Summary of Wellington Regional Climate Change Impact Assessment

December 2024

This summary report synthesises the recent Wellington Regional Climate Change Impact Assessment Report (WRCCIA)[1]. It is the first time climate change projections have been considered together with the things we care about across the region. The target audience for this document is those wanting a plain English, summary version of the full report.

Wellington
Regional Leadership Committee

Introduction

The Wellington region is no stranger to adapting to all kinds of different weather. Prior to colonisation, Māori avoided the land around Te Awa Kairangi /Hutt River as they were aware of the flood risk. In contrast, the first European settlement[2] in the Wellington region was close to the mouth of the Te Awa Kairangi / Hutt River. However, soon after initial settlement, ongoing flooding caused many Pākehā settlers to abandon the site and relocate to Thorndon.

In the future, the Wellington region[3] can expect:

1. More intense storms and heavy rainfall, with an increased risk of flooding and rainfall induced landslides.
2. More frequent dry periods, which could result in drought and wildfires.
3. Sea-level rise in low-lying coastal areas posing an increased chance of flooding, including a heightened risk of storms surging inland, damaging infrastructure and properties, and impacting people's lives.

The future of the Wellington region under climate change will require flexibility, proactive adaptation and cohesion. Entities in the region are doing incremental adaptation work already, but this work lacks a regional focus, instead occurring in ad hoc and inconsistent ways. Adaptation to the impacts of climate change occurs locally, place by place, but each action also occurs as part of a regional and national system. Critical infrastructure, river systems and the way people live their lives are independent of administrative or other boundaries and so collaboration and coordination is essential.

In many ways, it also told us what we already know – the region must plan for the impacts of increasing climate-related hazards and invest in adaptation. However, this is the first time this information has been brought together at this scale, highlighting the interconnected nature of climate-driven risks across the region.

The key messages of this report include:

- Even with emissions reductions, adaptation to ongoing climate impacts is necessary and requires appropriate planning and investment.
- Social cohesion across a variety of communities is at risk from hazards exacerbated by climate change, and councils need a better understanding of the potential impacts.
- Understanding and addressing how different hazards interact is vital when making choices about how and where we want to live.
- Council decisions on population growth and development directly influence how communities will live with and adapt to the risks of a changing climate.
- Consistency of knowledge, data and information is an issue nationally and across the region, as is the lack of baseline data in some rohe (geographic areas) and sectors.
- The region's current governance[4] and institutions are hindering adaptation planning and implementation and are not fit for purpose under Te Tiriti.
- There are opportunities to work as Te Tiriti partners with local iwi and hapū on climate adaptation.

What does the full WRCCIA report do?

The report seeks to identify opportunities to build the Wellington region's collective capacity to adapt to climate change impacts over the next 100+ years in a way that best supports our people, environment, and economy. It is based on research and data that looks at what could happen in the region under a changing climate and provides an assessment of what is most at risk.

It aims to help local councils, iwi, communities, business and central government better understand:

- The current climate situation in our region and what could happen here by 2050 and 2100 using two different climate scenarios[5].
- Where and what is at risk – including aspects of our society, our natural and built environments, the regional economy, and our institutions.
- How different hazards such as flooding, coastal erosion, landslides, coastal inundation, higher temperatures, sea-level rise, drought, wild-fires, and extreme weather events have different impacts across the region and how these impacts change over time.
- How significant climate change will be for the things we care about.

The full report does not provide assessment at a local scale. Nor does it incorporate a Te Ao Māori world view, which is broader and more holistic than a sectoral, risk-based approach. Because the impact of climate hazards will be felt differently across different parts of the region, this report points to the need to 'ground truth' this regional scale assessment with more specific work at the local level.

The findings of the WRCCIA represent the first important phase of the Regional Adaptation Project. The next phase has already begun and will use these findings to inform a regional approach to adaptation planning that ensures our society and environment become increasingly resilient to the impacts of a changing climate.

Working with uncertainty

There is significant scientific uncertainty around what the future climate in the Wellington region might be, especially in the more distant future. However, because we still need to make decisions now, we must work with uncertainty. This is done in a risk assessment by considering the risk generated by a range of changes associated with a changing climate in two possible futures:

- A moderate emissions scenario is the path where emissions peak around 2040 and then begin to decline
- A high emissions scenario is what could ensue if fossil fuels continue to be used as we do today.

Although many futures are possible, picking these two scenarios provides enough variation for us to identify a range of possible risks. In reality, we don't know what the future will hold. However, using a risk assessment means we can find the problem areas ahead of time and implement adaptation to manage the worst risks.

What does the full WRCCIA say?

The report took a look at the climate risks and impacts in the Wellington region, sector by sector, hazard by hazard under each of the two scenarios above. Similar to the National Climate Change Risk Assessment[6] results were recorded against each of the following domains:

1. The natural environment | whenua
2. Human | oranga tangata
3. Built environment | taiaohanga
4. Economy | whairawa
5. Governance | kāwanatanga

Overall the assessment identified 363 different risks and 11 opportunities[7]. These were then shortlisted and a further more detailed assessment was carried out on the priority risks.

Natural hazards assessed

The report assessed a wide range of natural hazards that are expected to be exacerbated by climate change, key ones identified include:

- **Higher Mean Temperatures:** This includes both air and water temperatures, with implications for ecosystems, human health, and various economic sectors.
- **Heatwaves:** The report anticipates an increase in the persistence, frequency, and magnitude of heatwaves, posing risks to human health, infrastructure, and ecosystems.
- **Drought:** More frequent and longer dry spells are projected, leading to increased drought risk with potential impacts on water resources, agriculture, and fire risk.
- **Increased Storminess and Extreme Winds:** This includes changes in the frequency and intensity of storms, as well as extreme wind speeds, with potential consequences for infrastructure, coastal erosion, and communities.
- **Heavy Rainfall and Flooding:** Projected changes in rainfall patterns, with an increased risk of both river flooding (fluvial) and surface flooding (pluvial) due to more intense rainfall events.
- **Coastal Hazards:** This encompasses a range of hazards related to sea-level rise, including:
  - *Coastal inundation:* Flooding of low-lying coastal areas due to higher sea levels.
  - *Coastal erosion*: Increased erosion of cliffs and beaches due to the combined effects of sea-level rise, storm surges, and waves.
  - *Salinity intrusion:* Saltwater intrusion into freshwater systems and aquifers due to rising sea levels.
- **Landslides:** The region's hilly topography makes it susceptible to landslides, which can be triggered by intense rainfall. Landslides can damage infrastructure, disrupt transport networks, and pose risks to communities.
- **Reduced Snow and Ice Cover:** Higher temperatures are expected to lead to reduced snow and ice cover, with implications for water resources, ecosystems, and tourism.

The report also makes a distinction between risk and impact, as below:

- **Risk:** The potential for negative consequences, considering both the likelihood of a hazard and the vulnerability of what's exposed.
- **Impact:** The actual consequences or effects that could occur.

Key findings

The key findings of the report, across each domain are detailed in Appendix A of the Report[8] and summarized below:

Built Environment

- The most significant climate-related hazards to the built environment are coastal erosion, landslides, and flooding (both freshwater and coastal).
- These hazards can cause significant damage to buildings and infrastructure, leading to substantial financial costs and potential disruption to transport networks.

Natural Environment

- The main climate-related risks to the natural environment are higher temperatures, flooding, and sea-level rise.
- These hazards can alter the composition and functioning of ecosystems, leading to a loss of habitat and biodiversity.
- Freshwater ecosystems are particularly vulnerable to these risks, as are coastal and marine ecosystems.

Human Domain

- The key climate-related risks to the human domain are a loss of social cohesion, damage to cultural heritage sites, and an increase in existing inequities.
- These risks can lead to displacement, trauma, and a breakdown of communities.
- Māori are likely to be particularly vulnerable to these risks.

Economic Domain

- The main climate-related risks to the economic domain are disruptions to international trade, damage to the tourism and forestry sectors, and an increase in insurance premiums.
- These risks can lead to a decline in economic productivity and job losses.
- Primary industries, including agriculture and forestry, are particularly vulnerable to these risks.

Each council, iwi, hapū, organisation, business and community will experience climate change differently. However, the way we live and work, along with our ecosystems and governance arrangements all transcend administrative boundaries.

Governance

The current approach to governance is hindering adaptation planning and implementation. Risks resulting from the current structures of governance were rated extreme in the WRCCIA report. Governance in this context includes:

- the legal and institutional arrangements that govern Council work,
- engagement with community and sector interests across the region,
- partnerships with iwi- Māori, and
- how adaptation-relevant decisions are made.

Unaddressed governance risks could lead to maladaptation[9] as decision-makers like councils and central government continue to use practices, processes, and tools that do not account for uncertainty and the ongoing climate changes.

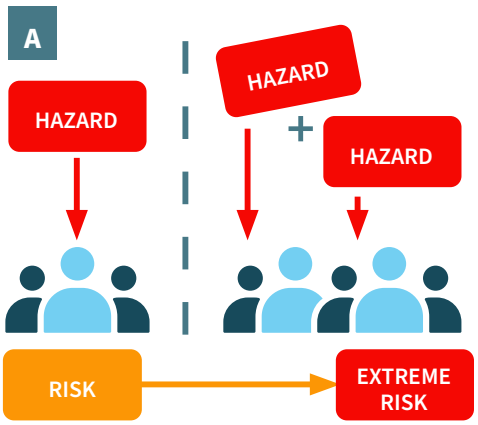
Indirect, cascading and compounding risks

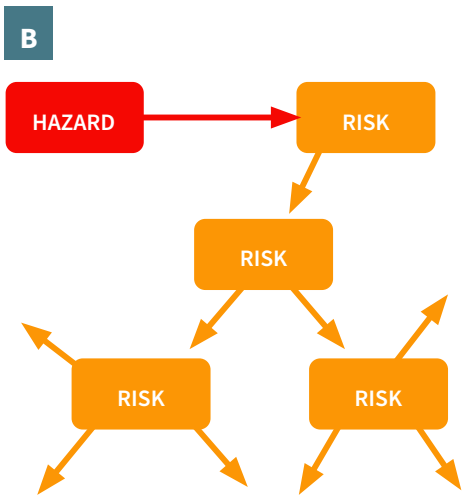
The report investigated indirect risks, compounding risks and cascading risks (refer Figure 1A and B) to illustrate the complexity and interconnectedness of the system. It also took a look at risks that may arise during the needed transition to a decarbonised future.

Figure 1: Simplified conceptual diagram explaining (a) compound risks – where more than one event can occur to increase overall risk and (b) cascading risks – where one risk can influence or lead to another risk or series of risks indirectly. Worked examples can be found in the full report.

Compounding risks are where risks overlap. For example, flooding caused by rain can often occur at the same time and in the same place as storms that bring higher water levels at the coast, leading to even bigger floods.

Consideration of **indirect** and **cascading risks is important** as they provide us an avenue to explore 'so what?' and 'what else?'. They help illustrate the interconnected nature of how an adaptation decision in one place may have a ripple effect somewhere else.





Community

Natural hazards exacerbated by climate change will affect communities by putting homes, property, businesses and facilities at risk. For example, more frequent flooding, or landslides and sea level rise may lead to unreliable or inaccessible infrastructure and services such as power, clean water, and insurance. The report also highlights areas in the Wellington region where people and communities are likely to be repeatedly isolated[10].

Over time, chronically affected locations may be abandoned by those who can afford to move. Those who leave their community behind and those who stay in place will be affected in different ways. Both will experience the breaking of social and cultural bonds. Those who stay may have fewer and fewer facilities and see a decline in infrastructure service, those who move will experience the challenges of resettlement. The impacts of having to leave may be particularly acute for Māori. A reduced ability to maintain a relationship with whenua will likely affect almost all aspects of Māori wellbeing.

Fractured, less cohesive communities are likely to be less resilient following a disaster event and over time as climate change unfolds. Key indicators for a deterioration in social cohesion include decreasing house prices, increases in the deprivation index, social conflict and anti-social behaviour, increasing turnover of residents and rates of property abandonment.

Inequity

In the Wellington region there are existing inequities, with Māori and those who identify as Pacific people over-represented in neighbourhoods of high socio-economic deprivation. While these communities can be resilient, especially when maintaining strong cultural and spiritual connections, they may also experience poor health outcomes, restricted access to education, poor employment and lower levels of home ownership. These factors all increase vulnerability to climate hazards.

Other groups within society already under stress, at an economic disadvantage or potentially more vulnerable (such as those living with disabilities) are also at risk of being further affected by the impacts of climate change. Such groups often rely on strong community bonds and are negatively affected when these are strained or fractured.

Ecosystems

Many of the region's indigenous ecosystems already face high pressure from introduced species. Ongoing sea-level rise, alteration to river flows, warmer temperatures, and declining ocean productivity (as oceans warm) are likely to threaten many of our indigenous and taonga species. Ongoing gradual changes in climate and extreme weather events will exacerbate the threat of invasive or exotic species acting as predators or competition.

It is likely that sustaining viable populations of our taonga species will require additional conservation interventions in response to increasing climate hazards.

Ecosystems are complex systems with interconnected processes. This makes it difficult to predict the full risks and impacts of climate stressors like changes in rainfall and temperature.

Planning

Locally specific challenges need to be considered in a joined-up manner and phased as part of local and regional adaptation actions. This will avoid unnecessary duplication of expenditure and resource, while creating opportunities for efficiencies and mutual benefit. It will also bring a consistent approach to the cross-cutting and interconnected issues involved in risk assessment and adaptation. Current council, iwi and government planning instruments (e.g. Long Term Plans and infrastructure strategies) should also complement each other and take a systematic approach to addressing the impacts of climate change. There is also an opportunity for more aspirational place-based community or neighbourhood development plans to help shape a more climate resilient future.

Need for consistent data

Some notable data gaps constrained a more detailed assessment for the Wellington region at this stage. In addition, the use of different approaches, scenarios, methods and scales for hazard identification, risk assessment, and adaptation planning across the region results in inconsistencies, e.g., where a coarse model shows a property is inundated, but a finer-grained model does not.

Clarity around what kind of information, what level of detail is appropriate for which type of decision is also needed. Consistent information is vital for:

- coherent long-term planning across territorial, iwi, catchment and other boundaries,
- continued operation and planning for critical lifeline utilities such as water, power, and transportation,
- appropriate and integrated central government planning for assets such as schools and housing, and
- reducing the risk of public and media misunderstanding the differences that result from the use of different climate scenarios and information.

National guidance or regional agreement is required to align future modelling and assessment. Those undertaking climate adaptation planning and action need a common language to ensure that decisions made in different spheres are coherent.

Key recommendations

The report outlined a number of adaptation recommendations throughout the report, key ones are captured below:

- **Develop a regional approach to climate change adaptation:** This approach should identify the most vulnerable areas and communities and outline specific agreed methods and actions to address risks.
- **Improve data collection and monitoring:** This will help to better understand the exposure and vulnerability of different elements to climate change impacts.
- **Strengthen collaboration between agencies:** This is essential for ensuring a coordinated and effective response to climate change.
- **Engage with communities:** This will help to build support for adaptation measures and ensure that they are equitable and effective.

The report is a call to action for the Wellington region. It is a reminder that climate change is a serious threat that requires urgent attention. By taking proactive steps to adapt to these challenges, the region can build a more resilient and sustainable future.

The full report and supporting documents can be accessed here - https://wrlc.org.nz/project/regional-adaptation-project

[1] See full report and supporting documents here: https://wrlc.org.nz/project/regional-adaptation-project

[2] Britannia *"The Town that never was"* https://collections.tepapa.govt.nz/topic/1415

[3] The region in this case includes those areas contained within the Greater Wellington Regional Council area – including the Wairarapa and north to Kapiti Coast. Horowhenua which is part of the WRLC region was not included as similar work for this region had previously been undertaken.

[4] Including policy, legislation and decision-making structures

[5] See https://environment.govt.nz/publications/a-guide-to-local-climate-change-risk-assessments/

[6] See https://environment.govt.nz/publications/national-climate-change-risk-assessment-for-new-zealand-main-report/

[7] Including those associated with the transition to a decarbonised future (transition risks).

[8] See Appendix A here: https://wrlc.org.nz/wp-content/uploads/2024/06/WRCCIA-Final-Report-Appendix-A-Public.xlsx

[9] Unintended negative outcomes, such as increased risk or structural or policy failure.

[10] Further and more recent work on this has been completed by Urban Intelligence for the Climate Change Commission's progress assessment on the National Adaptation Plan – see https://www.climatecommission.govt.nz/our-work/adaptation/nappa/nappa-2024/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