

# The Case for New Climate Change Adaptation Funding Instruments

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# Executive summary

## *Climate change adaptation – the nature of the challenge ...*

1. Adapting to climate change during the 21st century and beyond poses unprecedented technical, administrative and political challenges for which new governance arrangements, planning frameworks and funding instruments will be required.<sup>1</sup> In effect, humanity faces a slow-motion disaster which will grow in scope and scale progressively, yet sometimes abruptly. The impacts will include ongoing rising sea levels, more severe droughts, storms and rainfall events, biosecurity risks, loss of biodiversity and changing disease vectors. In New Zealand, for example, the value of assets in coastal areas exposed to sea level rise is estimated to be in the billions of dollars. Equally, the annual cost of repairing land transport networks damaged by weather-related events has more than quadrupled over the past decade, while the economic impact of major floods and droughts is also increasing. Importantly, in this regard, Local Government New Zealand estimates that \$1 spent on hazard risk reduction avoids losses and disruption worth at least \$3.
2. New Zealand, like other countries, faces significant uncertainties, multiple and compounding risks, large and growing disaster response and adaptation costs, and complex inter-temporal and inter-sectoral trade-offs. With much of its population located within a few kilometres of the sea, increasing coastal erosion and inundation will generate major policy challenges before such areas become uninhabitable. Tens of thousands of people – and perhaps more – will eventually need to be relocated and resettled, and large investments will be required to redesign, reposition and future-proof public infrastructure, especially transport networks and water services. While there are many examples of managed retreat internationally and some in New Zealand, few have approached the scope, scale or complexity that will be required in the future.

*... the policy framework for climate change adaptation in New Zealand is fragmented ... and the relevant statutes are not well aligned ...*

## *The need for sound anticipatory governance ...*

3. In confronting these challenges, sound, proactive, anticipatory governance will be essential. Policymakers will need to take a long view, looking out a century and beyond, using tools designed for that purpose. While surprises are inevitable, many of the impacts of climate change are readily foreseeable. Policy decisions in the near term and over the coming decades, especially for regional and district planning and infrastructure investment, will need to be made in a way that enables future adjustments to reduce exposure to risk. This will minimise future adaptation costs, both financial and non-financial. For instance, it will be critical to avoid significant new urban development in areas that are likely to face serious flooding, if not complete inundation, later in the century.
4. Efforts will also be needed to ensure that the financial costs of climate change adaptation are shared equitably, both intergenerationally and intra-generationally. Without funding arrangements that are generally regarded as fair, there will be an increased risk of public resistance to cost-effective adaptation planning and climate-smart infrastructure. Similarly, without adequate upfront financial resources, prudent planning decisions may be delayed, or suboptimal temporary 'solutions' adopted. Such problems are likely to increase overall adaptation costs; they will also unjustly shift more of the burden of adjustment onto future generations.

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<sup>1</sup> The authors acknowledge the valuable contributions to the development of this working paper from those attending two workshops in Wellington on 24 February and 21 July 2017. We would particularly like to thank Hilary Blake, Roger Blakeley, Marie Brown, Bryce Davies, Blair Dickie, Tim Grafton, Mike Reid, David Robson, Detlef Sprinz, and Ruth Stokes for their advice and substantial comments on earlier drafts. We are also most grateful to the New Zealand Society of Local Government Managers, the Greater Wellington Regional Council, and the School of Government and the New Zealand Climate Change Research Institute at Victoria University of Wellington for their financial and in-kind contributions.



### *The current adaptation deficits in New Zealand ...*

5. Currently, the policy framework for climate change adaptation in New Zealand is fragmented and not all the available measures are used at the regional and national levels. The relevant statutes are not well aligned and have unclear mandates, which results in perverse outcomes and entrenchment of risk. The framework is thus not fit for purpose. It is becoming increasingly evident that funding arrangements, in particular, are problematic. First, the existing arrangements are largely ad hoc and *post hoc*. They focus disproportionately on *post-event* responses (e.g. post-disaster assistance and recovery) and insufficiently on *pre-event* responses – that is, public funding designed to enhance societal resilience, minimise risk and enable cost-effective adjustments and transitions. Second, the current funding arrangements are poorly integrated, both across policy sectors and across the different tiers of government. Third, there are inadequate mechanisms to ensure that the costs of climate change adaptation are shared equitably, whether intergenerationally or intra-generationally. Fourth, the current arrangements and overall level of resources are unlikely to be sufficient to meet the increasing costs of adaptation over the coming decades. To compound matters, there is a mismatch in many cases between the resources and capabilities available to local authorities and the scope and scale of the adaptation challenges they face.

### *The purpose of this paper ...*

6. This paper discusses the funding of climate change adaptation in New Zealand and, in particular, the need for new funding instruments that can focus on risk reduction and thus complement existing disaster response funding. To avoid policy inconsistencies and the risk of moral hazard, adaptation funding must be well integrated with decision making on regional and district planning and infrastructure investment. Hence, such funding must be part of a wider policy response to the effects of climate change.
7. Part 1 explores the nature, scope and scale of the challenge of climate change adaptation and summarises the current policy frameworks in New Zealand of relevance to adaptation planning. Part 2 outlines and assesses current funding arrangements for climate change adaptation. Part 3 discusses the principles that could inform the design of adaptation funding arrangements and, drawing on these principles, it briefly assesses four possible funding options. Part 4 examines a possible Climate Change Adaptation Fund, including its institutional form, governance, purpose, funding sources, allocative mechanisms and linkages with other adaptation policies. Such a fund would be pre-event and preventative. It would be designed to reduce climate change risk exposure over time and complement existing post-event funding mechanisms, such as the Natural Disaster Fund administered by EQC and private insurance arrangements. It would contribute to the costs of transitions: for example, of managed retreat, including the associated infrastructure costs. It would build up a funding pool over several decades for allocation later in the century, thereby enabling the burden of climate change adaptation to be shared more fairly across several generations.
8. While a new funding instrument could potentially address a range of adaptation costs, the focus of this paper is on sea level rise impacts, such as ongoing inundation and erosion and periodic storm surges. However, the issues raised and options discussed and suggested could also have salience for funding the adjustment costs for other climate change impacts.
9. In summary, in the interests of sound anticipatory governance New Zealand will need regularly to re-evaluate and reform its policy frameworks and institutional arrangements. As it confronts the challenges of climate change adaptation, new policy tools will be required, ones that are simultaneously flexible, future-focused, well coordinated, cost-effective, equitable and resilient. This has major implications for our advisory systems, risk management practices, spatial planning, regulatory frameworks and funding instruments.

*This paper discusses ... in particular, the need for new funding instruments that can focus on risk reduction and thus complement existing disaster response funding.*

# Introduction

Adapting to climate change during the 21st century and beyond poses unprecedented technical, administrative and political challenges that will test the ability to cope at national and local levels. The impacts of climate change will be progressive (sea level rise) and intense (rainfall), and punctuated by abrupt and extreme events (storms, droughts, floods and landslips). Such changes will be outside the variability ranges that we have responded to in the past or are responding to currently. They will be ongoing for centuries, and occur concurrently in time around New Zealand. The risks will compound within, between and across sectors and domains of interest.

The foreseeable impacts will create high damage costs (Bell, Paulik and Wadwha, 2015; Insurance Council of New Zealand, 2014) and raise difficult inter-temporal and intra-generational trade-offs.<sup>2</sup> For instance, in New Zealand insured losses due to extreme weather events were as much as \$175 million in 2013 and \$135 million in 2014 (Insurance Council of New Zealand, 2017). The Treasury estimates that drought cost New Zealand around \$1.5 billion in 2013. Over the last ten years the annual cost of repairing land transport networks damaged by weather-related events has increased from \$20 million to \$90 million. Moreover, these costs can be expected to escalate significantly over coming decades as a result of climate change. Importantly, in this regard, Local Government New Zealand estimates – based on research by Deloitte Access Economics (Australia)(2013) – that \$1 spent on hazard risk reduction will reduce losses and disruption from natural disasters worth between \$3 and \$11. Other international estimates of the likely savings are consistent with these findings (Healy and Malhotra, 2009).

Yet for governments, public expenditure on pre-event risk reduction is often much harder to ‘sell’ politically than the funding of post-disaster recovery. Voters, it seems, reward governments that spend money on disaster relief, but not those investing in prevention and preparedness (ibid.). This phenomenon is common across advanced democracies. It reflects humanity’s myopia and other cognitive biases: citizens tend to value post-event cures over prevention. Unfortunately, such myopia contributes to underinvestment in disaster preparedness and risk reduction, with significant public welfare losses (ibid.).

For a coastal nation like New Zealand, rising sea levels will have a major and increasing impact on the built environment in many coastal regions over the coming decades. Increased frequency of storm events on top of sea level rise will make rare flood events much more frequent at the coast (Parliamentary Commissioner for the Environment, 2015). Longer term, large numbers of people and properties will be affected. For instance, it has been estimated that at least 43,683 homes and 1,448 commercial properties in New Zealand are within 1.5m of the current average high tide in spring (Bell, Paulik and Wadwha, 2015).<sup>3</sup> Sea level rise of this magnitude is possible within a century, and almost certainly during next century. Accordingly, many people will ultimately need to relocate from areas at risk from coastal inundation, higher groundwater levels, and more frequent and intense rainfall events. These impacts will affect whole communities, including significant parts of low-lying coastal settlements. Public infrastructure, including transport and energy systems and water services, will be significantly affected. This includes ports, airports, roads and railway lines, as well as hundreds of critical facilities and buildings. It is difficult to estimate the financial losses and economic costs of all these impacts, but cumulatively they will be very large and will increase non-linearly over the 21st century and beyond (see Box 1).

<sup>2</sup> For various perspectives see: Basher, 2016; Glavovic, 2014; Local Government New Zealand, 2016a; Parliamentary Commissioner for the Environment, 2015; Reisinger et al., 2014; Royal Society of New Zealand, 2016; Stephenson, McKenzie and Orchiston, 2017; Storey et al., 2017.

<sup>3</sup> This study covered only the more populated regions of New Zealand.

*For a coastal nation like New Zealand, rising sea levels will have a major and increasing impact on the built environment in many coastal regions over the coming decades.*

## BOX 1

# Estimating the economic costs of sea level rise

There is a modest but growing international literature on the likely economic costs of sea level rise. This draws on a variety of climate change scenarios and methodologies (Boettle, Rybski and Kropp, 2016; Hinkel et al., 2014; IPCC, 2014). Estimating such costs in the near term is easier due to the certainty of sea level rise, the built-in emissions trajectory from past emissions and our knowledge of the current exposures of people and assets. However, over the longer term cost estimates are more difficult to assess due to uncertainties in the rate and magnitude of changes in sea level rise and storm surges. In estimating costs, relevant considerations include: the timeframes under consideration; the path of global greenhouse gas emissions over the coming decades and beyond; the projected impact of global warming on the polar ice sheets and hence the pace and magnitude of sea level rise (especially later in the century); the projected impact of climate change on ocean currents and storm patterns; the assumptions made about the pattern and scale of future human development, especially in coastal and low-lying areas vulnerable to higher seas and storm surges; the nature and types of risks (e.g. compounding and cascading) considered and their related costs (e.g. direct and indirect, market and non-market); how losses (e.g. land, buildings and infrastructure) are valued; and assumptions about the kind of adaptation measures or protection strategies adopted.

Assuming no additional protective measures are taken, Hallegatte et al. (2013) estimate – based on a study of 136 major coastal cities – that sea level rise and related changes to the pattern of storm surges, floods and major storms could cost as much as US\$1 trillion annually by 2050 (i.e. globally) and multiple times this figure by 2100. Likewise, Hinkel et al. (2014) estimate that if the sea level rises by 1.23m by 2100, and if no adaptation

occurs, then up to 4.6% of the global population would be flooded annually, with expected losses of over 9% of global domestic product annually. Losses of this magnitude would obviously be unsustainable. According to Hinkel et al., effective coastal adaptation measures, including managed retreat (see Box 3), can be expected to reduce these losses substantially.

There are no comprehensive estimates of the costs of sea level rise for New Zealand over the coming century. A first-pass study of exposed residents, buildings and some infrastructure (roads, railways, port and airport facilities and critical facilities or government buildings) by Bell, Paulik and Wadwha (2015) for the Parliamentary Commissioner for the Environment (2015) provides an indication of the scale of costs. For instance, without adaptation, sea level rise of up to 1.5m would affect over 133,000 people and damage buildings with a replacement cost of close to \$20 billion (in 2011 dollars). Sea level rise of up to 3m would affect over 280,000 and damage buildings with a replacement cost of over \$50 billion (in 2011 dollars).

Regardless of the precise costs that New Zealand faces from sea level rise this century and beyond, several matters are clear: a) the costs will increase in a non-linear manner (i.e. as seas rise, the costs will rise even faster); b) the costs will be greater if emissions globally peak late and then fall slowly; c) the costs will escalate significantly as the century advances; d) the costs will be greater if there is further urban development in areas vulnerable to rising seas; e) the costs will fall unevenly geographically and intermittently; and f) the costs will be greater if governments (national and subnational) fail to invest in effective risk reduction and adaptation initiatives.

## Introduction

Mitigating some of the risks and increasing societal resilience via proactive, prudent and flexible policy responses – ones that can be adjusted as the future unfolds – will be necessary to reduce the potential escalation of costs over time. But implementing risk reduction strategies will be politically challenging for at least two reasons. First, such strategies will often entail substantial upfront fiscal costs – which, as indicated above, many citizens are reluctant to support. Second, some communities may resist the required changes in regional and district planning because they expect state protection and/or because they give priority to their property interests and sense of place.

Yet in the long term a failure to implement prudent and effective adaptation strategies will be even more costly.<sup>4</sup> The increased frequency of smaller events will undoubtedly add to such costs without a concerted effort to stem further exposure and explore options for adaptive risk management. Better anticipatory governance will be essential if the net long-term costs of adaptation are to be reduced.

Aside from this, there are significant equity issues over how the burden of adjustment, as well as the cost of damages from climate impacts, should be shared. Inevitably, the costs will fall differentially across and within generations depending on the capacity and willingness to adapt. Indeed, if policy decisions today and over the coming decades entrench risk exposure, then future generations will bear even greater burdens.

New Zealand has committed to the Paris Agreement negotiated in 2015 and ratified in 2016 (which includes provisions relating to climate change adaptation planning) and the Sendai Framework in 2015 to reduce risks from natural hazards, and it has elevated natural hazards to a matter of national importance under the Resource Management Act (RMA). It is therefore timely to consider whether new approaches to funding climate change adaptation are required, approaches that reduce exposure and the risk of future damages under the widening range and severity of climate-related changes.

Accordingly, this working paper discusses the need for a new approach to funding climate change adaptation over the coming century and beyond, especially the impact of sea level rise. Part 1 explores the nature, scope and scale of the challenge and summarises the current policy frameworks in New Zealand of relevance to adaptation planning. Part 2 outlines and assesses current funding arrangements for climate change adaptation. Part 3 discusses the principles that could inform the design of adaptation funding arrangements and, drawing on these principles, it briefly assesses four possible funding options. Part 4 briefly examines the creation of a Climate Change Adaptation Fund, one that would be pre-event and preventative rather than post-disaster.

*New Zealand has committed to the Paris Agreement negotiated in 2015 and ratified in 2016 ... and the Sendai Framework in 2015 to reduce risks from natural hazards ...*

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<sup>4</sup> New Zealand is already experiencing increased damage to property and economic activity due to severe weather events. For instance, there have been repeat flood events in Northland affecting Kaeo (most recently in 2014), there was severe flooding in Nelson and Tasman (December 2011), Dunedin (June 2015), Coromandel and Edgecumbe (May 2017), and in coastal communities in Wellington (June 2013), and Canterbury suffered significant damage from a windstorm in September 2013.



# Part 1 Background and policy context

Growing populations will combine with the impacts described earlier to increase exposure and vulnerability. The emissions trajectory that the world gets locked into will determine the scale of the adaptation challenge. Climate variability and extremes, and the extent to which they are outside the historical and current range, will affect the ability of societies to adapt to, and cope with, the new climate conditions. Also, different natural and human systems will have different capacities to adapt.

Fundamentally, the adaptation challenge is to reduce risk now and for the future. This means that decisions being taken today need to avoid locking in further exposure to damages. Some new investments will have long lifetimes, either in greenfield sites or through intensification in existing communities. Mitigation of risk will likely have physical and affordability limits, especially where the sea level is rising and will continue to do so for centuries even if greenhouse gas emissions were to stop today.

New Zealand local authorities are on the front line of adaptation. They have responsibilities, arising from several statutes (see Box 2), to address the reduction of risk from natural hazards and the effects of climate change. They are all at different stages in tackling the risks, with a historical emphasis on protection and with varying degrees of attention to reducing risk exposure through planning. Consideration of the efficacy of ongoing protection measures under changing climate conditions, and transitioning communities to more sustainable options, have had less attention to date (Lawrence et al., 2016).

New Zealand's policies and funding institutions largely address property damages *post hoc* through the EQC (see below), the Adverse Events Fund for rural areas, and ad hoc political decisions to support affected communities. Proactive risk reduction actions are confined to the planning framework in the RMA, which includes natural hazard avoidance, mitigation and reduction of risk, and regard to climate change effects. It is supported by flood warning under the Soil Conservation and Rivers Control Act 1941 and preparedness under the Civil Defence Emergency Management Act 2002. However, these statutes are not well integrated. In the case of the Building Act 2004 there are time inconsistency problems (e.g. a 50-year focus versus 'at least 100 years' in the New Zealand Coastal Policy Statement under the RMA) and the focus is only on the life-saving aspects of risk. Private insurance works alongside these instruments.

Existing funding mechanisms also have limitations. These include creating potential lock-in of current risk exposures by not having 'betterment' provisions (e.g. via insurance and EQC), but are mostly because they operate after damage has already occurred. Ad hoc responses to climate events as seas continue to rise will be increasingly costly and socially disruptive. A long-standing pattern of Crown 'bail-outs' not only has potential to create equity issues, but also raises public expectations of continued protection and funding assistance (see Appendix 1). Equally, it generates a potential 'safety paradox', where the long-term implications of increasing climate risk profiles are inadequately considered during the recovery process. Clearly, an integrated package of risk reduction statutes and tools for implementation is required, alongside funding mechanisms to implement them efficiently and equitably.

*New Zealand's policies and funding institutions largely address property damages post hoc through the EQC ...*

It is fair to say that the contingent liability at the local and national levels of government is not currently underwritten sufficiently to cover the known and likely effects of climate change, especially those outside the range of current climate impacts experienced. This suggests that hedging behaviour may be at play by central and local government or that there is poor risk information available to revise the policy settings. The question also arises as to whether current responses are an efficient use of public funds (whether generated by taxes or rates) and whether foreseeable risk should be anticipated and adapted to as the general rule. Local government alone is responsible for 'more than \$100 billion of community assets' (Office of the Auditor-General, 2014), comprising water supply, waste water, storm water and road infrastructure. The ongoing challenge for local and regional authorities to maintain and renew such assets as climate-related hazards and risk profiles increase (e.g. in Christchurch, Whanganui, Edgumbe, Hawke's Bay, Dunedin South, and locations on the West Coast of the South Island) has resulted in requests for new insurance models (Local Government New Zealand, 2016b), new funding models founded on principles-based partnerships with central government (Local Government New Zealand, 2015), and the development of new local government approaches for adaptation (see below).<sup>5</sup>

*... even with a 30cm rise in sea level, as is projected between 2015 and 2065, there will be a greatly increased frequency of what are now extremely rare events.*

In the wake of disasters, such as the recent flooding of Edgumbe in the Bay of Plenty, governments often provide various kinds of financial assistance. This includes support for affected homeowners, subsidies for struggling businesses (e.g. grants and temporary employment subsidies) and new investment in public infrastructure (e.g. for roads, schools and hospitals). In the case of Edgumbe, assistance has been granted to homeowners irrespective of whether their properties were insured (see below). Drought assistance to farmers under the adverse events policy also operates in the absence of insurance (see below).

Such policy interventions have created a political context in which the public expect governments to take reasonable steps to help those affected. Such expectations are likely to apply to the impacts of sea level rise, even though many of these impacts are already foreseeable.

Citizens have expectations that local councils will make prudent decisions regarding where people can settle and buildings erected. If councils fail to take proper account of known and foreseeable risks and permit construction to occur in harm's way, then there is potential for them to be held legally liable for the subsequent damages. An example of liability arrangements is in the Building Act, which makes councils jointly and severally liable for any failings (the last one standing regardless of fault). In the case of leaky homes (Mumford, 2011), costs were eventually shared three ways between central and local government and homeowners, after a long and disruptive process for all concerned.<sup>6</sup> Some commercial property companies repaired properties early to guard against reputational risk, while some other parties no longer existed when the full damage was appraised.

A few councils have made advances despite the barriers, but largely on an individual council and piecemeal basis (see Box 4). The measures used in planning generally have had the effect of reinforcing current exposures, because they are static in space and time bound: much development can occur between reviews of policies and plans, and lines on planning maps convey a sense of certainty, thus reinforcing permanency. The different statutes (see Box 2) that are used by councils to implement related but separate functions create non-alignment (e.g. time inconsistency of planning horizons) and confusion, especially in the absence of critical national policy statements and regional plans that could drive consistency and efficiency. At worst, they

<sup>5</sup> Clifton to Tangoio Coastal Hazards Strategy, <http://www.hbcoast.co.nz/strategy-development/>.

<sup>6</sup> Overall, 64% of the costs were borne by the owners, 26% by councils and 10% by central government.

embed risk exposure. Each council approaching such matters alone, using different approaches, creates inconsistencies across regions and nationally. These, in turn, create inefficiencies and potential inequities within and across generations for the large transformational changes that sea level rise will necessitate.

Furthermore, even with a 30cm rise in sea level, as is projected between 2015 and 2065, there will be a greatly increased frequency of what are now extremely rare events. For instance, one-in-100-year events will occur annually at the Wellington and Christchurch ports, every two years at the Dunedin port and every four years at the Auckland port (Parliamentary Commissioner for the Environment, 2015, pp.28–9). Such sea level rise and storm events are likely to be unacceptable to those affected within reasonably short time frames and certainly within the time frame of current generations.

Large investments across a number of different types of responses – hard structures, soft buffers and managed retreat (see Box 3) – will be necessary to respond to the anticipated damages. Protective structures will often not be affordable, practical or cost-effective, and some communities

## BOX 2

### Climate change adaptation: the statutory responsibilities of local government

The Local Government Act 2002 places a strong emphasis on sustainable development and forward thinking. Under section 10(1) of the act, the purpose of local government is to satisfy the current and future needs of communities, including for local infrastructure and public services. In this context, infrastructure and services must be, according to section 10(2), ‘appropriate to present and anticipated circumstances’. Similarly, under section 14(1)(h)(iii) of the act, local authorities are required to take into account ‘the reasonably foreseeable needs of future generations’. They are also charged, under section 11A(d), with having particular regard in undertaking their role to ‘the avoidance or mitigation of natural hazards’. Under section 101B councils must take into account the need to provide for resilient infrastructure assets by identifying and managing risks to natural hazards and making appropriate financial provision for those risks.

The Resource Management Act 1991 is the principal statute with express provisions relating to climate change. Under section 7(i) all those exercising functions under the RMA in relation to managing the use, development and protection of natural and physical resources shall have particular regard to ‘the effects of climate change’. Alongside the ‘avoidance or

mitigation of natural hazards’, managing the effects includes cumulative effects ‘regardless of the scale, intensity, duration, or frequency of the effect and also includes any potential effect of high probability; and any potential effect of low probability which has a high potential impact’.

Local authorities have responsibilities under many other statutory and non-statutory instruments of relevance to climate change adaptation, including the Civil Defence Emergency Management Act 2002, the Building Act 2004, the New Zealand Coastal Policy Statement 2010 and the Ministry for the Environment’s guidance manual *Coastal Hazards and Climate Change* (2008). For instance, objective five of the New Zealand Coastal Policy Statement requires that coastal hazard risks are properly managed, taking into account the effects and risks of climate change. In this regard, local authorities are charged with ensuring that new development in coastal areas is located ‘away from areas prone to such risks’. Likewise, in the case of existing coastal development that is at risk, councils are required under the Civil Defence Emergency Management Act to respond, including the possibility of managed retreat and transition mechanisms (New Zealand Coastal Policy Statement).

will face the prospect of withdrawal from the coast sooner than others. If responses are not planned in an orderly fashion there will be significant equity issues and dislocation, and future generations will face greater costs. Such threats are not distant: planning response measures and analysis of the funding implications need to start now before the impacts escalate and increase the residual risk that civil defence emergency management planning must provide for. An example of how a council has anticipated such risk is outlined in Appendix 2.

There are processes and assessment methods that enable such implications to be assessed. Some provide a framework for the assessment of options that are adjustable over time using triggers before critical thresholds are reached. Hence they can enable more open engagement with communities, thus reducing the risk of blocking coalitions of interests that could create difficult political contexts and potentially derail implementation.

### BOX 3

## Managed retreat

Technically, 'managed retreat' is defined as 'the application of coastal zone management and mitigation tools designed to move existing and planned development out of the path of eroding coastlines and coastal hazards' (quoted in Hino, Field and Mach, 2017, p.1). It is deliberate, intentional, coordinated and planned. The aim is to reduce natural hazard risk permanently, rather than temporarily. According to Hino, Field and Mach, over the past three decades approximately 1.3 million people in 22 countries have been relocated – in both pre- and post-disaster contexts and both voluntarily and involuntarily – through managed retreat. While significant, this is a tiny number compared to the scale of displacement expected during the 21st century and beyond (which will affect hundreds of millions globally).

Understandably, managed retreat is often viewed as complex and controversial, partly because of the significant up-front financial costs, but more importantly because of the more intangible costs – the loss of 'place', the social, emotional and psychological challenges of displacing people from their homes, the disruption to community life, and the loss of buildings or land of architectural, aesthetic or spiritual value. However, managed retreat can be implemented in a staged and progressive manner, as 'managed' suggests, preferably through community engagement processes that can address the sense of loss of place and value.

An example in New Zealand where managed retreat has been implemented is Twin Streams in Waitākere,

Auckland. Voluntary property purchase was offered within an inclusive participatory process across the community which linked environmental, social, economic and cultural goals by providing new public resources and accommodating those who moved to other areas. The availability of a regional fund enabled the retreat from flooding to be implemented.

Managed retreat options are being considered currently as part of a suite of adaptation options in two coastal localities. In Matatā in the Bay of Plenty a voluntary retreat option has been included after ten years of investigations following a weather-induced debris flow that engulfed a coastal community.<sup>7</sup> Voluntary retreat is unlikely to be implemented by the council unless there is landowner support, which is contingent on details of property purchase arrangements being available and acceptable. If retreat were to be enforced, empowering legislation is likely to be required. Funding needed to incentivise implementation is beyond the means of the district council, which means that regional and central government funding would be required. Many other issues arise that make implementation difficult: rating equity; confirmation of retreat boundaries; availability of affordable alternative building sites; existing use rights; planning issues; and property purchase criteria. In the second case, the Clifton to Tangoio Coastal Hazards Strategy 2120 in Hawke's Bay has managed retreat as one of the options being considered for the medium to long term in the community engagement process currently underway.

<sup>7</sup> 'A process towards a settlement framework to mitigate debris flow risk – Awatarariki fanhead, Matata', [https://www.whakatane.govt.nz/sites/www.whakatane.govt.nz/files/documents/about-council/council-projects/debris-flow-and-landslide-hazards/policy\\_committee\\_2\\_july\\_2015.pdf](https://www.whakatane.govt.nz/sites/www.whakatane.govt.nz/files/documents/about-council/council-projects/debris-flow-and-landslide-hazards/policy_committee_2_july_2015.pdf).



## BOX 4

# Recent adaptation funding initiatives by local government in New Zealand

### South Dunedin

There are 2,700 homes on low-lying land in South Dunedin that are less than 50cm above the spring high tide. The groundwater table is close to the ground surface, and, in some cases, less than 20cm below the surface. This means that when there is heavy rainfall or high tides, the water can rise above the ground level and cause temporary nuisance flooding. Over the last century sea levels have risen by about 14cm relative to the land. Longer term, sea level rise is expected to cause permanent ponding of water at the ground surface (according to Otago Regional Council modelling). The implications include damp conditions in homes and associated chronic health issues, and unusable public recreation facilities due to poor drainage. Such outcomes will be exacerbated by increased flooding from heavy rainfall events due to the inability of the water to be absorbed or run off the land. The Otago Regional Council and the Dunedin City Council are currently developing a joint programme to address these challenges for South Dunedin. This includes community engagement to develop a common understanding of climate change and the potential environmental, social, cultural and economic impacts. The work is drawing from international experience for managing rising groundwater, as well as the councils' own modelling and data. The biggest challenge for the councils is to build community confidence about plausible and affordable actions when the changes appear uncertain and are not always obvious now. Many of the necessary adaptation actions will impose significant ongoing costs.

### Hawke's Bay

The Hawke's Bay Regional Council, Napier City Council and Hastings District Council have come together to develop the Clifton to Tangoio Coastal Hazards Strategy 2120 to address the long-standing coastal erosion and inundation along the Hawke's Bay coast, problems that are being exacerbated by sea level rise and increased storm frequency. They have set up a joint council committee, a technical advisory group and two collaborative community panels to develop the strategy. Using a structured and inclusive decision-making process they will recommend adaptive responses to the issues that can last at least 100 years. Both the immediately affected residents and the wider community are being consulted to gauge their

appetite for different adaptation options and their willingness to pay. Ongoing insurance coverage in the coastal areas at risk is uncertain. In addressing the risks and policy options there are expectations that all parties should be treated fairly. However, public funding (via rates) of ongoing costly protection of private property in existing areas at risk will create precedents. Within this context and in the absence of national guidance on adaptation funding, the councils are developing coastal response contributory funding options. The concept aims to embrace current and future funding sources, including public and private beneficiaries (both local and national). It also seeks to ensure that liabilities fall equitably between current and future generations, and that there is consistent and equitable funding between councils, not least to avoid undesirable precedents. Options being considered include: individual councils building and holding funds; a collaborative council-owned entity; and a funding agency of shareholding councils as a council-controlled organisation. Such a funding scheme could address the long-term need for investment in combinations of engineering protection works, beach renourishment and progressive retreat from the coast, and how these costs may be met by current and future ratepayers, thus addressing intra- and intergenerational equity.

### Hutt City

The risk of flooding along sections of the Hutt River led the Greater Wellington Regional Council to decide to acquire 117 properties between the Ewen and Melling bridges. In order to provide the agreed level of flood protection, allowing for the effects of climate change, the floodway has to be widened, resulting in the need for property purchase. The initial budget for these acquisitions was around \$42 million. However, due to changes to the Public Works Act compensation provisions and rising property values in the area, the costs may exceed this figure. The council has acquired only ten properties so far (*Dominion Post*, 13 May 2017). The cost of purchasing the remaining properties may be partially offset through the subsequent resale of land not required for widening the floodway and through the creation of a community hub and other facilities expected to increase the land value of surrounding sites.

## Part 1: Background and policy context

Sea level rise was not considered – or was not perceived to be a serious risk – when many of the current statutes and funding mechanisms were designed, and in their misaligned state these statutes are unlikely to be a suitable basis for amendment. Instead, new, overarching legislation may be necessary. Such legislation must be designed to encourage efficient and equitable adaptation responses that are efficacious over the long term and engage with those affected and paying for them.

There are at least three kinds of adaptive responses that are likely to need funding over long time frames and thus require new funding mechanisms to ensure intergenerational fairness and policy commitment:

1. large-scale managed retreat (see Box 3);
2. large-scale public infrastructure redesign and relocation; and
3. land purchase for resettlement.

The existing policy settings, previous policy decisions and legal precedents have implications for funding adaptation, and the legal obligations of the Crown and local government. What has gone before will shape public expectations. These, in turn, will constrain what is politically possible in the future.

# Part 2 Existing funding instruments and their limitations

The next part of this paper outlines the existing policy instruments that could be used to fund the costs of climate change adaptation, and briefly assesses their strengths and weaknesses. In so doing, we comment on the following matters:

1. private insurance arrangements;
2. central government funding instruments;
3. local government funding instruments; and
4. other sources of funding or recompense for damage.

## 2.1 Insurance markets and their limitations

It is sometimes argued that societies like New Zealand which are faced with rising sea levels and other climate-related impacts should rely on private insurance markets, the pricing of risk and individual self-interest to generate the desired adaptive responses and mitigate future risk. But insurance redistributes and transfers risk; it does not lessen it. Hence, while insurance is a desirable – indeed vital – complement to robust risk management, it is no substitute for it. Moreover, insurance markets have well-recognised imperfections and limitations, all the more so when risk profiles are subject to significant change (IPCC, 2014; Kunreuther and Lyster, 2016; Storey et al., 2017; O’Hare, White and Connelly, 2016; Treasury, 2015). Accordingly, relying solely on private insurance to address the adaptation challenges posed by sea level rise is likely to be neither efficient nor equitable.

First, insurance signals alone may be insufficient to incentivise people to leave exposed locations that are subject to increasing climate-related risks. This may be due to an inability to secure or afford insurance or a decision not to take out insurance. Furthermore, relying on insurance and the EQC backstop alone has the effect of leaving the *residual* risk (i.e. the amount of risk remaining after all available efforts have been made to reduce the potential consequences) to governmental interventions that provide pre-event or post-event compensation. This, in turn, increases moral hazard by lessening the incentives for property owners to take out insurance. After all, if those who ignore the risks and fail to insure their property are subsequently rescued by the state, with their losses in effect being socialised, why should people bother to take precautionary measures?

Second, relying on insurance alone can generate equity issues. For one thing, insurance coverage of residential and other properties is incomplete. This has implications for social equity and post-disaster recovery. Even in New Zealand, where insurance coverage is high by international standards, a proportion of households – especially poorer ones – have no insurance cover or are inadequately insured. Residential properties without insurance are not covered by EQC (see below and Appendix 1). The economic and social implications of this situation have been readily apparent in recent natural disasters in New Zealand, including the Canterbury earthquakes (2010–11), the Kaikōura earthquake (November 2016) and the severe flooding of Edgecumbe (April 2017) when the Rangitāiki River burst its banks.

*Even in New Zealand, where insurance coverage is high by international standards, a proportion of households – especially poorer ones – have no insurance cover ... [therefore they are] not covered by EQC ...*

In the case of Edgecumbe, where around 70% of the town's properties were flooded, the government announced in early May 2017 that EQC would be responsible for cleaning up and repairing all affected properties, including the 100 or so properties that were not insured or where the owners otherwise lacked the necessary funds to undertake repairs. The rationale for including uninsured properties was summed up by the mayor of Whakatāne, Tony Bonne: 'There's no way we want those homes to sit and rot because their owners do not have the means required to get them back to a liveable standard' (Radio New Zealand, 9 May 2017). It is notable that Edgecumbe is a relatively poor community, with a social deprivation index score of 9 (on a scale where 10 is the most deprived) (Stephenson, McKenzie and Orchiston, 2017). Subsequently, in June the government announced that it would provide businesses in Edgecumbe with business continuity assistance (*Dominion Post*, 9 June 2017).

*... many citizens expect that governments will provide ... compensation should their properties be detrimentally affected by coastal erosion or flooding due to climate change.*

During the 21st century, as climate-related hazards escalate, in all likelihood insurance premiums will become more costly, not least in areas exposed to greater risks. Furthermore, additional costs are likely to reduce the insurance coverage of residential properties, particularly among poorer households and communities that cannot bear the cost increases. A growing number of insurers may withdraw from the market (e.g. in coastal regions and flood plains), with major implications for property values, homeowners and businesses.<sup>8</sup> Insurance companies are commercial enterprises: they insure low-probability quantifiable risks; they do not provide cover when the probability of claims is high (Storey et al., 2017). Also, insurance contracts are typically renewed annually, thus enabling insurance companies to exit contracts within a year.<sup>9</sup> For such reasons, relying on private insurance arrangements to manage climate-related risks will generate many inequitable outcomes, which will escalate as the century progresses.

Third, relying on private insurance is highly likely to be inefficient in allocative terms. For one thing, insurance premiums currently only partially reflect the underlying risk and do not properly signal changing risk profiles over long time periods. Accordingly, most of those living in climate risk-prone areas pay cross-subsidised or discounted premiums. For another, insurance policies often require replacement of 'like for like' after a disaster. Hence, they fail to encourage post-event betterment. Moreover, assessing climate-related risks is complex. For instance, climate change will increase the categories of risk (both direct and indirect) and alter the frequency and intensity of various hazards (e.g. major storm events), thereby making historical patterns and trends unreliable for predicting future events. For all these reasons, insurance is a blunt instrument by itself for incentivising risk reduction behaviours by councils and individual homeowners.<sup>10</sup> To quote Storey et al. (2017, p.1):

In reality, there is little information about time-varying climate risks, the information that is available is not always of satisfactory quality, and it is rarely accessible to the lay-person. Even with good information, people often make poor decisions under different types of uncertainty: they can over-react to small threats and exhibit optimism bias when risks are higher.

Aside from this, many citizens expect that governments will provide (at least partial) compensation should their properties be detrimentally affected by coastal erosion or

<sup>8</sup> Note that in New Zealand it is normal for insurance to cover 'all perils', including floods. In many other parts of the world, flood insurance is handled as a separate peril.

<sup>9</sup> This raises the question of whether governments could encourage the growth in longer-term residential insurance, with pre-agreed premiums over several or more years; but the feasibility of this approach will likely depend on the availability of multi-year reinsurance.

<sup>10</sup> This, of course, may change in the future. If the capacity to assess future risks increases, then the pricing of risk may become more forward-looking.



flooding due to climate change. Such expectations are not unreasonable. After all, there are now numerous precedents of governments providing financial assistance to residents and businesses affected by natural disasters (including most recently in Edgecumbe, as noted above; see also Appendix 1). In addition, the national civil defence plan makes provision for central government to contribute 60% of the costs of repairing underground infrastructure, as it did in Canterbury after the 2010–11 earthquakes and in the Manawatu/Whanganui regions after the 2004 floods. Interventions of this kind are politically understandable: democratically elected governments must be responsive to the needs of their citizens, all the more so in the face of natural disasters. New Zealand is not alone in this respect.<sup>11</sup> But such interventions also have the consequence of reducing the incentive for property owners to insure their assets.

Consequently, while private insurance has an important role to play in societal efforts to build resilience and cope with the challenges posed by climate change, it will never be sufficient on its own. Insurance markets are no substitute for effective, proactive risk management by governments. Relying on insurance is unlikely to reduce long-term risk or the future costs of climate change adaptation, certainly unless risk ratings become more specific and prospective. Other instruments will be necessary for funding adjustments to climate change, ones that do not transfer risks in highly inequitable ways.

*... while private insurance has an important role to play in societal efforts to build resilience ... it will never be sufficient on its own.*

## 2.2 Central government funding instruments

### 2.2.1 The nature of central government intervention

As noted above, New Zealand governments have intervened extensively in the wake of major natural disasters to support affected communities. Such assistance has taken many forms, including financial assistance to affected homeowners, support for struggling businesses (e.g. grants and temporary employment subsidies) and new investment in public infrastructure (e.g. for roads, schools and hospitals). Furthermore, central government operates a variety of funds that can be accessed by, or managed in collaboration with, subnational governments for particular purposes. There are many examples.<sup>12</sup> These funding arrangements have evolved over time, based on specific cost-sharing arrangements between central and local government. In some cases, the relevant functions – and costs – have been devolved to local government (e.g. flood protection funding).

Of the current funding instruments administered centrally, the only one of direct relevance to climate change is the adverse events policy administered by the Ministry for Primary Industries. This helps communities and individuals affected by adverse events, including severe weather, volcanic eruptions, earthquakes and biosecurity incursions. The fund is managed in collaboration with regional agents, local government, regional trusts and industry. Importantly, however, it is a *post-event* funding instrument; it not designed to mitigate climate change impacts or fund adaptation measures.

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<sup>11</sup> For instance, in Britain a publicly mandated, not-for-profit flood insurance scheme has been established, known as Flood Re. It was negotiated between the government and insurance companies. It commenced in April 2016 and is designed – at least in theory – to be phased out around 2041. Flood Re aims to ensure that affordable flood insurance coverage is provided to properties deemed to be at significant risk of flooding (i.e. a 1 in 75 annual probability of flooding). Around 250,000 homes (or 2% of the British housing stock) fall into this category. The insurance premiums of these homeowners are, in effect, subsidised by other homeowners via a surcharge. While the government does not supply any form of ongoing subsidy to insurance companies, it has agreed to provide resources in the event of exceptional flooding events (i.e. those that occur 1 in 200 years).

<sup>12</sup> The waste minimisation fund (approximately \$12.6 million annually); the contaminated sites remediation fund (approximately \$8.4 million annually); the community environment fund (approximately \$3.1 million annually); the freshwater improvement fund (approximately \$10 million annually); the Heritage EQUIP earthquake upgrade incentive programme (approximately \$12 million annually); Te Mana o Te Wai fund (approximately \$2 million annually for several years); the housing infrastructure fund, for councils in high-growth areas (approximately \$1 billion spread over several years); the regional mix-sized tourism facilities grant fund (approximately \$4–5 million per annum for several years); and the adverse events policy (approximately \$5.5 million allocated in 2016/17 for adverse climatic and earthquake events).

Like the adverse events fund, most of the other funding instruments are small, with less than \$15 million allocated per annum. The main exception is the Housing Infrastructure Fund. This was announced in early February 2017 and is designed to assist councils in high growth areas with significant housing pressures to fund new public infrastructure (including water supply, storm water, waste water, and roading). Funding of around \$1 billion is available to eligible councils via a competitive bidding process. Such investment will be made in the knowledge of climate change risks.

### 2.2.2 The Natural Disaster Fund administered by EQC

For well over half a century, New Zealand governments have supported the concept of pooling some of the risks associated with natural disasters via a legally mandated institution, the Earthquake Commission, generally known as EQC. The Earthquake Commission is a Crown entity which operates under the Earthquake Commission Act 1993 (Treasury, 2015). Via the Natural Disaster Fund, it has provided partial insurance since 1945 for damage to privately insured domestic premises caused by natural disasters, such as earthquakes, volcanic eruptions, floods and storms. The Natural Disaster Fund is government guaranteed. Policyholders contribute to EQC via a flat-rate levy of 15 cents for every \$100 of home or contents fire insurance.<sup>13</sup> EQC does not insure commercial properties or the buildings and infrastructure owned by the central and subnational governments.

EQC has settled over half a million claims resulting from the Canterbury earthquakes (2010–11) and the Kaikōura earthquake (2016) and paid out around \$12 billion. In response to the Canterbury earthquakes, the government conducted a review of coverage arrangements under EQC. A discussion document was issued in 2015 and, following public consultations, various policy changes were announced in late June 2017. It is expected that these reforms will take effect in 2020.

Currently, for seismic events EQC pays the first \$100,000 of property damage (including to land) and the first \$20,000 of damage to residential household contents. Amounts beyond these levels are covered by policyholders' insurance companies. From 2020 the EQC's monetary cap on property damage will be increased to \$150,000 (excluding GST), but contributions towards any damage to personal effects will cease. In the case of flood and storm damage, EQC currently covers land damage only, while for landslip damage it covers homes, contents and land. From 2020 compensation for land damage will only apply when an insured residence (or access to it) has been damaged or when the land is a total loss (whether physically or economically).

Importantly, EQC does not contribute to the costs of protecting properties against natural disasters in the future: it is a *post-event* insurer; it does not fund *pre-event* residential relocation or resettlement. Potentially, its role could be changed and broadened to include both insurance and pre-event adaptation (see below). Be that as it may, as with other government post-event funding mechanisms, the existence of EQC and the principles it embodies creates an expectation that those negatively affected by climate-related risks should also receive some form of public assistance. In short, if there is a logic to governments providing disaster insurance and other kinds of disaster-related assistance, then arguably this logic applies both to *post-disaster* situations and to *anticipatory measures* designed to

... EQC does not contribute to the costs of protecting properties against natural disasters in the future ...

<sup>13</sup> In the Budget in May 2017 the government announced that the levy would be increased by 20 cents for every \$100 of home or contents fire insurance from 1 November 2017.

prevent or minimise future risks and damage costs to the government (through EQC and the adverse events policy), such as those associated with a rising sea level.

These policy interventions have created a political context in which the public expects central government to take reasonable steps to help those affected by natural disasters. It is highly likely that such expectations will apply to the impacts of sea level rise – which, understandably, most people will regard as *natural* rather than *man-made* disasters and hence beyond their control (even if they are largely attributable to anthropogenic climate change).

### 2.2.3 Subsidies

In principle, the central government could increase existing subsidies or establish new ones to help local authorities cover the additional costs of adaptation over the coming decades. Such subsidies could be negotiated and distributed through existing administrative and budgetary arrangements. Additionally, the central government could itself fund specific adaptation projects (including managed retreat) directly, rather than subsidising local authorities. The funding of red zone properties in Christchurch following the Canterbury earthquakes provides a possible model (see Appendix 1 and also Box 5).

But temporary, ad hoc arrangements based on annual budgetary allocations are unlikely to provide a satisfactory long-term solution to the challenges of adaptation funding. The reasons for this include:

1. the sheer scale of the resources and complexity of the adaptation investments required over the long term;
2. the persistent and long-term nature of the fiscal burden;
3. the highly uneven costs facing different regions and councils;
4. the desirability of setting national priorities and targeting resources accordingly;
5. the desirability of having a consistent approach to the funding of public infrastructure and managed retreat, including what types of infrastructure investment should be funded as part of specific efforts to improve climate-related resilience and minimise risk and what aspects of managed retreat might be funded (e.g. making land available for communities to move to or funding community facilities away from climate risks);
6. the need for consistent assessments of the relative merits of different adaptation options;
7. the desirability of adopting a principled and consistent funding approach over extended timeframes (for fairness and optimal planning reasons); and
8. the desirability of durable cross-party support.

*Local government has statutory responsibilities for many functions which will be affected by climate change, especially sea level rise ...*

## 2.3 Local government funding mechanisms

Local government has statutory responsibilities for many functions which will be affected by climate change, especially sea level rise (see Box 2). Currently, some of these functions are jointly funded by central and local government (e.g. post-disaster infrastructure repairs), while others are funded entirely by local ratepayers. Local government also has the primary responsibility for climate change adaptation. But that mandate is fragmented and greater central government leadership has been called for by local government representatives.

Local government undertakes a range of functions, most notably the provision of local infrastructure, local public services and regulatory activities. These are funded mainly via rates, regulatory income, user fees and charges, interest and dividends, and grants. Local

**BOX 5****Insurance practice and co-funding of infrastructure by local and central government****Local government insurance**

Insurance in New Zealand's local government sector is calculated on a maximum probable loss basis (Office of the Auditor-General, 2013). This common approach to insurance means that an agency does not insure 100% of its assets. On the basis that it is unlikely that all assets would simultaneously be affected by a hazard event, this approach to insurance focuses on the effects of low-probability, high-impact events, with councils providing adequate funding in annual maintenance budgets to accommodate repairs as a result of smaller, more frequent events.

**Co-funding of infrastructure restoration**

Local authorities have a unique arrangement with central government in terms of insurance. The 1991 Disaster

Recovery Plan states that central government will pay up to 60% of the restoration costs for water and sewerage services after a catastrophic event (Office of the Auditor-General, 2013). The present financial assistance scheme for local authority infrastructure places specific responsibilities on local authorities (via the Local Authority Protection Programme).<sup>14</sup> For instance, to be eligible for central government assistance a local authority must be able to demonstrate that it can meet the remaining 40% of the restoration costs through: proper maintenance; the provision of reserve funds; and effective insurance and/or participation in a mutual assistance scheme (the Local Authority Protection Programme) with other local authorities.

government frequently partners with the public sector, private sector and non-government organisations to fund projects. Nearly 30% of its expenditure is on transport and roading, with another 30% on storm water, water supply and waste water and related council services (Statistics New Zealand 2013 figures). Critical for this discussion is that expenditure patterns (e.g. of types of expenditure and affordability) vary considerably between urban and rural councils. In addition, through the New Zealand Transport Agency's funding assistance framework, central and local government co-invest in the land transport system, recognising that there are both national and local benefits. There are other examples of co-investment (e.g. regional economic development funding).

For capital expenditure, councils are guided by intergenerational equity principles when deciding how to pay and what proportion is funded by operational income and debt. Councils primarily borrow to fund capital investments like infrastructure which benefits both current and future generations. This enables cost smoothing over the lifetime of the asset across those who use, and thus benefit from, the service. This also recognises that councils do not have the capacity to fund large investments from operating income alone. Use of debt for capital investments and not operating expenditure is different from the case of central government, which is able to borrow to fund operational expenditure. The Local Government Funding Agency will generally only lend to councils if their income to interest ratio is less than 20%.

Recently, Local Government New Zealand recommended the establishment of a central risk agency in order to pool and coordinate local government resources to lower the risk and cost of disasters. One of the issues identified for attention is risk financing and several suggestions are made in a guide (Local Government New Zealand, 2016b), including

<sup>14</sup> See [www.lappfund.co.nz](http://www.lappfund.co.nz).



assessment of the risk appetite and risk tolerance, risk retention and risk transfer, self-insurance, deductibles and policy layering, and the relationship with insurance markets. Other options for transferring risk include local government collectives, catastrophic bonds, risk swaps, contingent capital (the right but not the obligation to issue debt instruments after a redefined event at pre-loss financing terms), contingent risk and finite risk (a central fund administered by the risk transferee from which claims are made).

Currently, local government owns and manages \$120 billion of fixed assets (including 100% of the country's drinking water, waste water and storm water assets and 88% of the roads). As noted earlier, it is estimated that every dollar spent on disaster risk reduction now saves around \$3-\$11 in disaster costs by avoiding losses and disruption (Deloitte Access Economics (Australia), 2013).

The proportion of central government transfers to local government has fallen since 1985, when it was 18% of councils' operating revenue, to around 13% currently. Total revenue is about \$4.4 billion per annum. This also needs to be seen against an increase in local government functions over that same period, and the additional costs expected from climate change adaptation. Sixty per cent of local funding comes from local property taxes (i.e. rates). Councils spend around 10.5% of all public expenditure, but they raise only 8.3% of all public revenue (Local Government New Zealand, 2015) This vertical fiscal gap is caused by a 'mismatch between revenue means and expenditure needs'.<sup>15</sup> The gap is likely to increase as the costs of climate change adaptation grow.

Looking forward over the coming decades, there are large capital expenditure programmes planned by local government for infrastructure renewal, often on a regional basis. In the metropolitan areas there are already stressors on existing infrastructure, some of which is affected by the impacts of climate change (e.g. storm water, water supply and waste water systems). Population decline and an ageing population will exacerbate such pressures in some parts of the country and increase the challenges faced in funding community services. Increasing climate-related changes, like sea level rise and increased frequency of storms and heavy rainfall, will likely create major costs for local government as communities shift from vulnerable areas and infrastructure is redesigned or made more climate-resilient. This will increase councils' financial risk.

There are many different funding mechanisms at the disposal of local government: for example, rating generally across the whole community; rating on a differential benefit basis; borrowing; shared funding with public and private partners; revenue from user and regulatory charges and financial and development contributions; dividends on vested assets; and government grants. However, rates on property are the primary source of income for all councils, but the percentage from rates varies considerably across councils. Taxes (income, expenditure, land, poll, transaction) and rating of the currently non-rateable land<sup>16</sup> are potential candidates for new revenue streams, along with new and principled partnerships with central government. Particular options for vulnerable communities have been suggested (Local Government New Zealand, 2015), such as managing and funding at a regional level by improving information and management of infrastructure at a greater scale; 'right-sizing' council activities; government subsidies; contestable subsidies for specific

*... it is estimated that every dollar spent on disaster risk reduction now saves around \$3-\$11 in disaster costs by avoiding losses and disruption ...*

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<sup>15</sup> <http://www.worldbank.org/publicsector/decentralization/fiscal.htm>.

<sup>16</sup> Around 4% of the total New Zealand capital land value, which is equivalent to \$180 million of rates revenue annually.

projects;<sup>17</sup> co-funding along the lines of the New Zealand Transport Agency's funding model;<sup>18</sup> and equalisation payments.

When considering the potential gap between expenditure and revenue when projecting the expected costs of infrastructure renewal over the next 30 years and beyond (\$10–15 billion for Auckland city alone), there is reason to doubt whether the current funding arrangements at the subnational level will be adequate to meet the challenges of climate change adaptation. First, adaptation costs will fall unevenly across the country and over time. In some cases, large costs will fall on local authorities in relatively deprived communities and/or those with ageing and/or declining populations. Without significant additional funding mechanisms and support from central government, some councils will struggle to meet these costs. And without such support, the burdens will also fall very inequitably. Aside from this, in some cases the costs of managed retreat will be very large (e.g. where whole communities are affected), although investment can be staged over time and avoid high damage costs. Some individual councils will simply lack the financial resources (whether via rates or borrowing) to meet even the staged costs. Taking an anticipatory approach to reducing climate-related risks suggests that new funding arrangements may be needed. The local government funding review (Local Government New Zealand, 2015) suggested that a different mix of funding instruments will be required to meet the declining revenue base and increasing funding demand related to natural hazards, which are being exacerbated by climate change. This is an ongoing discussion that can be enhanced by consideration of anticipatory adaptation funding mechanisms set out in this paper.

*... the existing funding mechanisms ... are insufficient to ensure that decision making on climate change adaptation over coming decades ... will be proactive, coordinated, cost-effective and equitable.*

## 2.4 Some legal consequences of inadequate adaptation funding

In the absence of adequate funding to enable efficient and equitable adaptation (including managed retreat where necessary), citizens may take legal action to secure compensation for the damages generated by climate change, thereby covering some of the costs of adaptation. But traditional tort systems are not well suited to problems of the scope, scale and complexity of climate change (Farber, 2006; Farris, 2009/10). Indeed, the pursuit of redress via the courts is likely to be costly and may generate outcomes that are ad hoc, partial and inequitable.

From whom compensation might be sought is uncertain. For example, affected parties (including insurance companies) might seek redress from local government, particularly if councils have inappropriately permitted development on land that was risk prone and subsequently becomes uninhabitable. If court action were to be successful, questions would arise as to how local authorities would fund the required compensation, especially if there are large numbers of claimants (e.g. an entire community or suburb). Alternatively, affected parties may seek compensation from greenhouse gas emitters, such as fossil fuel companies. But pursuing such action would be enormously challenging, especially where such companies are global, because of the constraints of international law, the difficulties of establishing standing and proving causation and damage, the problems of valuing climate-related losses, and the large legal costs involved. Trials would be lengthy and outcomes uncertain, and most citizens lack the resources required. For such reasons, it will not be possible to fund climate change adaptation efficiently or equitably via legal action.

<sup>17</sup> Two funds were set up in 2005 for smaller low socioeconomic communities to invest in water and waste water treatment plants. The drinking water scheme was exhausted, and in 2011 all water providers for schemes servicing fewer than 5,000 people were eligible until 2015.

<sup>18</sup> For details of the New Zealand Transport Agency's co-funding arrangements for land transport and current funding assistance rates see <https://www.pikb.co.nz/home/nzta-investment-policy/funding-assistance-policy-and-rates-for-the-2015-18-nltp/>.

## Summary

Arguably, the existing funding mechanisms, both individually and collectively, are insufficient to ensure that decision making on climate change adaptation over coming decades, and especially those associated with sea level rise, will be proactive, coordinated, cost-effective and equitable. There are multiple problems.

First, the existing arrangements are largely ad hoc and *post hoc*. They focus too much on *post-event* responses (e.g. post-disaster assistance and recovery) and too little on *pre-event* responses – that is, public funding designed to enhance societal resilience, minimise risk and enable cost-effective adjustments and transitions. Second, the current funding arrangements are poorly integrated, across both policy sectors and the different tiers of government. Third, there are inadequate mechanisms to ensure that the costs of climate change adaptation are shared equitably, whether intergenerationally or intra-generationally. Fourth, the overall level of resources is unlikely to be sufficient to meet the increasing costs of adaptation over the coming decades. To compound matters, there is a mismatch in many cases between the resources and capabilities available to local authorities and the scope and scale of the adaptation challenges they face.

# Part 3 Funding climate change adaptation – guiding principles

The overarching objective of any funding framework for climate change adaptation in New Zealand (and other jurisdictions) should be to enhance the incentives for decision makers in central and local government to undertake sound anticipatory governance in the interests of what is variously called the ‘long-term common good’ or ‘collective intergenerational well-being’. This means making policy decisions in the near term that are likely to reduce citizens’ exposure to climate-related risks and minimise the long-term adjustment costs, both public and private.

The design of a funding framework for climate change adaptation could be conceptualised with two overarching goals – namely, efficiency and equity (or distributive justice):<sup>19</sup>

1. *Efficiency* – funding arrangements should seek to minimise the long-term net costs of climate change adaptation by encouraging cost-effective decisions regarding district planning and investment in public infrastructure. The aim would be to reduce the likely costs of climate-related impacts (e.g. major floods) through cost-effective measures to future-proof infrastructure or undertake managed retreat (or both). Successful adaptation will, in turn, help to reduce future insurance (including EQC) costs, thereby keeping insurance more affordable and available. Consistent with this, funding arrangements, and related planning and regulatory frameworks, must be well coordinated and designed to minimise moral hazard (e.g. the risk of giving individuals, companies or other organisations incentives to act in ways that are likely to increase overall adaptation costs and/or shift costs inappropriately onto taxpayers or ratepayers).
2. *Equity* – funding arrangements should be consistent with widely accepted principles of distributive justice, and as fair as possible to all affected parties. Such principles need to be applied in two ways:
  - a. intergenerationally: that is, sharing the costs of adaptation fairly over extended time horizons (e.g. at least 100 years); and
  - b. intra-generationally: that is, sharing the costs of adaptation fairly between citizens at any given point in time, including how costs are shared between the different tiers of government (central, regional and local), between different regions, and between the public and private sectors.

Any adaptation funding framework (and related institutional arrangements and policy instruments) should also take into account a range of other principles and considerations, including:

- making the best possible use of the available scientific evidence and relevant expert advice;
- minimising administrative and compliance costs;
- ensuring procedural fairness and thereby minimising the likelihood of costly litigation;
- ensuring sufficient policy clarity, consistency and stability over time to facilitate effective long-term regional spatial planning and infrastructure investment, thus generating an adequate degree of certainty for affected households, businesses and other organisations;

<sup>19</sup> There are some interesting parallels between the funding of climate change adaptation and the funding of accidents, as Sir Geoffrey Palmer has helpfully noted. For instance, the accident compensation scheme in New Zealand in the early 1970s was designed to achieve multiple goals, including the shifting and spreading of losses (via compulsion), the redistribution of risk (via social insurance) and the minimisation and avoidance of costs (through more effective risk rating and investment in prevention).

... any funding framework for climate change adaptation in New Zealand ... should ... enhance the incentives for decision makers ... to undertake sound anticipatory governance ...



- enabling sufficient policy flexibility to accommodate changing risk profiles;
- disincentivising policy responses that create path dependence;
- ensuring a high level of transparency in relation to revenue collection and funding allocations; and
- ensuring fiscal sustainability.

Principles of this nature, of course, are easier to enunciate than to apply in practice. Moreover, they sometimes conflict, thereby making it impossible to realise every objective simultaneously or to the same degree. For instance, policy flexibility and responsiveness may at times be in tension with policy consistency and stability. Given that climate change will generate many uncertainties and surprises and that policymakers will face unprecedented policy challenges as the century progresses (e.g. relocating large numbers of people at risk of inundation, etc.), any funding regime will almost certainly need to evolve over time to reflect changing circumstances, lessons from previous experience and the developing evidence base.

### 3.1 Distributive principles that affect adaptation funding

There are two high-level distributive principles that affect how adaptation funding mechanisms could be designed. The first is the Aristotelian principle of comparative justice, or what is sometimes called the ‘principle of like treatment’. This principle provides the ethical basis for notions of horizontal and vertical equity (i.e. treating some people the same and others differently). It nonetheless begs many questions, not least the issue of which particular differences between people are morally relevant and which are not. This leads to a second high-level principle, namely the fair opportunity requirement. This is the idea that people should not be discriminated against or suffer disadvantages for things over which they have no control. Such a principle provides an ethical basis for assisting or compensating people who suffer an accident or are harmed by a natural disaster (which they could not reasonably have foreseen or avoided).

Next, there are various ‘material’ principles of justice which provide guidance about when it is justified to treat people differently (rather than the same), including:

1. allocating resources on the basis of need;
2. allocating burdens on the basis of ability or capacity to pay;
3. allocating burdens on the basis of who is likely to benefit; and
4. allocating burdens on the basis of a person’s (or community’s or sector’s) responsibility for the problem or damage caused. Determining responsibility raises questions of causation, attribution and blame, raising in turn questions of intent, knowledge about the potential harm, reasonable foreseeability, alternative courses of action, and whether appropriate precautions were taken, for example.<sup>20</sup>

### 3.2 Applying the principles

Applying principles of distributive justice to the issue of how the various costs of climate change adaptation should be shared – that is, who pays, for what and when – raises the following questions, among many:

1. Do considerations of intergenerational fairness provide grounds for pre-funding some of the expected costs of climate change adaptation – that is, building up a fund (or funds)

*... humanity’s failure to live within safe and sustainable planetary boundaries may curb economic growth in the future.*

<sup>20</sup> Aside from these material principles of justice, equity issues may also arise where collaborative arrangements are negotiated between small and large councils. For example, the small councils may expect savings off the back of having large councils as part of the mix, but large councils could see this as a kind of subsidy to the small councils. Furthermore, if small councils fail to receive the savings they anticipate, then they will likely suspect that they are funding the large council’s latest venture.

by imposing additional taxes (or rates) over the coming decades for drawing down later in the century as adaptation costs escalate?

2. Do considerations of intra-generational fairness provide grounds for sharing the costs of adaptation between local communities and regions – that is, with communities and regions that are least affected cross-subsidising those that are most affected (e.g. low-lying coastal communities)?
3. Do considerations of fairness provide grounds for governments compensating (at least to some degree) those who are at risk of harm from the impacts of climate change – for instance, by funding some or all of citizens’ private property losses (including land) or funding some or all of the costs of managed retreat (e.g. moving expenses, the loss of business income, providing risk-free land, etc.)? And, if so, what kind of compensation would be justified, under what conditions, to what extent and for whom?

*Without some form of national cost sharing, the principles of need and ability to pay will almost certainly be violated.*

### *The issue of pre-funding future adaptation costs*

There are arguments both for and against pre-funding some of the future costs of adaptation. The case for pre-funding rests primarily on the principle of responsibility, namely that those who have caused a harm should be required to contribute to alleviating the damage they have caused (or will cause in the future). This principle of justice is embodied in the idea of polluter pays. In the case of climate change, there can be no question that the damage that will be inflicted on current and future generations (and hence the costs of adaptation that they will bear) is largely due to the activities of recent generations. Accordingly, there is a strong case for taxing current citizens (e.g. taxpayers and ratepayers) and building up a public fund (or funds) which can be deployed to help cover the financial costs of adapting to climate change later in the century.

Against this, the scale of the costs of adaptation remains uncertain. Also, future technological innovations may significantly reduce them, thus enhancing their affordability. Accordingly, it is unclear how much pre-funding would be justified. Perhaps the strongest objection, however, is the claim that future generations will be better off than current generations, at least in terms of real incomes per capita. Hence they will be in a better position than those alive today to cover the long-term costs of adaptation. Also, if the costs are much less than some fear, future governments will have little difficulty covering them from normal ongoing revenues.

But there can be no guarantee that future generations will be better off, however ‘better off’ is defined. After all, humanity’s failure to live within safe and sustainable planetary boundaries may curb economic growth in the future. And even if per capita growth continues, there are still strong moral grounds for those who have caused climate-related harm to bear part of the cost. Societies do not, after all, avoid prosecuting and penalising criminals who are poorer than their victims.

Hence, there is a plausible *prima facie* case for pre-funding at least a modest proportion of future costs of climate change adaptation. This suggests that any overall adaptation funding framework should include a mechanism – perhaps similar in concept to the New Zealand Superannuation Fund – to help cover future climate-related liabilities. For instance, a new fund of this kind could receive revenue via an additional levy on the use of fossil fuels, with the pooled funds invested and then drawn down progressively later in the century. Having said that, the question of how any pre-funding mechanism of this nature might

operate, including its source of funds and its governance and operational arrangements, requires much more detailed consideration.

### *National cost sharing*

The principles of distributive justice outlined earlier – and especially the principles of need and ability to pay – provide a strong *prima facie* case for an element of national burden sharing for the costs of climate change adaptation. At the same time, the principle that those who benefit disproportionately from a government intervention should contribute disproportionately to its costs (if they are able) provides an equity case for cost sharing. There are also efficiency grounds for co-funding across multiple tiers of government and between the public and private sectors.

In brief, adaptation costs are bound to vary – often significantly – across different households, communities, regions and economic sectors. Many of the costs will fall in arbitrary ways, with little or no regard to the extent of each citizen’s (or region’s) contribution to climate change (i.e. via their cumulative greenhouse gas emissions), or their capacity to pay either for the damages inflicted or for the measures required to minimise future risks (e.g. by relocating from places threatened with inundation to safer locations). Importantly, the resources available to subnational governments to implement prudent and cost-effective adaptation measures will vary greatly (depending on their relative wealth, demographic structure, etc.). Some subnational governments may face only modest costs, yet have ample resources; others will face very large costs, yet have limited resources. Without some form of national cost sharing, the principles of need and ability to pay will almost certainly be violated. Equally, it will be hard for poorer communities to find the resources necessary to fund proactive measures to mitigate future risks. The case for national cost sharing is further supported by a recognition that vulnerable areas were generally settled in a manner consistent with the dominant risk management practices at the time.

### *Compensation for those facing the loss of property (including land)*

The question of how adaptation costs should be shared between private residents, businesses and governments (national and subnational), and in particular whether there is a case for compensating those who face the loss of property (including land) and/or income, is challenging. Consider briefly two cases. The first involves wealthy families who have recently purchased expensive coastal properties in the full knowledge (based on advice from the local council and relevant experts) that these properties are at a significant risk of being inundated by a rising sea level within several decades. The second involves poor families who purchased modest homes several decades ago in a low-lying area of a city with no expectation that these properties might subsequently be at risk of sea level rise. Yet they have recently been advised that their properties could be inundated within several decades and that it will be increasingly difficult and costly for them to obtain insurance. They also face a large reduction in the market value of their property, if, in fact, they can find any buyers. Some may lose their entire equity or even be left with a net debt (i.e. depending on the size of their mortgage). Without public compensation, such families have little prospect of buying other properties in safer locations.

Drawing on the principles of justice outlined earlier, many people are likely to question the fairness of compensating the wealthy families, while being more sympathetic to the

*The principles of distributive justice .... provide a strong prima facie case for an element of national burden sharing for the costs of climate change adaptation.*

plight of the poorer ones. After all, the former families might be seen as having made unwise decisions and possessing the resources to purchase other properties (if they are required), while the latter might be viewed as innocent victims of circumstances beyond their control, confronting risks which they could not have reasonably foreseen, and facing losses that they lack the capacity to bear. These two cases, of course, are relatively stark. In practice, many of the situations that will arise over coming decades are likely to be more complex, not least because of rapidly changing risk profiles and unpleasant surprises. For instance, coastal areas previously deemed to be safe may unexpectedly face the risk of inundation or the sea level may rise much faster in certain areas than had been previously projected.

Additionally, in some cases there may be good reasons for the relevant authorities to require people to relocate to safer areas. Where compulsion is involved in acquiring land, there has been a long history in New Zealand (and elsewhere) of providing compensation to those directly affected (and sometimes those indirectly affected). The provisions relating to such compensation in New Zealand are set out in considerable detail in the Public Works Act 1981.

While designing compensatory arrangements is beyond the scope of this paper, several matters are relevant to this discussion:

1. There are robust *prima facie* grounds for compensation, at least in some cases and to some extent.
2. Given the long-standing practice of societal risk pooling and cost sharing for natural disasters, the public are likely to expect governments to compensate (at least partially) those suffering loss and damage from climate change, including those facing significant costs to reduce climate-related risks (e.g. due to the need to relocate). This also raises a credible commitment problem: a government may assert categorically that it will not compensate people who choose to build in certain vulnerable areas, but the public may doubt whether the government (or a future government) will abide by such a commitment.
3. There will be strong pressures, in the interests of overall fairness, for any compensatory arrangements to be broadly consistent, both across the country and over extended periods of time. This points to the need for a nationally mandated framework with cross-party support.
4. In the absence of a well-designed, principled and consistent system of compensation, there will be political pressures for governments to implement costly engineering ‘solutions’ to protect vulnerable properties (and also threats of legal action). Yet many of these potential ‘solutions’ will provide only temporary respite.
5. Pre-event compensation could generate moral hazard (e.g. by encouraging risky investments). It will be imperative to mitigate such risks through well-designed regulatory and planning frameworks.

Any compensatory regime will be controversial and its implementation open to fraudulent claims.<sup>21</sup> As indicated, there are many relevant principles and considerations, and some of these will be in tension. It will be important, therefore, to design any regime carefully, with proper public engagement on the relevant issues and options and detailed stakeholder involvement.

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<sup>21</sup> So far in Christchurch, for instance, EQC has identified fraudulent claims following the earthquakes worth about \$4.6 million, and 979 fraudulent claims have been prosecuted.

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### 3.3 Funding climate change adaptation – the broad institutional options

We now assess the broad institutional options and consider some of the specific policy issues that are bound to arise. In institutional terms, there are many ways to design a framework for funding the costs of climate change adaptation. For New Zealand there are at least four possible options:

1. expand and modify existing local government funding instruments;
2. expand and modify existing central government funding instruments (excluding EQC), albeit in the context of annual appropriations;
3. amend the legislative mandate of EQC so that it becomes responsible for both pre-disaster funding (i.e. for protective and preventative measures) and post-disaster funding; and
4. establish a new Climate Change Adaptation Fund with a mandate to fully fund, part-fund or co-fund various specified adaptation-related costs.

In our view, the first three options are unlikely to satisfy the funding principles outlined above, although a combination of the three options would almost certainly contribute to better outcomes than relying on any single option.

Regarding option 1, as discussed in Part 2 (see also Appendix 3), existing local government funding instruments and arrangements are unlikely to be sufficient to meet the expected costs of climate change adaptation. For one thing, subnational governments in New Zealand have modest revenue sources and there are practical and political limits on the extent to which rating increases could be relied upon to fund major ongoing costs. For another, councils are constrained in how much they are able to borrow to fund the large-scale infrastructure investments required by climate change adaptation (e.g. in relation to water services and transportation networks), including any new infrastructure required as part of managed retreat. Additionally, equitable sharing of the costs of climate change adaptation across regions, sectors or households will not be possible if most of these costs are borne by subnational government; only central government has the necessary revenue and expenditure mechanisms to undertake such a task.

Regarding option 2, it would be possible for central government to rely on existing funding instruments, using annual appropriations to co-fund some of the costs of climate change adaptation. But such arrangements would be ad hoc and thus unlikely to facilitate the necessary level of consistency, certainty, stability, credibility or long-term durability. Moreover, as the scale of the adaptation challenges increases over coming decades, there are bound to be political pressures – from subnational governments, civil society and affected citizens – for the central government to develop more comprehensive and tailored approaches. Aside from this, there would be limited scope under current fiscal arrangements for specific pre-funding of future adaptation costs, except via more concerted efforts to reduce net Crown debt.

Regarding option 3, amending the legislative mandate of EQC and extending the role of the Natural Disaster Fund to include proactive, pre-event adaptation funding is a possibility. There are several arguments in favour of such an approach. First, it would provide EQC with both a stronger incentive and a greater capacity to reduce *post-disaster* costs through cost-effective adaptation measures. Assuming that the commission was adequately funded

*... it would be possible for central government to rely on existing funding instruments ... But such arrangements would be ad hoc and thus unlikely to facilitate the necessary level of consistency, certainty, stability, credibility or long-term durability.*



to undertake such interventions, it could reduce the commission's future liabilities and the overall financial costs of climate change impacts. Second, under such an approach, responsibilities for funding adaptation would be placed in the hands of an independent body operating in accordance with statutory criteria. This would help to ensure that funding decisions were evidence-based and principled, and broadly consistent over time, thus increasing the fairness and legitimacy of the policy regime. Third, a modified EQC could incorporate an element of pre-funding for future adaptation costs.

Against this, adding responsibilities for pre-event adaptation funding to EQC's current role would fundamentally transform the commission's current role as an insurer. It would result in the commission having multiple and potentially conflicting objectives – serving simultaneously as an insurer of residential properties (with a primary focus on seismic events), a mechanism for mitigating a wide range of risks, and a funder (or co-funder) of often large-scale adaptation projects, including major infrastructure and residential relocation. Among other things, it would raise questions over whether the insurance mandate of EQC should be extended (e.g. to include public property and businesses). It would also pose the risk that any fund that was built up over time to help pay for the future costs of adaptation could be depleted (unless quarantined separately from the post-disaster fund) every time a major natural disaster occurred (although potentially the commission could administer two separate funds: the current Natural Disaster Fund and a stand-alone fund for climate change adaptation purposes). Aside from this, questions would arise about how EQC should be funded. Currently, those who are not insured, together with commercial property owners, do not pay the EQC levy. Yet many of these households and businesses will stand to gain significantly if the EQC becomes a pre-event funder of managed retreat and other large-scale, area-wide adaptation responses. Lastly, effective pre-event planning and adaptation will require extensive public consultation. If this were to be part of the responsibility of an adaptation funding entity, it would involve processes and procedures that are far removed from those currently undertaken by EQC. This, in turn, would entail very different skills and expertise.

The final option would be to create a new funding entity – such as a Climate Change Adaptation Fund – and modify other policy settings accordingly (e.g. in relation to regional and district planning and the funding of public infrastructure, and supported by an agency that makes risk information available, such as the Local Government New Zealand risk agency proposal). The primary aims of a Climate Change Adaptation Fund would be to enhance the capacity for anticipatory governance in relation to adaptation through the funding of cost-effective and equitable responses, thereby reducing climate change risk exposure over time and minimising future damage and loss. An advantage of such an approach is that it would enable policymakers to establish a purpose-built institution with a specific and enduring statutory mandate. A disadvantage is that it would require modifications to many existing policy settings, including its effect on private insurance arrangements and EQC. However, many of these changes will be inevitable in coming years as the challenges posed by climate change adaptation grow.

*The primary aims of a Climate Change Adaptation Fund would be to enhance the capacity for anticipatory governance in relation to adaptation through the funding of cost-effective and equitable responses ...*

### 3.4 Climate change adaptation funding in other jurisdictions

The funding of climate change adaptation varies internationally according to differences in governance arrangements, political cultures, approaches to property rights and the historical treatment of hazard risks.

Common funding instruments used internationally include: taxes on property and income; fees charged for permits; state and federal grants; bonds for borrowing at a community level; loans for projects and programmes; and private–public partnerships. Common risk management instruments that reduce the potential loss and damages include integrated legislation across scales and statutes, and regulatory instruments administered centrally (e.g. by government department oversight of local government implementation, as in the UK) or devolved to states as in Australia or to local government as in New Zealand.

One international example of an anticipatory fund that manages retreat from coastal erosion and inundation is the Defra Coastal Change Pathfinder programme in the UK.<sup>22</sup> Lessons include the increased ability of communities to adapt, ranging from awareness raising and adaptation planning to ‘rollback’; the need to engage early with communities on a wide range of adaptation options; the expectation of at least some ongoing central government funding; the necessity of spatial planning to facilitate ‘rollback’ and the role of planning policy to support coastal adaptation (e.g. the removal of residential status of land to support buy- and lease-back arrangements); the ongoing need to fund the implementation of adaptation measures; and capacity deficits at the local government level.

In the US, a number of ‘clearing houses’ have been provided by the Environmental Protection Agency (at the federal level) to assist with funding community infrastructure to reduce coastal hazard risk. These include provision of financial expertise and revolving loan funds.

Several European countries have signalled the necessity for developing shared national/local/community/private sector funding arrangements for climate change adaptation (e.g. Denmark).<sup>23</sup> There has been a general movement in many European countries towards transferring climate risk to insurance (e.g. in the UK through Flood Re, and in Finland, Germany and France), alongside the development of adaptation plans designed to reduce exposure to risk, based on an EU strategy on adaptation to climate change.<sup>24</sup>

Funding models for climate change adaptation are at best nascent internationally, but mostly yet to be developed for the scope and scale of climate change impacts envisaged. New Zealand can learn from several models in other domestic policy domains (e.g. the Accident Compensation Corporation, EQC and the New Zealand Super Fund). These have design characteristics that incorporate several of the principles enunciated in this paper, such as intra- and intergenerational equity, policy consistency and commitment, and administrative efficiency. Some institutional design features are now discussed, but further research on these will be required.

*Several European countries have signalled the necessity for developing shared national/local/community/private sector funding arrangements for climate change adaptation ...*

<sup>22</sup> See <http://sites.cardiff.ac.uk/secg/files/2016/03/CGC-7-Defra-pathfinder-review-report-2012.pdf>.

<sup>23</sup> See <http://base-adaptation.eu/adaptation-storm-surges-denmark-who-pays>.

<sup>24</sup> See <http://climate-adapt.eea.europa.eu/eu-adaptation-policy/strategy>.

# Part 4 Institutional design issues

Any proposal to establish a new entity raises many issues of institutional design. Among these, in the case of a Climate Change Adaptation Fund, are the following:

1. *Type of entity*: would the entity be a ministerial department or a Crown entity, and if the latter would it have a single commissioner or a board?
2. *Intergovernmental dimensions*: would such an entity include representatives from multiple tiers of government (i.e. central, regional and local)?
3. *Purpose*: how broad would the entity's mandate be and how precisely would it be framed? Would it include adaptation costs other than those associated with sea level rise? Would compensatory arrangements cover only residential properties or also include business premises, losses due to business disruption, and local government assets?
4. *Powers*: what would the decision rights be, who would exercise them and under what conditions? Would there be provisions for the responsible minister to override the decisions of the entity and, if so, under what circumstances?
5. *Sources of funding*: how would the entity be funded (i.e. what sources of revenue would it have access to and how would the funding rates for particular revenue sources be set)?
6. *Pre-funding*: would the entity be designed to generate a surplus in its early years for use in subsequent periods as adaptation costs increase, and how would such a mechanism operate?
7. *Funding allocations*: what criteria would guide the allocation of funds for adaptation purposes? Would there be a competitive bidding process or would the Climate Change Adaptation Fund allocate all its funds on the basis of statutory criteria? What proportion of the total costs of specific adaptation projects would be funded? In relation to funding for compensatory purposes, what statutory criteria would the entity be obliged to act in accordance with and would there be financial limits on individual claims?

While we do not seek to answer all these questions here, several matters deserve brief comment.

First, a Crown entity similar to EQC rather than a ministerial department would ensure a greater degree of independence and minimise the possibility of inappropriate political interference in the entity's decisions. The design of the New Zealand Super Fund could inform this question.

Second, like EQC, the entity would need a secure, ongoing source (or sources) of revenue, as well as the capacity to seek additional funds from the government as circumstances dictate. Possible sources of revenue could include a levy on fossil fuels (i.e. a carbon tax), a levy on the rateable value of properties, or an annual appropriation via the budget.

Third, the entity could be tightly focused on supporting those who have to move from their properties and helping to fund the future-proofing of infrastructure in new locations away from exposure to climate impacts and thus reduce the risks to vulnerable communities (according to an agreed formula, etc.). Alternatively, the entity could also be responsible for protecting existing properties using hard structural measures. But in that event the entity would face difficult internal tensions. Moreover, stronger flood defences would in the end face affordability and social limits and create a 'safety paradox' or 'levee effect' (Tobin, 1995) by encouraging further exposure to risk (Lawrence, 2016; Lawrence, Sullivan et al., 2013). By contrast, proactive support for managed retreat staged in advance of harm would lessen the need for flood defences and their long-term

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maintenance and strengthening over time. In short, a fund with a clear and transparent focus would be easier to administer.

Fourth, a crucial issue requiring careful attention is where decision rights ought to lie for adaptation planning (e.g. for deciding which particular adaptation options are chosen). Plainly, if the central government is a major funder (or co-funder) of adaptation, and especially large-scale managed retreat, it will expect to have an influence on planning decisions. This, in turn, raises questions about the respective roles of central and subnational government in the planning process and the required mechanisms for intergovernmental coordination. Given the scope and implications of some of the required adaptation responses, there would also be a need for specifically designed processes for public participation and consultation.

Finally, any new funding mechanism that is established would need to sit within a more integrated risk reduction framework than currently exists. This would require realignment of some statutes that currently govern risk reduction to ensure that they are consistent and do not reinforce decisions that increase exposure to climate change impacts and can anticipate changing risk profiles. This implies the availability and use of assessment and implementation tools that can do this.

### Issues requiring further research

This paper has addressed only a limited number of issues relating to the funding of climate change adaptation. The focus has been largely on mitigating the impacts of sea level rise. However, many of the principles and considerations discussed here are relevant to other climate change impacts. Various policy issues require further research, both relating to funding and the linkages between funding and other policy instruments. Some of these are being explored by the Technical Working Group on Climate Change Adaptation established in early 2017 by the Minister for Climate Change Issues, Paula Bennett.

Nevertheless, among the issues requiring additional investigation are:

1. policy lessons regarding adaptation planning and funding from other comparable jurisdictions;
2. the impacts of climate change unrelated to sea level rise, and whether other new policy mechanisms may be required to facilitate effective, efficient and equitable adaptation;
3. the implications of climate change for private insurance and possible regulatory changes to enhance the efficiency of insurance as a risk mitigation tool;
4. the implications of climate change for banks, and especially mortgage lending;
5. the design of land use and infrastructure planning arrangements, and procedures for decision making and implementation, including the design and resourcing of stakeholder and community engagement processes;
6. the criteria governing staged retreat of communities and their services;
7. the legal requirements regarding the provision of public infrastructure and utilities (including water services, electricity and gas) once an adaptation plan has been adopted;
8. the design of compensation arrangements (especially for managed retreat), including the criteria for funding allocations and the nature of any justifiable exemptions or exclusions;
9. the criteria for delineating between funding arrangements for 'normal' investments in public infrastructure and funding arrangements for climate-related adaptations to infrastructure;
10. the relative merits of the different governance options for an adaptation fund; and
11. the structure and content of legislation to give effect to new funding arrangements and the implications for related statutes (e.g. the Local Government Act, the Public Works Act, the Building Act, the RMA and the Soil Conservation and Rivers Control Act).

*... any new funding mechanism that is established would need to sit within a more integrated risk reduction framework than currently exists.*

# Conclusion

This paper has outlined and assessed the current policy framework for climate change adaptation in New Zealand. For various reasons, existing funding arrangements are poorly designed for the challenges that policymakers confront now and over coming decades and beyond. First, the current arrangements are largely ad hoc and *post hoc*. They focus too much on *post-event* responses (e.g. post-disaster assistance and recovery) and too little on *pre-event* responses – that is, public funding designed to enhance societal resilience, minimise risk and enable cost-effective adjustments and transitions. Second, the current funding arrangements are fragmented and thus poorly integrated, both across policy sectors and between the different tiers of government. Third, there are inadequate mechanisms to ensure that the costs of climate change adaptation are shared equitably, whether intergenerationally or intra-generationally. Finally, the overall level of resources is unlikely to be sufficient to meet the increasing costs of adaptation over the coming decades. To compound matters, there is a mismatch in many cases between the resources and capabilities available to local authorities and the scope and scale of the adaptation challenges they face.

Unless these deficiencies are rectified, prudent planning decisions may be delayed, or highly suboptimal – and largely temporary – ‘solutions’ will be adopted. Such problems are likely to increase the overall costs of adapting to climate change and place communities and public infrastructure at greater risk. In so doing, more of the burden of adjustment to climate change will be shifted onto those least able to adjust and to future generations. In our view, such outcomes would be neither efficient nor fair.

As part of any comprehensive plan to enhance the country’s capacity to adapt to climate change in a cost-effective and equitable manner, there is a good case for establishing a new national, publicly-administered fund that is *pre-event* and *preventative* (i.e. it is designed to reduce climate change risk exposure over time as risk profiles increase). Such a fund could complement existing *post-event* funding mechanisms, such as the Natural Disaster Fund administered by EQC and private insurance arrangements. It could be designed primarily to contribute to the costs of managed retreat, including the associated infrastructure costs. As with the Natural Disaster Fund, the aim would be to build up a funding pool over several decades for allocation later in the century, thereby enabling the burden of climate change adaptation to be shared more fairly across several generations. It could also adopt a number of the design features of the New Zealand Super Fund that enable the spreading of costs across generations and encourage enduring political commitment and durability of the institutional arrangements.

Any new statutory funding instrument must be carefully designed and properly integrated with related planning and regulatory frameworks. In particular, it must avoid creating incentives for moral hazard (e.g. new investments being made in areas at risk from future sea level rise in the expectation of full public compensation for any losses of land and buildings).

In summary, there is a good case for developing a more integrated, efficient and effective regime for adaptation funding. A key aim must be to enhance the quality of New Zealand’s anticipatory governance by creating institutional arrangements that can help reduce the country’s long-term risk exposure and lower the overall long-term costs of adaptation. To be durable, any such arrangements need to be fair, both within and across generations, and secure multi-party support. Constructing a policy framework that satisfies such criteria will be challenging, but we need to make a start. This paper is designed to encourage new thinking about the issues and options; its purpose is to open, not close, the debate.



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# Appendices

## Appendix 1

### The Christchurch red zone – implications for climate change adaptation funding

There are many examples internationally of governments partially or fully covering the costs of moving people from high hazard areas following a major natural disaster (e.g. floods, erosion, earthquakes or tsunamis) or in order to reduce future risks (e.g. by creating a larger floodplain for high river flows). The form and extent of the financial assistance provided in such cases has varied, depending on the context, including whether resettlement was voluntary or compulsory (Hino, Field and Mach, 2017). Types of assistance commonly include, at least in advanced democracies, fair value compensation for lost land and buildings (based on pre-disaster property values), relocation support, the purchase of new properties, and the provision of new infrastructure. The level of assistance per capita varies greatly.

A recent example of such governmental funding – and one of relevance to addressing the future impacts of sea level rise – occurred in Christchurch. Here a series of damaging earthquakes in 2010–11 caused severe land subsidence and an increased risk of flooding, liquefaction and rock falls (see Canterbury Earthquake Recovery Authority, 2016). In response, more than 8,000 properties were ‘red-zoned’ by the authorities during 2011–15. Those living in a ‘red zone’ were strongly urged by the authorities to relocate. To facilitate this goal, residential and commercial owners were made offers by the government to purchase their properties (including land) based on (independent) rateable values in 2007/08.<sup>1</sup> If they chose to accept the offer, their properties were transferred to the Crown, together with any unsettled insurance claims for damage to built property resulting from the earthquakes.<sup>2</sup> Compensation was not provided for non-property-related harm (e.g. loss of income or emotional harm).

Following successful court action by the so-called ‘quake outcasts’ in 2015, the government was required by the Supreme Court to review its approach with regard to, and consult with, uninsured landowners (including those without buildings on their properties and thus unable to purchase insurance). As a result of this review, the quake outcasts were made more generous offers by the Crown: those with uninsured vacant land (163 properties) were offered 100% of the unimproved land value (based on 2007 rating valuations); those with uninsured improved land (103 properties) were offered 100% of the unimproved land value but no compensation for the loss of the buildings on these properties. The latter offer resulted in further court action. In August 2017, the Court of Appeal ruled that the decision of the Minister of Canterbury Earthquake recovery to approve the Residential Red Zone Offer Recovery Plan in July 2015, under which nothing was offered for uninsured improvements, was unlawful.<sup>3</sup> The Court argued, among other things, that the real cause of the losses experienced by the owners in question was the government’s decision to create the red zone, rather than the earthquakes. Once the properties were red-zoned, they had little or no market value.

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<sup>1</sup> Compulsion was avoided because this could have caused serious difficulties with respect to the handling of insurance claims.

<sup>2</sup> Insurance payments for damage to built property that had already been received by owners were deducted from the amount received by owners. Outstanding insurance claims, other than for contents, were taken over by the government.

<sup>3</sup> *Quake Outcasts v Minister of Canterbury Earthquake Recovery*, Court of Appeal, 332, 1 August 2017. See especially paras 49–50; 55–59; and 87.



By August 2017, virtually all the red zone property owners had accepted the government's offers, at an initial cost to the Crown exceeding \$1.9 billion.<sup>4</sup> Well over six square kilometres of land has been purchased. The government has also extended insurance coverage by EQC to some residents in areas that were not red-zoned, but who faced greater vulnerability to flooding because of quake-related subsidence.

While climate change will generate unique policy challenges (due to the scope, scale and duration of the impacts and the complexity of the responses required), the experience of other compensatory funds and mechanisms – such as those used in Christchurch – deserve careful analysis in considering the role and operations of any new climate change adaptation fund. Among other things, such cases will heighten public expectations that those facing unavoidable losses from climate-related impacts should receive some form of governmental assistance. In particular, the nature of the compensation provided to red-zoned property owners in Christchurch is bound to set a precedent for the handling of climate-related risks over the coming decades (see Storey et al., 2017). Likewise, the decisions of the Court of Appeal and Supreme Court on whether, when and to what extent it is justified for the Crown to discriminate between different categories of residential property owners (e.g. on the basis of their insurance status) will have enduring implications.

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<sup>4</sup> The net fiscal cost was much less than this because the government was able to secure reimbursements from insurance companies (i.e. for the property damage covered by insurance).

# Appendix 2

## Auckland Unitary Plan (district plan coastal hazard provisions) council decision version 19 August 2016<sup>1</sup>

In the regional policy statement for development in the coastal environment, one of the objectives is to avoid increasing the risk: 'In areas potentially affected by coastal hazards, subdivision, use and development avoid increasing the risk of social, environmental and economic harm.'

The relevant coastal hazard objectives (E36.2) set out in section E36 (Natural Hazards and Flooding) of the Auckland Unitary Plan are:

- Subdivision, use and development outside urban areas does not occur unless the risk of adverse effects to people, property, infrastructure and the environment from natural hazards has been assessed and significant adverse effects are avoided, taking into account the likely long-term effects of climate change.
- Subdivision, use and development, including redevelopment in urban areas, only occurs where the risks of adverse effects from natural hazards to people, buildings, infrastructure and the environment are not increased overall and where practicable are reduced, taking into account the likely long term effects of climate change.

The coastal hazard policies (E36.3) include:

- Ensure that subdivision, use and development on rural land for rural uses and in existing urban areas subject to coastal hazards avoids or mitigates adverse effects resulting from coastal storm inundation, coastal erosion and sea level rise of 1m through location, design and management.
- Avoid subdivision, use and development in greenfield areas which would result in an increased risk of adverse effects from coastal hazards, taking account of a longer term rise in sea level.
- Ensure that buildings in areas subject to coastal hazards are located and designed to minimise the need for hard protection structures.
- Ensure that when locating any new infrastructure in areas potentially subject to coastal hazards consider, where appropriate, an adaptive management response taking account of a longer term rise in sea level.
- Require habitable areas of new buildings and substantial additions, alterations, modifications or extensions to existing buildings located in coastal storm inundation areas to be above the 1 per cent annual exceedance probability (AEP) coastal storm inundation event including an additional sea level rise of 1m [CSI1 level].

Activities such as providing habitable rooms in new buildings, and additions of habitable rooms (of more than 25m<sup>2</sup>) to existing buildings, within the CSI1 layer (excluding the coastal hazards area adjacent to the shoreline) require a resource consent if the floor level is below 1% AEP coastal storm inundation level plus 1m sea level rise. In this case, hazard risk assessments are required, including considering climate change effects over at least 100 years.

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<sup>1</sup> Source: <http://unitaryplan.aucklandcouncil.govt.nz/pages/plan/Book.aspx?exhibit=ACDecision>

# Appendix 3

## The risk of public opposition to prudent adaptation planning

Understandably, most people have a strong desire to protect the things they value. This includes their private property rights and material assets (i.e. their land, homes and business premises) and their sources of income (e.g. their farms and other commercial enterprises), as well as their lifestyles, communities, public facilities, cultural treasures (taonga) and environmental 'goods' (including landscapes, resources and ecosystems). The impacts of climate change, such as rising sea levels, threaten many of the things people value. It is highly likely, therefore, that many of those directly affected will oppose policy proposals such as managed retreat (which involve them giving up or surrendering valued 'goods') or changes to regional and district planning provisions (which restrict or override existing private property rights, including the rights to develop their properties). Yet opposition to prudent anticipatory measures (e.g. to reduce societal risks and the long-term costs of adaptation) is likely to increase exposure to risk, reduce resilience and exacerbate the overall costs of climate change adaptation.

Already there are many examples of governments in various countries, including New Zealand, facing strong and persistent opposition to their adaptation proposals (Barclay, 2016; Lawrence, 2016; Parliamentary Commissioner for the Environment, 2015). In some cases such opposition has thwarted (or at least hindered and delayed) sensible long-term planning, generated significant political tensions and reduced public confidence in existing governmental institutions and planning processes.

Public opposition has been motivated by a variety of considerations, including:

- fears of a loss of property value and livelihoods;
- reservations about the credibility and validity of the science of climate change;
- doubts over the nature, timing and salience of the projected impacts;
- disputes over risk assessments, discount rates, acceptable levels of risk, and the trigger points for implementing specific plans;
- misgivings about aspects of the measures proposed;
- specific concerns about the impact of such measures on the cost and availability of insurance; and
- the absence of an agreed mechanism to provide fair compensation to those who will suffer significant financial and other losses as a result of the proposals.

### *A contemporary example of public opposition to adaptation planning – Kāpiti Coast*

Territorial authorities are required under the New Zealand Coastal Policy Statement and the coastal hazard guidance of the Ministry for the Environment to take a 'precautionary approach' to the planning for coastal hazards, such as sea level rise, and to note any impediment to a property on a land information memorandum (LIM) report. In 2012 the Kāpiti Coast District Council (a territorial authority north of Wellington) published a coastal hazard assessment, based on independent expert advice, for the part of the west coast of the North Island for which it has responsibility (see Parliamentary Commissioner for the Environment, 2015). Among other things, the report contained projections about likely changes to the shoreline looking ahead 50 and 100 years. The council took these projections as the primary basis of 'erosion hazard zones' in its proposed district plan. These embraced about 1,800 existing coastal properties along the coast, most of them

residential. The affected property owners were duly informed. They were also advised that ‘erosion hazard zones’ would appear on LIM reports. The relevant information pertaining to properties (e.g. known hazards, water services, rates, consents, and district plan classification relating to land or buildings) is held by councils and provided on request to prospective purchasers. The proposed district plan ‘erosion hazard zones’ included a series of restrictions on building and subdivision within the 50-year time frame. This direct use of coastal hazard assessment as the primary basis of the zoning provisions generated much concern, not least because of the perceived negative impact on coastal property values and the possibility that insurance premiums might rise as a result.

In response, some affected property owners took legal action<sup>1</sup> regarding the information held on the LIM reports and were successful to the extent that the court regarded the maps as inadequately identifying the hazards, but noted that the council was required to identify known hazards in the reports. Later, after further scrutiny of the risks by an independent scientific panel, and a review of the planning provisions in the proposed district plan, the council decided not to include the particular ‘erosion hazard maps’ on their LIM reports or use them as a basis for zoning in the district plan. The proposed district plan was withdrawn subject to review.

Such outcomes have had a salutary impact on the planning for climate change adaptation at the coast by other territorial authorities. Admittedly, in the case in question, there were legitimate concerns about the council’s decision-making processes, the evidence upon which it drew for the district plan zoning provisions and the extent to which it considered alternative planning responses. Nevertheless, some other councils have also encountered opposition to their proposals to manage future climate risks along the coast (Parliamentary Commissioner for the Environment, 2015). This case highlights, among other things, the wider governance challenges posed by climate change and the potential for an increasing deficit in adaptation planning. It is also a cautionary tale about the critical importance of good processes – ones that ensure that communities have adequate and appropriate information for decision-making, whether by individuals, businesses or public authorities.

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<sup>1</sup> Weir v Kapiti District Council, High Court 43/15 (final), December 2013.



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