outputs from this Science Plan include:

1. An annual DOC cross functional workshop to ensure collaboration and promote research synergies.
2. A list of DOC research priorities to use to influence / leverage / co-develop research projects with external science providers.
3. A register of DOC research and significant external research. This will track progress and will feed into the CCAAP action register.

[2] Christie et al. (2020). Climate Change Adaptation Action Plan. Wellington: Department of Conservation.

[3] Department of Conservation 2020. Te Mana o te Taiao - Aotearoa New Zealand Biodiversity Strategy. Wellington: Department of Conservation

[4] Ministry for the Environment 2020. National Climate Change Risk Assessment for Aotearoa New Zealand: Main report – Arotakenga Tūraru mō te Huringa Āhuarangi o Āotearoa: Pūrongo whakatōpū. Wellington: Ministry for the Environment.

Table 1. Framework for what climate change adaptation research need to be done. Research actions are summarised from the CCAAP and fitted within the three ANZBS Pou (pillars)

WHAKAHAU
Empowering action

	Improving understanding of the impacts of climate change	CCAAP ID#
1.1	How species traits (e.g. breeding, torpor), distribution or location drives vulnerability to climate change. Prioritise species already affected or known to be at risk.	TB1b, TB1d, AB1b, AB1d
1.2	Identify the critical climate drivers of ecosystems (e.g. temperature, rainfall, drought) and their likely response to climate change (e.g. phenology) and when tipping points could occur. Prioritise ecosystems already affected or known to be at risk.	TB1c, AB1c
1.3	How pressures (e.g. pests, drought, fire, land use change) will interact with climate change to impact ecosystem and species. Prioritise pressures already known or suspected to be climate limited or transformational to ecosystems.	TB1e, TB1f, TB1g, TB1h, AB1e, AB1f, AB1h
1.4	How pressures (e.g. landslides, flooding, coastal inundation) will interact with climate change to effects infrastructure (e.g. biodiversity, heritage & visitor) and people's connection to nature. Prioritise locations already affected or known to be at risk.	TB1j, AB1g, HV1b, HV1c
1.5	Identify the critical climate drivers of visitor use patterns and how these interact with visitor experience and risk. Prioritise activities already affected or known to be at risk.	HV1d
1.6	How location (e.g. coastal, high rainfall site) and composition (e.g. wooden or brick structure) of cultural heritage interact to influence exposure to climate change. Prioritise types of cultural heritage already affected or known to	HV1e, HV1f, HV1g

TŪĀPAPA
Getting the system right

	Information and monitoring needs	
2.1	Confirm what long-term monitoring needs to be sustained and identify where new information is needed to answer climate related research questions.	ER2a
2.2	Identify where finer resolution information is needed to support coarser regional scale models and drive 'end to end' processes.	ER2d, ER2g
2.3	Innovate new and existing monitoring tools (e.g. remote sensing, visitor counters) to measure climate related processes (e.g. phenology) and patterns (e.g. visitor numbers).	ER2b
2.4	Research to underpin the development and use of climate change adaptation planning tools (e.g. Adaptive pathways) for biodiversity, heritage, and visitors	ER3c

TIAKI ME TE WHAKAHAUMANU
Protecting and restoring

	Supporting climate change adaptation management	
3.1	Determine the effectiveness of existing management biodiversity, heritage and visitor tools and techniques (e.g. timing of pest control, use of toxins, hut booking systems) in the face of climate change	TB1j
3.2	Innovate new and repurpose existing management tools (e.g. pest control, hut water supply) and techniques (e.g. deer control for forest resilience to drought) to be used for adaption to enhance the long-term resilience of biodiversity, heritage and visitor experience to climate change	TB4b, HV4c TB4d, AB4d, AB4e
3.3	Develop management tools to restore / recover biodiversity, visitor infrastructure and visitor use following catastrophic climate events.	TB4h, AB4f
3.4	Identify how to ensure ecosystem restoration and carbon sequestration has long-term resilience to climate change	TB4i