



Reflections on Using Risk Assessments in Understanding Climate Change Adaptation Needs in Te Taitokerau Northland

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Climate adaptation involves using understandings of projected climate impacts on society and the natural environment to develop appropriate flexible responses, often using a risk management approach.

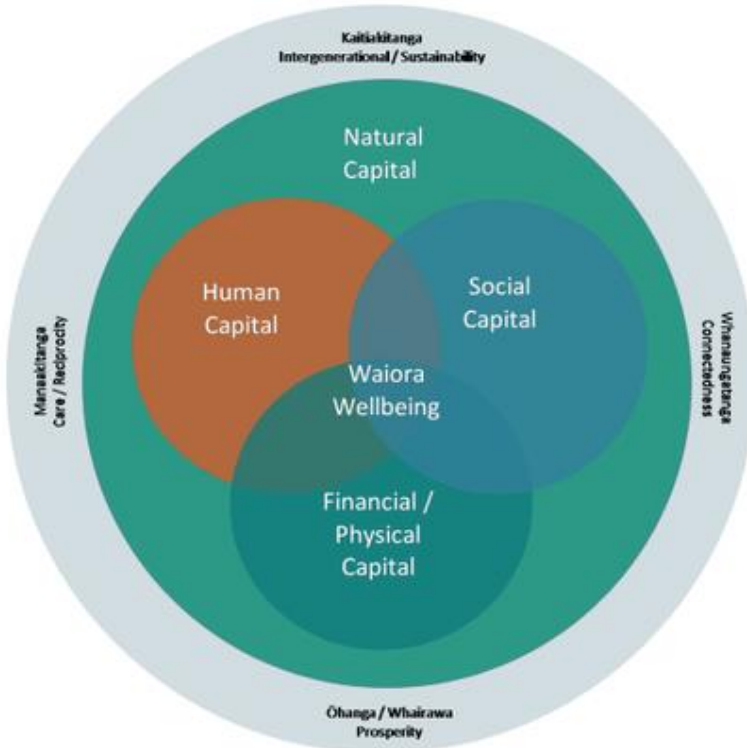
Due to the complexities associated with understanding climate risks, adaptation practitioners face challenges in developing appropriate and effective adaptation actions and policies. Obstacles include inherent uncertainty in the type, timing, severity and interactions of climate hazards and stressors, complexities arising from their cross-scale, cascading and cross-sectoral interactions, and idiosyncratic consequences on different elements of society and the environment.

Other issues relate to the diversity of evidence and varieties in underlying assumptions and the ability of risk assessments to provide guidance for adaptation decision-making and planning [\[1\]](#). While risk assessment is a commonly used tool by local government to characterise climate risks, additional work and creative application is required to advance its use as an effective adaptation decision-support tool. This discussion piece explores ways in which risk assessments have recently contributed to the understanding of climate impacts for local government in Northland, New Zealand.

Risk assessment involves formal methods and processes to describe the nature and level of risk for an event or action, commonly estimated by multiplying the consequence of a hazard event with its likelihood. Risk registers are used by local governments to compare risks across financial, organisational, reputational, and operational domains; at the time of writing, climate change risks top the risk register for one Northland council. One assessment of organisational risk in Northland was calculated by comparing how well different climate hazards were

understood (i.e. data maturity), the role councils play in managing the hazard (level of responsibility) with the potential consequences. This helped give an indication of priority actions for councils to manage different climate risks, including information gathering, policy development, adaptation planning and risk management interventions. These priorities were key to informing the development of a regional adaptation strategy.

New Zealand's first National Climate Change Risk Assessment [\[2\]](#) considered the impacts of multiple hazards on societal values grouped into five broad 'value domains' (the natural environment, built environment, human, economy and governance domains). This approach provides a pragmatic way to create high-level qualitative summaries of climate change impacts from multiple hazards but tends to compartmentalise and separate socio-ecological values, creating a fragmented framing of climate risks. For adaptation practitioners, the approach can create problems in a practical sense when attempting to develop adaptive solutions for climate hazards that cut across different domains.



The He Ara Waiora framework (Ministry for the Environment, 2019)

When developing a 'first-pass' climate risk assessment, Northland councils responded by using systems diagrams to show causal interactions between climate hazards and affected areas of society and the environment. This approach helped describe cascading impacts between domains and hazards, such as where responses to drought can lead to the lowering of water tables, affecting springs and river flows and compounding the impact of saline intrusion due to sea level rise in coastal communities. Nonetheless, feedback from iwi and hapū indicated that the approach still failed to incorporate a te ao Māori worldview in its framing of societal values.

Exposure assessments are common quantitative climate risk assessment approach used by councils, for instance using spatial analysis to count the number of affected ‘value elements’ (e.g. houses, marae) that might be impacted by sea level rise and coastal hazards. While this process is relatively straightforward, quantifying consequences is less so. An example is where indicators such as criticality measures, or depth damage loss assessments are used to understand consequence for council infrastructure assets. While this approach is efficient in that it can use existing data, it often ignores impacts such as those on wider network connectivity, and the differential impacts between communities, which are more difficult to define.

The development of more nuanced risk assessment methodologies attempts to resolve this issue, such as the IPCC’s definition of climate change risk for the AR6 report^[3] which acknowledges the important role of vulnerability in assessing climate risk. Vulnerability assessments can be plagued by both the practical limitations of available tools and data, as well as conflicting framings and value systems in deciding what evidence is included and how it is assessed. Many vulnerability heuristics use combinations of census data such as indices of social deprivation as a proxy^[4], potentially missing key factors that may be in fact primary drivers of sensitivity or adaptive capacity.

For instance, remote Māori communities in Northland show some of the poorest social deprivation statistics in the country, including per-household income. However, these same communities led highly responsive and effective drought responses in the 2020 summer drought where many remote marae, communities and farms ran out of water. Drawing on extensive community relationships, Māori communities quickly developed systems of water distribution to the needy, independent of, and arguably more efficiently than, well-resourced local government responses. Responses to Covid19 have been similarly well-coordinated in Northland Māori communities, indicating a high level of adaptive capacity.

Different knowledge systems and worldviews bring alternative approaches for engaging with climate change impacts and framing conversations on climate change adaptation. While they can be complementary, they can also present incommensurable evidence and conflicting value systems and without appropriate processes to integrate different perspectives, can inhibit the development of appropriate adaptation responses. In 1995, Funtowicz and Ravetz^[5] argued that the interface of science and society was witnessing the emergence of new problems characterised by being long-term, novel and complex, with the best scientific representation by untestable models that include large uncertainties in variables. In addition, they observed that decision-making processes on environmental risk were becoming fraught due to uncertainty in knowledge, high decision stakes, values in dispute and a growing sense of urgency.



Over twenty-five years later, these observations are no less relevant, and it appears that in addressing the impacts of climate change, we are still to realise practical methodologies that ‘enhance the process of the social resolution of the problem, including participation and mutual learning among the stakeholders, rather than a definite “solution” or technological implementation’^[6]. What is needed is a deliberative approach involving the co-production of knowledge (including local, indigenous and expert knowledges), the democratisation of expert, political and bureaucratic power, and processes to ensure the inclusion of ‘values without a voice’ of non-human taonga and future generations. Encouragingly, local governments are adopting more inclusive engagement processes in assessing risks, but we have a long way to go.

One Northland example is in the co-development of mutually agreed coastal hazard information. Following the publication of new coastal hazard maps, there were conflicting community views on the accuracy of the models. In response council engineers, farmers, and drainage managers collaborated to ensure that topographic models derived from LiDAR data reflected the on-ground reality. Clear, grounded communication helped facilitate this process, although differences remain in perceptions of sea level rise values that exceed the lived intergenerational experiences of locals.

Facilitating collaborative adaptation engagement and planning with communities, including using the ‘dynamic adaptive pathways’ approach advocated by the Ministry for the Environment^[7], is one way councils can co-develop long-term adaptation solutions with communities, bringing together both regulatory (such as land-use planning policies and rules) and non-regulatory (such as the provision of infrastructure, information, spatial planning and support for communities) solutions. This approach includes a step devoted to understanding community values and “what matters most”. However, as promising as the prospect of co-designed adaptation planning seems, questions arise concerning the influence of power and framing, what constitutes acceptable knowledge and evidence, and conflicting values in decision-making processes.

Northland councils are developing place-based approaches to adaptation engagement that use methods appropriate for local communities, using region-wide climate hazard data to understand and map community adaptation needs. Exposure assessments were undertaken using a spatial analysis of a small range of community indicators against 3 hazard types (coastal erosion, storm surge flooding and high-tide flooding) at three scenarios (represented by timeframes and indicative sea level rise values). Alongside a consideration of community attributes (like population size, cultural values and desire for self-determination), the exposure assessments informed the development of adaptation profiles for around 70 communities. These profiles identify areas with urgent need or desire for adaptation planning, and help define the types of engagement approach appropriate at the local level. Councils have received feedback from Māori that in some locations, hapū- and iwi-led planning processes will be more appropriate than a council-led process; in others the administration and resources required to develop adaptation plans mean a larger role for councils.



Photo: RNZ / Alexa Cook

Further work is required to ensure that adaptation planning processes embed Māori perspectives; a first step in that process is developing appropriate risk assessment approaches. Hapū and iwi have reiterated the need for tools to consider climate impacts on cultural resources, papakāinga and marae, to enable hapū-led adaptation planning at the local scale. This bottom-up approach will help communicate climate risk in meaningful ways with Māori communities, potentially by working with local knowledge-holders to set parameters how to appropriately combine Western science and risk analysis with indigenous knowledge and apply this in appropriate planning contexts. The approach will also support iwi and hapū to develop their own adaptation plans, by providing tools, hazards advice and other support, while ensuring data sovereignty.

Reducing uncertainty in hazard data and impact consequences is not sufficient to address the issues facing local government in using risk assessments to develop adaptation actions and policies. Moving toward increased participation by communities and tangata whenua in climate risk assessments is a necessary step toward the resolution of incommensurable evidence and conflicting value frameworks in adaptation planning.

References

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[4] See for example: <https://www.ehinz.ac.nz/indicators/population-vulnerability/social-vulnerability-to-natural-hazards/>

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