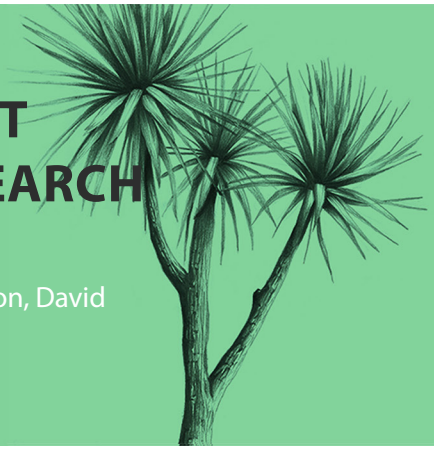
INSURANCE, HOUSING AND CLIMATE ADAPTATION: CURRENT KNOWLEDGE AND FUTURE RESEARCH



Motu Note #27

Belinda Storey, Ilan Noy, Wilbur Townsend, Suzi Kerr, Rhian Salmon, David Middleton, Olga Filippova and Vanessa James
Motu Economic and Public Policy Research,
belinda.storey@vuw.ac.nz, ilan.noy@vuw.ac.nz, suzi.kerr@motu.org.nz

SUMMARY HAIKU

Insurance, housing
Are hard climate change issues
Let's research and talk

ABSTRACT

Climate change will inevitably threaten New Zealand's coastal housing, but the exact nature of that threat will depend on the insurance options available. This note discusses how insurance will adapt to a changing climate. New Zealand's current insurance institutions are surveyed; these are sufficiently unusual to limit the applicability of the international literature. Issues with the provision of climate-sensitive insurance – particularly with its pricing – are discussed, as are relationships between insurance markets and financial markets. Possible policy responses are suggested. The note concludes by proposing high-priority questions for future research.

1. INTRODUCTION

Climate change will increasingly create severe risks for New Zealand's coastal housing stock. Even a small amount of sea-level rise will substantially exacerbate the costs of flooding and storm surges[1]. Under the most optimistic emissions scenario studied by the Intergovernmental Panel on Climate Change, global average sea levels will likely rise by between 44cm and 55cm by 2100, and around 1 m with continued high emissions[2]. Across New Zealand, for regions with high-quality data, there are 43,683 homes within 1.5m of the present average spring high tide and 8,806 homes within 50cm[3].

In the best of all possible worlds, New Zealand would face fewer risks from climate change, though some risks would nevertheless remain. Sound science would communicate future risk, which would be understood by all decision-makers. These decision-makers would make the best decisions possible given their interests and would coordinate easily. Existing home-owners would take risk into account when making renovation decisions. Home-buyers would take risk into account when purchasing; this would affect both what they purchase and how much they are willing to pay. Developers would take risk into account in siting and designing developments. Insurers would pool the remaining risk across individuals. Councils would credibly commit to an adaptive decision-making approach for land use and building decisions and would continue to adjust this approach as risk thresholds are realised.

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. They often discount future events heavily. These same obstacles and barriers faced by homeowners and renters also afflict policy-makers and the private sector.

1. Parliamentary Commissioner for the Environment 2015.
2. IPCC WG1 2013.
3. Bell et al. 2015.

National Science Challenges
THE DEEP SOUTH
Te Kōmata o Te Tonga

In this paper we explore the New Zealand institutions which are relevant to managing climate risks. Specifically, we focus on managing the risks to coastal housing that are induced by sea-level rise. We limit our scope to adaptation to climate change, rather than mitigation of climate change, and we focus on risk management rather than the provision of social services to vulnerable communities: the latter will be the focus of subsequent work by the Deep South National Science Challenge. We synthesise New Zealand and international literature and draw on local expertise and perspectives from a short dialogue process involving the insurance sector, local and central government, and researchers. We aim to identify areas where further research could be valuable – and specifically we identify high priority research for Deep South National Science Challenge funding.

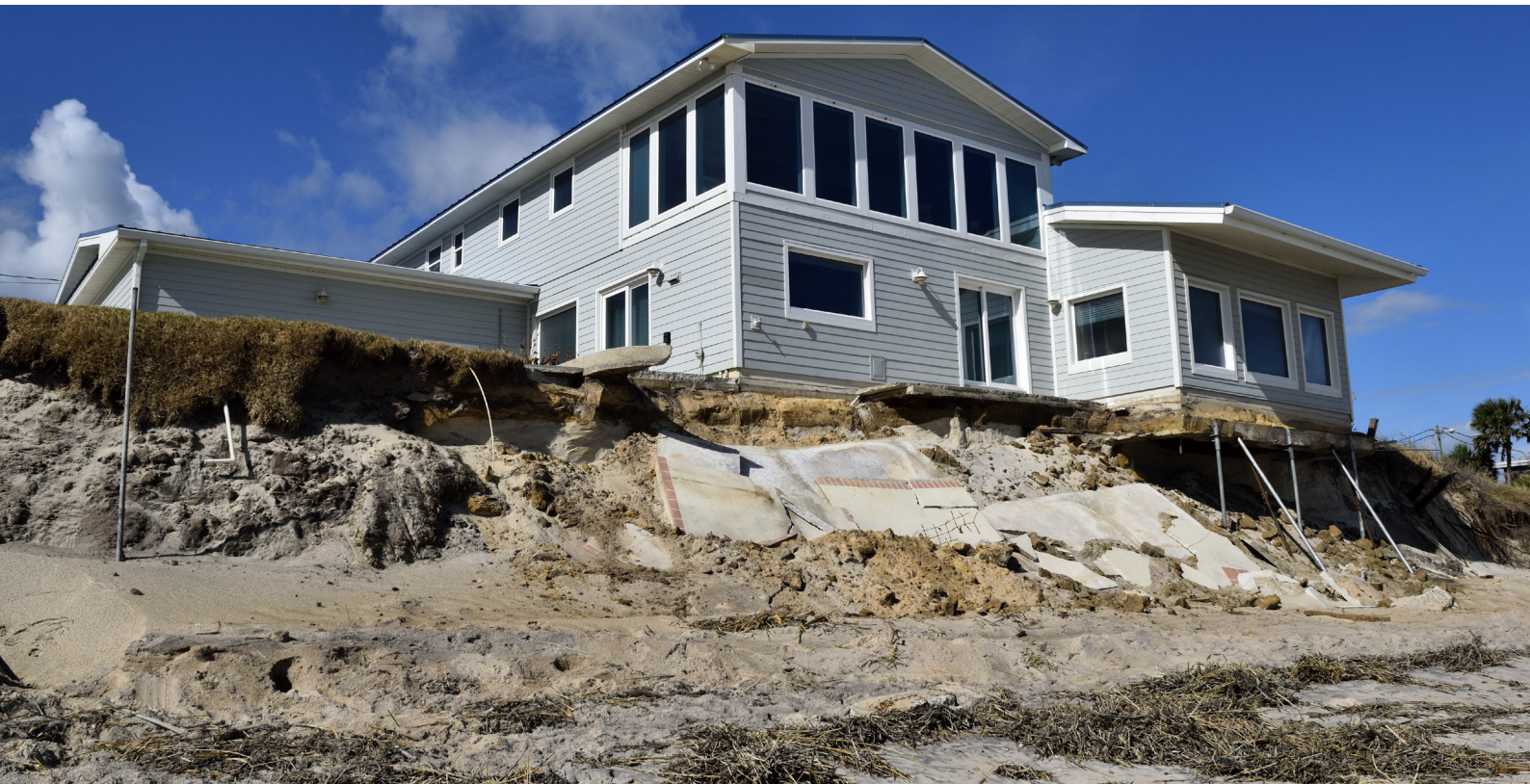
In areas recognised as especially vulnerable to climate change risks, there will be properties that become difficult to sell or insure. Discussion with insurance experts confirms that actual risk is but one element in the setting of premiums by insurers. Evidence from international markets suggests that when a risk becomes uneconomic, insurers can decide that an area is 'uninsurable' and withdraw insurance altogether. As hazards escalate, property developers and existing home owners may seek to block the transmission of information about risk to potential home-buyers.

When coastal disasters occur, homeowners could experience significant losses and displacement. Some may be forced to permanently leave their community after a single and sudden-onset disaster like a storm surge, flash flood or landslide or following a series of smaller events that accumulate to large losses[4]. Local and central government could face high costs from protective measures and continued provision of infrastructure when abandoning housing may be more efficient. Local authorities, and their insurers, could find themselves holding unexpected liabilities if future courts rule that councils are liable for resource consents provided to homes threatened by climate change.

Climate change will render some currently-inhabited locations uninhabitable. This transition could well be costly for individuals and the community. It is not yet known how many locations will face this transition over the next decade, however many of the costs considered in this paper will be accrued in the more distant future. The traditional use of government discount rates might portray such costs as innocuous. However heavily discounting the future losses of climate change is generally inappropriate, especially when those harmed will be uncompensated[5]. Moreover, discounting is incongruous with the emphasis within Mātauranga Māori on safeguarding treasures that have been passed down by past generations[6]. The far-reaching consequences of current decisions should be reflected in current policy.

Section 2 provides an overview of New Zealand's institutions, with an emphasis on the uniqueness which limits the applicability of the international literature. In sections 3 and 4 we study the issues relating to managing climate risks through insurance mechanisms and evaluate New Zealand's current insurance market. In section 5 we consider the risk of climate change costs spilling over to the broader financial industry. In section 6 we offer some potential approaches to improve climate risk management as a basis for further discussion. Section 7 concludes and presents questions for future research.

4. See Moftakhar et al. 2017
5. Cowen & Parfit 1992
6. Awatere 2008



2. CURRENT NEW ZEALAND INSTITUTIONS

A sound insurance sector contributes to the financial security of individuals and firms and supports economic growth by allowing efficient risk-taking[7]. The Earthquake Commission (EQC) and the prudential regulation of insurers under the Insurance (Prudential Supervision) Act 2010 helps minimise the unfunded fiscal risk to the Crown posed by natural hazards.

Non-insurance institutions are also used to manage risk. The New Zealand Coastal Policy Statement 2010 (NZCPS), established under the Resource Management Act, provides the overarching planning document regarding New Zealand's coasts along with Part II matters in the RMA. Each Regional Council is required to prepare a Regional Coastal Policy Statement which outlines how, among other matters, the regional council addresses management of natural hazards (including climate change) and must give effect to the NZCPS. The NZCPS states that use and development in coastal environments should adopt a precautionary approach wherever the effects of activities "are uncertain, unknown, or little understood, but potentially significantly adverse" (Policy 3). It highlights climate change as a particularly important source of vulnerability for coastal resources and outlines policies for identifying and managing coastal hazards including the effects of climate change (Policies 24 – 27)[8].

Local councils are also responsible for managing risk insofar as they construct infrastructure and make planning decisions which affect exposure to coastal hazards. Councils could be liable for private damages if they make planning decisions which significantly increase exposure to coastal hazards[9].

Residential Property Insurance

The New Zealand Government plays a major role in the provision of natural disaster insurance through the EQC. Several other features differentiate the New Zealand residential property insurance sector from those in other countries. First, New Zealand has mostly international insurers in the local market. Second, prudential regulation of New Zealand insurers is quite recent and does not constrain the product categories in which an insurer may operate[10]. Third, the New Zealand insurance industry has historically offered all-perils coverage. Fourth, insurers prefer to set high excesses in hazardous locations rather than increase premiums, such as the $10,000 excesses in Christchurch's Flockton Basin[11, 12].

The Reserve Bank of New Zealand sets solvency standards which establish minimum capital requirements[13]. Insurers are required to be solvent following a 1 in 1000 year earthquake (a 99.9% probability of solvency within a 12 month period). In setting the standard at this level the Reserve Bank noted that "insurer failures are rare but the worst time for them to happen is when the country is facing a major rebuilding programme and government finances are more stretched after a major catastrophe[14]." The solvency standard for non-earthquake perils, including storms and floods, is 1 in 250 years (a 99.6% probability of solvency within a 12 month period). This standard does not address the cumulative effects of smaller hazard events that do not trigger reinsurance payments and will play an increasing role as the frequency of extreme events increases.

Earthquake Commission (EQC)

The government believes it is important to help private property owners avoid "socially unacceptable distress and loss in the event of a natural disaster"[15]. EQC has helped ensure greater insurance penetration in New Zealand and that homeowners have a much higher take-up rate of catastrophe insurance than other countries[16]. International experience suggests that in the absence of an EQC-type scheme most homeowners do not insure against natural hazards and governments find themselves compelled to provide ad hoc assistance[17]. This creates a 'charity hazard' by encouraging home owners to avoid insurance, thereby increasing the future fiscal risk for government if it is induced to provide compensation.

Applying a standard (flat) EQC premium price nationwide helps spread the risk faced in more hazardous locations across all policy holders. This makes catastrophe insurance affordable for those who are most exposed and helps ensure high catastrophe insurance penetration. In doing so, however, it also mutes the price signal which otherwise may discourage or shape development in more hazardous locations.

7. Vucetich et al. 2014
8. Department of Conservation 2010
9. Simpson Grierson 2010
10. Dean 2010
11. Hughes et al. 2014
12. Cann 2017
13. Fiennes & O'Conner-Close 2010
14. Dean 2011
15. New Zealand Treasury 2015
16. New Zealand Treasury 2015
17. Kunreuther 2014

This paper has been informed by a facilitated dialogue.
Experts in the dialogue other than the co-authors include Tim Grafton, Charlotte Brown, Hilary Blake, Kelly Chapman, Bryce Davies, Rick Liefting, Kelvin Berryman, Sally Owen, Ryan Paulik, Jacob Pastor, Richard Dore, Wendy Saunders and Michael Drayton.
Opinions are those of the authors and not necessarily those of dialogue participants or of their employers.

Box 1: Extra-tropical Cyclone Debbie

In the immediate aftermath of natural disasters public officials face intense pressure to offer support, particularly to those households and businesses that for whatever reason are not insured. For example, immediately following the Edgecumbe floods caused by ex-Cyclone Debbie, the Prime Minister, Bill English acknowledged that "there's probably going to be people there who aren't insured or for whom it's had a huge impact" and suggested that public assistance would be offered to households to work through "their immediate issues and then if the long term one is lack of insurance then we'll have to deal with that then"[i]. On 10 April the Prime Minister added that a support package for businesses was also likely to be offered potentially creating a disincentive for businesses to purchase business continuity insurance for future events[ii].

i Radio New Zealand 2017a

ii Radio New Zealand 2017b

EQC protects private residential property and contents from damage by earthquake, volcanic eruption, hydrothermal activity, landslip, tsunami, or fire caused by natural disaster. EQC land cover extends the range of perils to include storm and flood hazards but excludes coastal erosion[18]. EQC does not cover damage to residential structures or contents from storm or floods (or coastal erosion).

EQC premiums are collected by private insurance companies and are embedded within residential insurance policies that include fire insurance. Consequently, if private insurers withdraw from certain markets, homeowners would need to apply directly to EQC for cover[19]. Retreat by private insurers from particular locations could increase the unfunded fiscal risk to the Crown associated with private property in natural disasters, should the Crown elect to provide a backstop insurance[20].

3. ISSUES WITH PRICING CLIMATE CHANGE-SENSITIVE INSURANCE

Climate change may make the calculation of actuarially precise premiums more difficult both because climate change increases the categories of risks which may require insurance and, because the hazard's frequency and intensity are changing over time rendering historical data less relevant.

Categories of Climate Risks

Most current climate change insurance risks fall into two categories of physical risks: direct and indirect. Direct physical risks relate to losses resulting from weather-related events[21]. Indirect risks relate to the impacts on residents and communities that may arise through cascading impacts or disruptions[22]. For example, if a local council becomes insolvent because of its losses along the coast, other areas under the jurisdiction of that council will be adversely affected. Indirect risks arising for New Zealand from climate change impacts experienced outside New Zealand are not addressed here, except where they may influence the coverage by the reinsurers on which New Zealand insurers rely[23].

18. EQC land cover insures against damage to private residential land within 8 metres of an insured dwelling, land under a dwelling's main access way (up to 60 metres from the dwelling), and retaining walls within 60 metres of a dwelling that are necessary for the support of the dwelling.

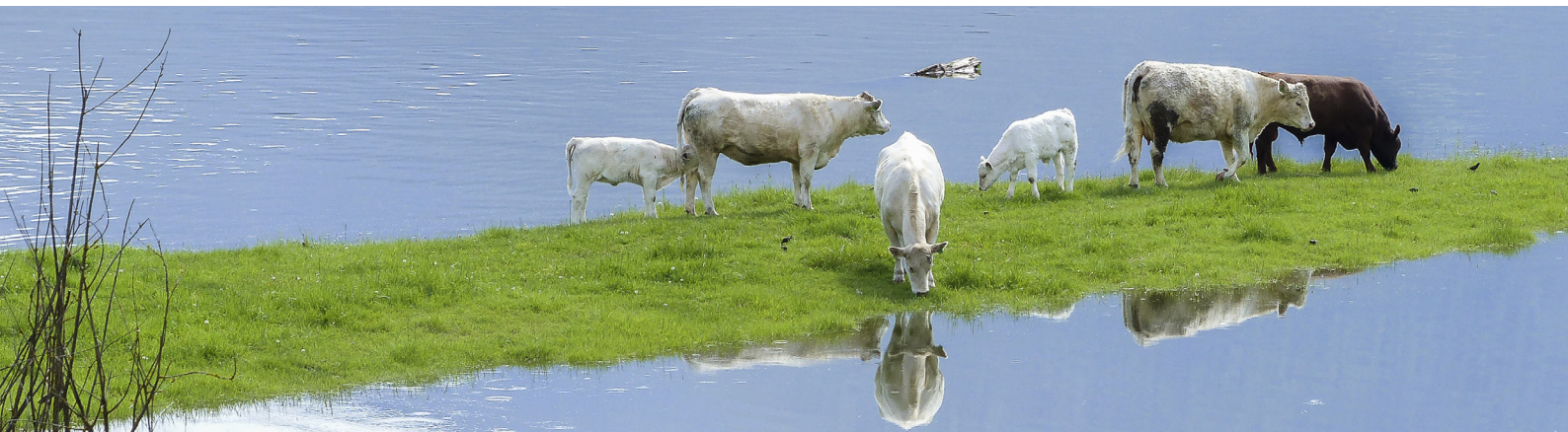
19. The criteria EQC uses when deciding whether to provide insurance upon request are unclear. Alternatively, private insurance firms may opt to provide fire-only insurance allowing customers to access EQC cover.

20. New Zealand Treasury 2015

21. In the future these direct physical risks will include at least two types of non weather-related events. For example, with even modest sea level rise, the direct physical risk from small to moderate tsunami and in some locations liquefaction (from rising groundwater) – both geotechnical hazards – increase dramatically (Hughes 2014)

22. The cascading impacts of climate change are currently being studied by Deep South National Science Challenge research; see http://www.deepsouthchallenge.co.nz/cascading-impacts-and-implications-aotearoa-new-zealand.

23. The Bank of England Prudential Regulation Authority identified two other key categories of risks imposed by climate change policy on insurers: transition risks and liability risks. Transition risks are changes in insurance markets resulting from a rapid transition to a low carbon economy including reduction in revenues from carbon-intensive industries. Liability risks relate to claims against carbon intensive and related industries from parties that have suffered losses as a result of climate change. These liabilities are sometimes insured. These transition and liability risks are also outside the scope of this paper because they relate to climate mitigation.



The inverse revenue-expenditure cycle of insurance tends to mitigate some of the liquidity risk for insurers and reinsurers alike. Insurance premiums are paid in advance, with claims payments made after an event, so liquidity risks are of potential concern only if the liability after an event is higher than the liquid resources available to the insurer or reinsurer. Several factors tend to delay the payout of insurance claims following disasters, thus ameliorating liquidity risks. For example, the spike in demand for loss adjusters and skilled construction labour often outstrips supply following catastrophe events causing delays in the assessment of claims and the physical reconstruction.

Estimating Sea Level Rise Risk

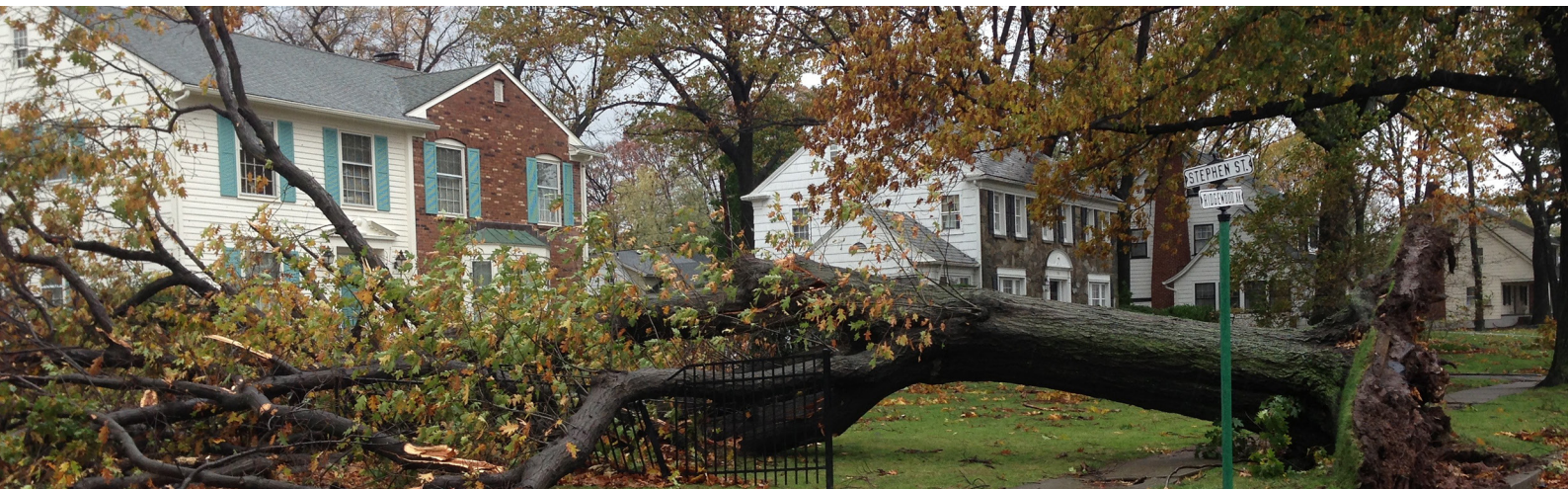
In recent decades most of the increase in global coastal risk has come from increased exposure through urbanisation and economic development[24 25]. However, as the sea-level rises at faster rates, and storms intensify, changes in hazards are expected to replace changes in exposure as the primary driver of escalating coastal risks[26].

As the global sea level rises, king tides, storm surges, and waves will reach further inland. Research commissioned by the Parliamentary Commissioner for the Environment demonstrated that even modest increases in sea level will dramatically reduce the return period of major events. For example, with 10 cm sea level rise the return period for a 1 in 100 year storm surge in Wellington will reduce by a factor of 5 to a return period of 1 in 20 years. Once sea level has risen by 30 cm a 1 in 100 year event is expected to become an annual event in Christchurch and Wellington. In New Zealand, sea level is projected by rise by 30 cm by 2065[27].

Geomorphological science, which measures the impact of coastal processes on topography and overland flow, can currently provide estimates of the damage from coastal-storm inundation in select locations in New Zealand, but less accurate estimates for coastal erosion and sedimentation in harbours and estuaries, given the complex processes and sediment sources involved. Furthermore, accurate estimates of future coastal hazards are limited by: deep uncertainties around polar ice sheet response and future global emission pathways; the high collection cost of up-to-date high-resolution land elevation and asset datasets; and the limited precision of actuarial models for extreme events estimated using little reliable data.

The resolution of climate models is such that it is difficult to predict even large events such as tropical cyclones[28 29 30]. Nevertheless, most climate models predict that while the number of tropical cyclones will reduce slightly, the proportion of tropical cyclones that reach Category 4 and 5 (the strongest) will increase and the path of tropical cyclones will move poleward[31 32]. Since at least the 1980s there has been strong evidence that the tropics have been expanding[33], with the greatest rates – of up to 1° latitude per decade – evident over southern hemisphere Asia, Australia and New Zealand[34 35]. While this is due in part to natural climatic variability[36], much of the expansion over New Zealand and Australia is likely a result of anthropogenic climate change and the slow recovery of stratosphere ozone depletion over Antarctica[37 38]. This is expected to increase the number of long-lived cyclones and move their paths poleward[39 40 41]. This could increase the probability that a tropical cyclone undergoes an extratropical transition that results in a large storm surge in Auckland.

24. McGranahan 2007
25. For example, given the rapid pace of development along China's eastern waterways, MunichRe estimates that if the 1991 floods which caused US$6.8 billion in damage (in 2015 dollars) were to occur today they would result in over $165 billion in damage (Munich Re 2016).
26. Prudential Regulation Authority 2015
27. Parliamentary Commissioner for the Environment 2015
28. Walsh et al 2015
29. Lin et al. 2012
30. Roberts et al. 2017
31. Holland & Bruyere 2014
32. Woodruff et al. 2013
33. Choi et al 2014
34. Kossin et al 2014
35. Given the Earth's finite size and other physical constraints on the global atmospheric circulation, such as the Earth's rotation rate, this rate of tropical expansion cannot be sustained indefinitely (Ramsay 2014).
36. There is further evidence that anthropogenic climate change may itself be impacting natural variability with the Southern Annual Mode positive phase currently at its highest in more than a millennia and continuing to strengthen.
37. Heffernan 2016
38. Lucas & Nguyen 2015
39. Kossin et al 2014
40. Ramsay 2014
41. Munich Re 2016



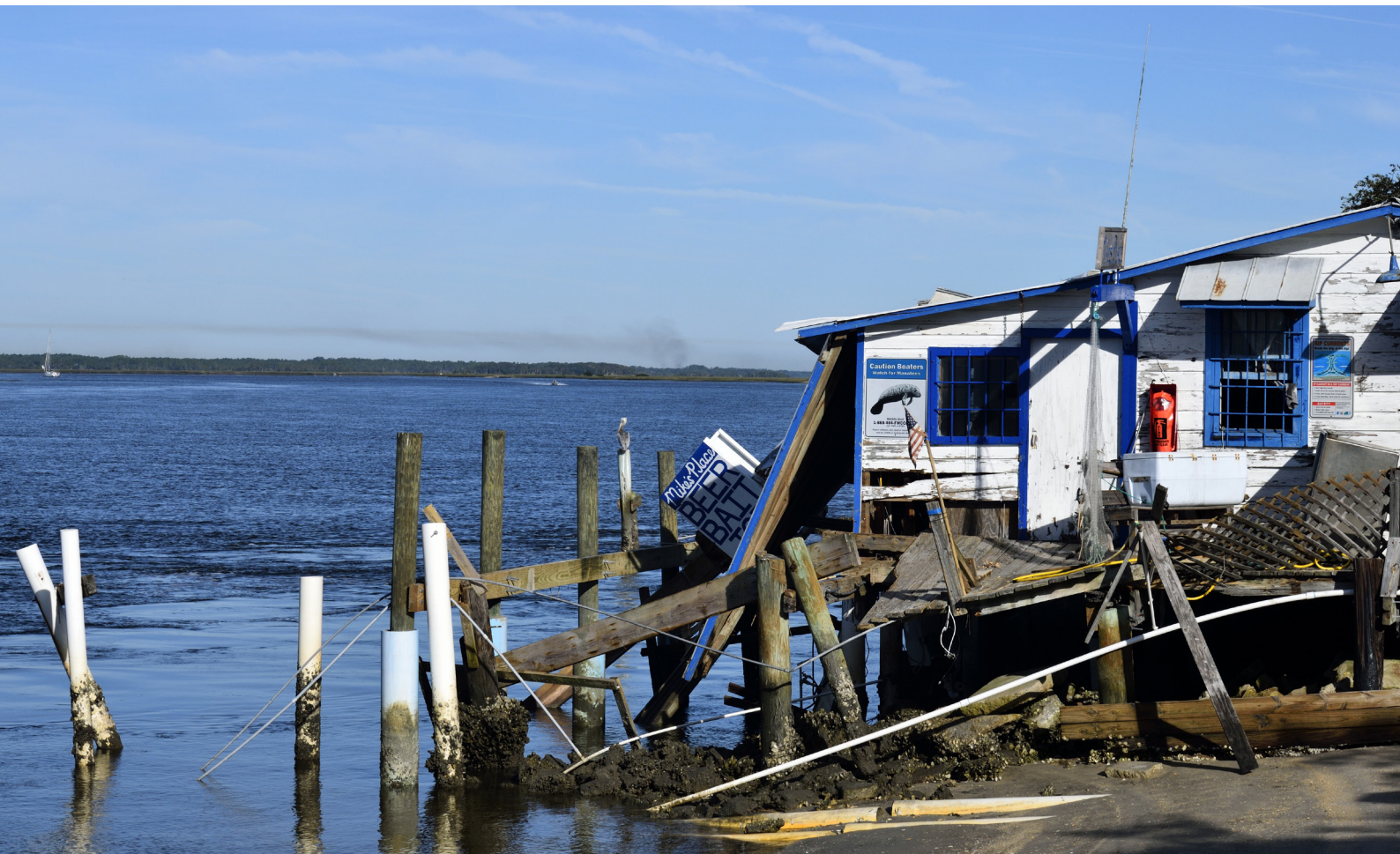
Case Study: Hurricane Sandy

Several studies were conducted on storm surge risk in New York City in the years leading up to Hurricane Sandy[42 43 44]. One study published in Nature Climate Change in June 2012, four months prior to Hurricane Sandy, estimated that an approximate 3.5m storm tide[45] at Battery Park was a 1 in 900 year event[46 47]. Furthermore, the study estimated that increased storm severity and a 1m increase in sea level would reduce the return period for 1 in 500 year events at the Battery by a factor of between 2 and 20 by the end of the century (i.e. a 1 in 500 year event today could become a 1 in 25 year event by 2100)[48 49].

The maximum storm tide during Hurricane Sandy at Battery Park, which is at 40.7° latitude north, was 3.48m[50]. After Hurricane Sandy the return period for a storm surge of this size was estimated to be a 1 in 700 year event[51] though other researchers have suggested such events may already have much higher frequency (shorter return period)[52].

Hurricane Sandy caused approximately US$50 billion of damage (in 2012 dollars)[53]. Most of Manhattan's sea wall is only 1.5m above mean sea level[54] however the previous record storm tide at Battery Park of 2.3 metres in 1960 during Hurricane Donna caused less than US$1 billion in damages (2012 dollars)[55]. Hurricane Donna caused approximately US$3.7 billion (2012 dollars) in damage across the East Coast of the US but only a fraction of this cost was caused by flooding in New York City[56]. Tropical cyclones that undergo extratropical transition and become hybrid storms by merging with an active cold front, such as Hurricane Sandy and Cyclone Giselle in New Zealand (which caused the Wahine disaster in 1968)[57], can produce large slow-moving storms that, despite their relatively low intensity at time of landfall, produce some of the largest storm tides in part because the storm surge remains in place long enough to coincide with high tide[58 59]. Consequently, these types of storms can cause damages that are orders of magnitude greater than intense tropical cyclones.

42. Colle 2010
43. Lin 2010
44. Orton 2012
45. A storm tide is the peak combination of storm surge height and astronomical tide height
46. Lin 2012
47. Brandon et al 2014
48. Lin et al. 2012
49. Some climate models predict that increased storm severity may have as much impact on New York storm surges as projected sea level rise over the next century (Lin et al. 2012)
50. Kemp & Horton 2013
51. Hall & Sobel 2013
52. Brandon et al. 2014
53. Kemp & Horton 2013
54. Lin et al. 2012
55.Brandon et al. 2014
56. Blake et al. 2007
57. Revell & Gorman 2003
58. Reed et al. 2015
60. Brandon et al. 2014



4. CLIMATE AND THE INSURANCE MARKET

The previous section illustrated difficulties with the correct quantification of climate risk. This section discusses other concerns for New Zealand's public and private insurance organisations from climate change.

Provision of private insurance

Insurance covers risks for which there is significant uncertainty. As such, insurers will retreat from coastal locations once risks are sufficiently probable. Insurance retreat by a single insurer can cause industry-wide retreat: after the Hawaiian Insurance Group ceased trading following Hurricanes Andrew and Iniki, other insurers also withdrew from Pacific and Caribbean island nations[60]. Insurers may retreat from a coastal area of New Zealand following a climate event in that location or in another New Zealand location. Alternatively, being international, they may retreat after their experience in another country convinces them that risk profiles have changed because of sea-level rise or other climatic changes. Insurance retreat from coastal locations could increase the unfunded fiscal risk faced by the Crown and decrease house prices as mortgages become unavailable (or more costly).

Insurers may be more willing to continue to provide insurance to high risk areas if they decide to discriminate between these areas and lower-risk ones in the policies they offer (in premium prices, in excess, or in the policy wording). As noted earlier, policy discrimination in New Zealand has historically taken the form of higher excesses instead of higher premiums, but this could change.

Provision of EQC

The nature of EQC land cover is currently being re-considered as part of the review of the EQC Act 1993. As outlined above, EQC land cover includes storm and flood perils but EQC does not cover damage to residential structures or contents from these perils. There is no current proposal to remove EQC's land cover for storms or floods[61].

The primary change to land cover proposed by the EQC review is the inclusion of site works into the building cover with a monetary cap of $200,000. Where rebuilding on damaged land is not practicable, there may be an area cap (e.g. the minimum residential lot size) but no monetary cap on the land cover. Consequently, if the value of coastal and riparian land rises so too will EQC's exposure[62].

Historically, 85% of EQC's historical land claims have been less than $20,000[63]. Except for severe liquefaction and major landslides most geological hazards are unlikely to render remediation futile: volcanic ash can be removed and buckled earth can be levelled. However, when land disappears, full compensation may be required. EQC does not protect against erosion caused by slow onset events or rising seas, but the courts may hold EQC liable for land loss caused by a storm – and that storm surge may be attributable to climate change. Given the rising value of coastal and riparian land, and the sea-level rise, EQC's exposure could be orders of magnitude greater than historical averages.

Following the Christchurch earthquakes, the interaction between the public insurers and private insurers was difficult, though an efficient process was eventually developed. Similar challenges, though currently unanticipated, may arise following climate change-related disasters. As discussed earlier, withdrawal of private insurance from coastal properties will result in homeowners seeking to insure directly with EQC. It is not clear how many homeowners would seek to do so, whether they will be permitted to, and what administrative demands this would place on the EQC and on its interactions with the private insurance sector.

Demand for insurance

Home-owners may not purchase insurance if they believe that they will be compensated by government. Following the Christchurch earthquakes, the government did not assist homeowners that had not purchased insurance except where it was compelled to do so for property that was red-zoned. The public objection to that decision was muted, as the number of people who reportedly did not have insurance was very small. Public objection and government response after a climate change-related disaster may be very different if the number of uninsured properties is higher as insurance had previously been prohibitively priced for affected communities.

60. Prudential Regulation Authority 2015. At that point, both Hawaii and Florida set up their own publicly funded re-insurance mechanisms.
61. The EQC land liability is the smallest of: the area of the insured land that is damaged; the minimum sized area allowed for use of a residential site under the relevant district plan; or the value of the 4,000 m2 closest to the dwelling: New Zealand Treasury 2015.
62. There is also no cap on EQC coverage of the land under access ways and retaining walls which are both insured at indemnity value.
63. New Zealand Treasury 2015

International experience suggests that insurers could experience an increase in demand if coastal homeowners sought to increase coverage in response to increasing risk of extreme events. However New Zealand already has an unusually high penetration rate of catastrophe cover[64]. Consequently, the net effect of extreme coastal events will likely be a reduction in insurance coverage in New Zealand.

5. CLIMATE AND FINANCIAL MARKETS

Much of the climate change-related economic research to date has been on developing market mechanisms to promote mitigation. There has been less analysis of the economic impact of climate change or exploration of potential economic adaptations to climate change[65]. Without such information, financial markets are not able to allocate capital to best manage escalating climate risks. As Mark Carney, Governor of the Bank of England stated in his December 2016 speech, "without the necessary information, market adjustments to climate change will be incomplete, late, and potentially destabilising"[66].

Global Reinsurance

The top ten reinsurers account for approximately half of the total global premium[67]. According to Swiss Re, annual premium income for the reinsurance industry was approximately £367 billion in 2014, compared to a total premium for insurance of £3 trillion[68]. The credit ratings and profitability of insurance companies are highly sensitive to the ratio of capital to expected liability. Catastrophic risk differs from more traditional insurance products in that catastrophes experience long tail risks which require higher ratios of capital-to-liability. The capital-to-liability ratio is dependent on the volatility of the catastrophe liability and its correlation with the reinsurer's remaining portfolio. Consequently, catastrophe insurance premiums are often several multiples of claim liabilities[69]. Climate change is making reinsurers' tail risks both longer (i.e. increased severity of the largest events) and fatter (i.e. increased frequency of major events)[70]. This raises the (albeit remote) possibility of multiple sequential events overwhelming the capital reserves of a global reinsurer[71].

Reinsurance is important for the prudential requirements placed on local insurers and the EQC to prepare for tail events. If financial woes were to affect the international reinsurers—currently they are facing historically unprecedented low costs of financing—the reinsurance premiums paid by EQC and New Zealand's private insurers could significantly rise in the future. A higher cost of reinsurance will increase the retail cost of insurance. If international reinsurance markets harden, reinsurers will also likely place greater scrutiny on EQC's exposure to storm surges and flooding, potentially increasing their prices or even refusing to reinsure this untraditional cover for land.

Banking

Climate change could precipitate home loan defaults because of the maturity mismatches between residential insurance and mortgages. Insurance is a requirement for residential mortgages in New Zealand and failing to maintain insurance can trigger default. While mortgages are often granted with repayment periods spanning decades, insurance contracts are renewed annually. Insurers are thus able to completely exit an insurance market within 12 months, while a lender may still have decades before their loans mature. Insurance retreat could leave some lenders with a portfolio of assets in technical default. Whether banks experience material losses will depend on the number of houses made uninsurable, the geographical concentration of the bank portfolio and the pace at which banks can divest themselves of mortgages on uninsured properties. As a consequence, bankers expect that in the future they may lend to owners of coastal property less often, or require more equity or higher interest rates[72]. Even now, and despite their rules requiring mortgagors to insure, the general absence of compliance checks means banks do not currently know whether particular properties they mortgage remain insured beyond the first year of ownership.

Commercial property portfolios tend to be highly correlated and commercial property often contributes more non-performing loans during downturns even where residential loans comprise a much larger proportion of the total loan book. While commercial property lending in New Zealand is only 9 percent of total bank lending, it is perceived as relatively high risk and so comprises 20 percent of banks' risk-weighted assets.[73] The impact of sea level rise on commercial property is outside the scope of this effort, but is important for the understanding of climate risk in the New Zealand banking sector.

64. Hjort 2016
65. Dietz 2016; Hjort 2016
66. Carney 2016
67. Prudential Regulation Authority 2015
68. French 2015
69. Kunreuther 2014
70. Reed et al. 2015
71. While reinsurance firms seek to diversify their risk across perils and geographies there remains a strong concentration in catastrophe insurance in hurricanes in the United States. Consequently, should an extraordinarily large hurricane occur there at the same time as natural disaster in New Zealand (whether geological or meteorological) this could undermine the solvency of firms that provide reinsurance to New Zealand.
72. Lawrence et al 2016.
73. Dunstan & Skilling 2015

6. POSSIBLE RESPONSES

This paper has argued that climate change will present difficult challenges to homeowners, local, regional, and central government, private insurers, and the financial institutions. In this section we discuss some plausible policy changes which could help overcome some of these shortcomings. This section is not intended as a comprehensive list of possible policy responses, but only as suggestive of future directions that might well be worth exploring in detail.

Provide Information to Prospective and Current Homeowners

Some Councils have tried to provide information on climate risk for individual properties through statements on Land Information Memorandums (including Kapiti and Dunedin), and planning rules. They have faced resistance. Climate-risk statements, in some form, could be made mandatory by central government – removing political pressure from local governments[74]. Similarly, guidance on sea level risk, such as is already provided by the Ministry for the Environment to local government, should be further disseminated and include more analysis of storm surge risk and flooding, and information about long-tail events.

Longer-term Insurance

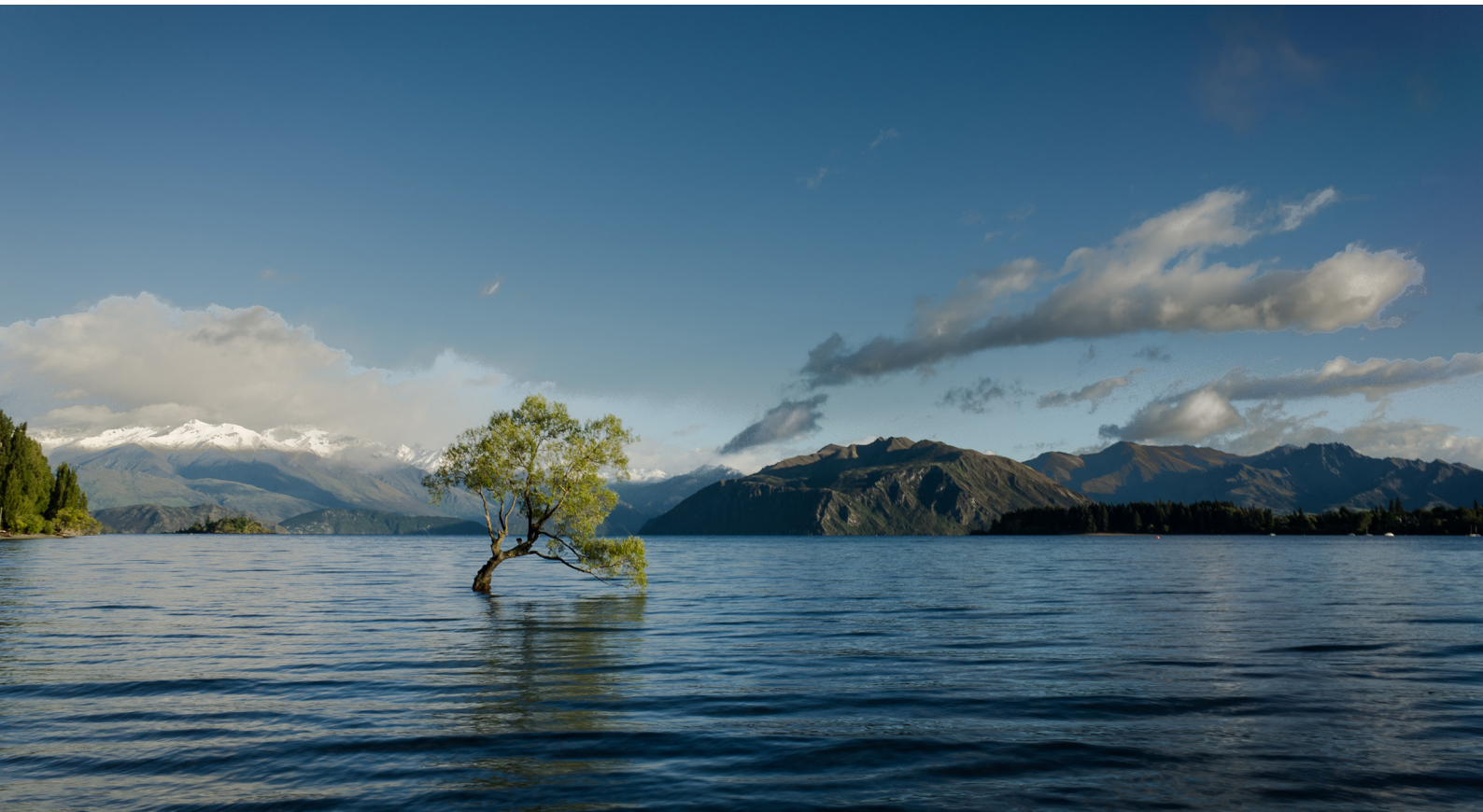
The viability of a market in long term residential insurance could be investigated. Policies could then more closely match the timeframe against which a mortgage is paid off, or the expected term of occupancy. This insurance would likely involve a pre-agreed schedule of premiums which would increase over time and could be contingent on observed sea level rise. This schedule would communicate to potential home owners the likely costs of coastal home-ownership and would help the banking industry avoid mortgaging properties which would later become uninsurable[75].

Long-term risks are likely to be highly correlated, and so insuring against them would require solving distinct actuarial problems[76]. Longer-timeframe home insurance would also require general insurance firms to more actively manage the interaction between asset and liability risks, as is currently done by life insurance firms. It may also depend on the availability of long-term re-insurance arrangements.

Develop Rules for Risk and Cost Allocation

Whether local government is liable for properties which will later become uninhabitable is unclear: some local authorities have begun purchasing at-risk properties, essentially compensating the owners of those properties, while other local authorities have refused to do so. The compensation for red-zoned houses following the Christchurch earthquake may have set a precedent which could be extrapolated to houses red-zoned by climate-related disasters. In this previous case, owners

74. See Saunders & Mathieson 2016 for discussion of national standards of Land Information Memoranda.
75. Kunreuther 2009
76. Aerts 2014



were fully compensated (based on estimated per-catastrophe housing values), but compensation in this case may or may not be full. In order to ensure on-going political credibility, any local compensation policy is likely to require central government endorsement, and maybe funding.

Present Housing-Related Liabilities in Financial Statements

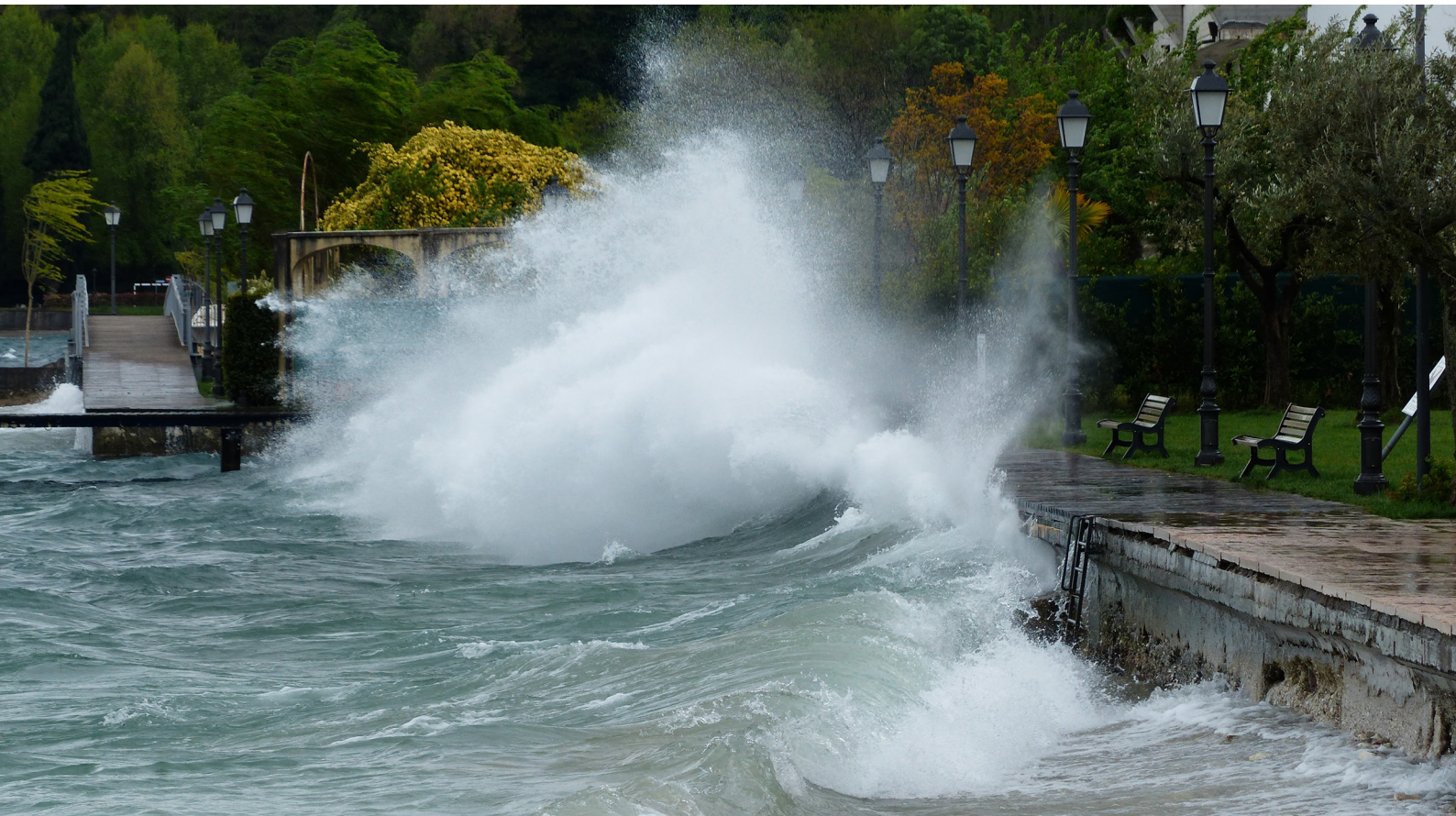
Valuing climate liabilities may help central government, councils and other organisations defend efforts to minimise such liabilities. It would also ensure that organisations remain solvent after a climate-related disaster. However the pricing of such liabilities is non-trivial and, conceivably, may result in some organisations appearing insolvent. There is thus a real need to develop robust ways of accounting for these risks.

7. CONCLUSIONS: HIGH-PRIORITY RESEARCH QUESTIONS

The transitions necessitated by climate change will be difficult, and managing them will require social and financial responses that will generally be perceived as fair by the wider New Zealand community. Rules to preserve efficient decision-making must be credible and enforceable. Given the overlap between local and central government, that credibility will require the national coordination of local conversations. Below, we suggest research that would help advance those conversations and have them be better-informed.

As mentioned earlier, this paper has been shaped by a dialogue involving the insurance sector, local and central government, and researchers. That dialogue identified six high-priority research questions which both address the unknowns identified in this paper and are tractable to high-quality research. These questions are:

1. Where do sea-level rise risks currently fall across the different parties (homeowners, government, and private insurers)? How should this exposure to risk be allocated to contribute to a fair and sustainable adaptation to sea-level rise?
2. What policy options are available to local, regional and national government when a tipping point of uninsurability is reached?
3. What would those tipping points be? What would be the economic implications of a maximum probable weather event in Auckland?
4. What is the relationship between house prices, climate change related hazards, and insurability?
5. What financial instruments or institutional arrangements can be developed to mitigate climate change risk and insure the functioning of housing markets?
6. How can we better inform coastal property owners' decision-making with respect to climate change?



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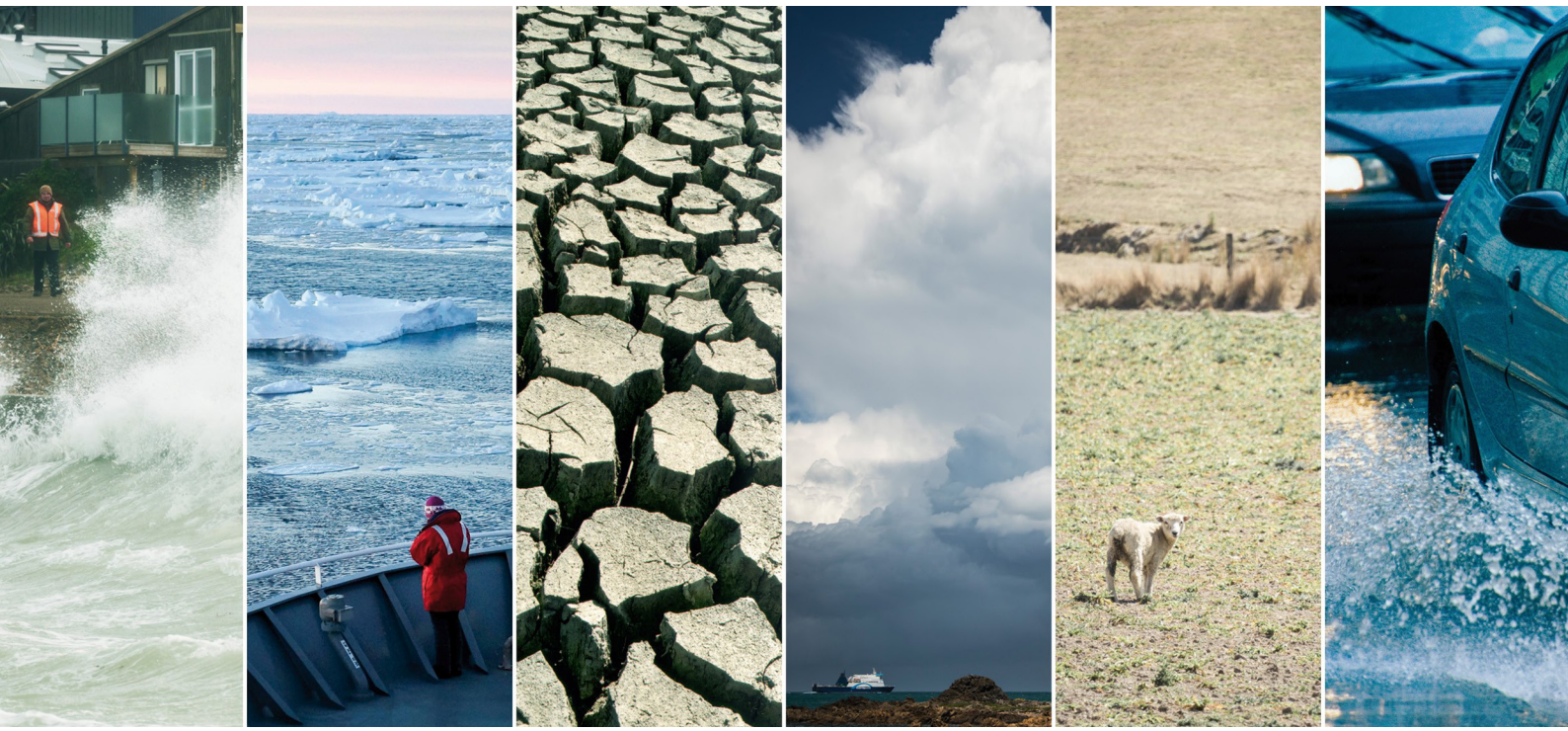
THE DEEP SOUTH

Te Kōmata o Te Tonga

National SCIENCE Challenges



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