
Towards incentivising resilience to natural hazards in Aotearoa: a case for action

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ABSTRACT

This paper explores both the opportunities and pitfalls of incentivising resilience to natural hazards in Aotearoa New Zealand, with a focus on earthquake risk. Drawing on international case studies and frameworks, the first part of the paper analyses the systems and policies implemented elsewhere that promote community resilience through policies and financial incentives. These include risk-reduction strategies, insurance schemes, and public-private partnerships aimed at improving disaster preparedness and recovery.

The second part of the paper contextualises these approaches through a distinctly Aotearoa New Zealand lens using several case studies. The assessment of outcomes is conducted using triple-bottom-line principles: people, planet, and prosperity.

Ultimately, the paper argues that incentive-based approaches are crucial, in order to safeguard our communities from these vulnerabilities, rather than the reactive and free-market-based policy settings that we currently have. A case for action is made, calling for adaptive policies that prioritise not just immediate risk reduction, but also a reduction in strain on our emergency services, better environmental stewardship, and multi-generational economic resilience in the face of growing natural hazards.

1 INTRODUCTION

Natural hazards pose an ongoing threat to communities across the globe, but in Aotearoa New Zealand, the unique combination of risks is particularly acute. Situated on the Pacific Ring of Fire, Aotearoa New Zealand experiences frequent seismic activity alongside other natural hazards, including floods, landslides, and volcanic eruptions. The question is not if, but when, the next catastrophic natural disaster will strike. Despite this inevitability, Aotearoa New Zealand's current approach to managing natural hazards remains largely reactive and market-driven, leaving communities vulnerable to escalating risks. This paper seeks to explore a more proactive path forward by examining how incentivising resilience can help safeguard communities, reduce economic losses, and foster long-term sustainability in a variety of measures.

At the heart of this discussion lies the newly introduced Natural Hazards Insurance Act 2023 (NHIA), which replaces the Earthquake Commission Act 1993 (EQCA). The NHIA aims to improve the insurance claims

process and increase the focus on building resilience to all natural hazards (Natural Hazards Commission, 2024). While the NHIA represents a positive step forward, it stops short of explicitly incentivising homeowners to invest in resilience measures (Tibshraeny, 2024). This omission is significant, given that research consistently demonstrates the substantial financial and social benefits of such investments. For example, the National Institute of Building Sciences (NIBS) in the United States has shown that for every dollar spent on mitigation, stakeholders can save up to \$13 over a building's lifetime (NIBS, 2019). Beyond cost savings, enhanced resilience reduces disruptions to daily life and emergency services, decreases the environmental impact of construction waste, and provides peace of mind for families.

Globally, programs in countries like Japan and the United States provide compelling examples of how financial incentives can encourage the adoption of resilience measures. Japan's Housing Quality Assurance Act (HQAA) offers reduced insurance premiums for homes that meet stringent resilience standards, while California's Earthquake Brace + Bolt (EBB) program provides grants for retrofitting older homes. These initiatives demonstrate that modest investments in resilience not only benefit individual homeowners but also strengthen community-wide preparedness, easing the strain on public resources during disaster recovery.

Aotearoa New Zealand's unique social, cultural, and economic context must also be considered when developing policies to incentivise resilience. The principles of Te Tiriti o Waitangi (the Treaty of Waitangi) and the bicultural nature of Aotearoa New Zealand's society underline the need for solutions that are equitable and inclusive of a variety of world views. Additionally, with construction costs at an all-time high and consistently outpacing general inflation (Corelogic, 2024), any additional financial burden is likely to deter homeowners and developers from pursuing resilience measures unless meaningful incentives are provided.

This paper argues that incentivising resilience is not merely a matter of mitigating risk, but of rethinking how we build, plan, and prepare for an uncertain future. By learning from international best practices and leveraging the opportunities presented by the NHIA, Aotearoa New Zealand can lead the way in creating a resilient society. The following sections will first explore international approaches to incentivising resilience, drawing on case studies and frameworks from Japan, the United States, and other countries. The paper will then contextualise these lessons within the Aotearoa New Zealand setting, evaluating their applicability through a triple-bottom-line framework of people, planet, and prosperity. Finally, it will argue for a comprehensive, adaptive approach that prioritises proactive risk reduction and multi-generational resilience.

2 PART ONE: INTERNATIONAL APPROACHES TO INCENTIVISING RESILIENCE

2.1 Risk-Reduction Strategies

Across the globe, governments and organisations have implemented targeted risk-reduction strategies to mitigate the impacts of natural hazards. These strategies aim not only to reduce the immediate consequences of disasters but also to encourage proactive investment in resilience. Among the most prominent examples is Japan's HQAA, a groundbreaking framework that incentivises resilience in residential construction. Enacted in 2000, the HQAA requires all new homes to meet stringent structural and durability standards, including earthquake resistance. A cornerstone of the HQAA is its provision of a 10-year warranty for homebuyers, which assures quality and incentivises developers to adhere to high construction standards. Moreover, the HQAA links compliance with financial incentives such as reduced insurance premiums—up to 50% in some cases—making resilience a financially attractive option for homeowners and builders alike. By integrating resilience into the regulatory and financial framework, Japan has created a system that not only mitigates disaster risks but also encourages innovation and sustainability in the construction sector.

In the United States, California's EBB program offers another example of effective risk-reduction incentives. Though it has had various challenges in implementation, the program provides homeowners with grants of

up to US\$3,000 to retrofit older homes and improve their seismic performance. The initiative targets homes built before 1979, and aspects in these homes which are particularly vulnerable to earthquake damage. Participants who complete retrofitting are further rewarded with reduced earthquake insurance premiums, often by as much as 25%. By focusing on older properties, this program addresses a critical area of vulnerability while simultaneously reducing the financial burden of retrofitting for homeowners. The dual benefits of upfront grants and ongoing premium reductions create a compelling case for participation, leading to a broader culture of preparedness in the face of insurance withdrawal.

2.2 Insurance Schemes

Insurance mechanisms have proven to be a crucial tool in providing resilience to natural hazards, not only by offering financial protection but in some cases also by encouraging proactive risk mitigation. Recent innovations and international approaches reveal how insurance schemes can be reimagined to drive preparedness, improve affordability, and foster community-level resilience.

One significant innovation comes from the growing adoption of parametric insurance, which provides payouts based on predefined triggers such as earthquake magnitude, storm intensity, or flood levels (Swiss Re, 2023). Unlike traditional indemnity insurance, parametric policies bypass the lengthy claims adjustment process by linking agreed payouts directly to measurable event parameters such as peak ground velocity. This approach ensures rapid disbursements, enabling communities to begin recovery efforts immediately after a disaster. Franco et al. highlight how parametric models can be tailored to community-level needs, pooling risks across participants and spreading costs more equitably (Franco et al., 2024). Such systems are particularly appealing in regions with limited uptake of traditional insurance due to distrust or administrative inefficiencies.

In Japan, a combination of parametric triggers and community disaster risk reduction strategies are used. For example, local governments and businesses collaborate to establish parametric disaster relief funds (Japan NPO Center, 2025), ensuring that resources are quickly available following seismic or climatic events. A proportion of these donations are backfilled by parametric policies taken out by the local governments and businesses, provided by larger multi-nationals (Sullivan, 2023). These funds complement existing insurance frameworks and help reduce reliance on government disaster aid while also providing a good corporate image for participants. This model offers a valuable blueprint for countries like Aotearoa New Zealand, where the speed of post-disaster recovery is critical for maintaining social and economic stability.

In the United States, the concept of community-based insurance has gained traction, particularly in areas prone to frequent natural hazards. Programs such as reciprocal insurance exchanges enable communities to self-insure by pooling premiums into a shared risk fund as shown in Figure 1. As outlined in the Franco report, these exchanges can be structured to include a mix of parametric and indemnity coverage, offering both transparency and cost efficiency. The use of external reinsurance markets further reduces financial strain on the community fund, ensuring long-term viability. This model also provides a pathway to gradually reduce dependence on private insurers, which have increasingly withdrawn from high-risk markets such as California due to unsustainable losses from wildfires and earthquakes (Insurance Journal, 2024).

Under the now repealed EQCA, the effect of Aotearoa New Zealand's Earthquake Commission (EQC) provides a cautionary example of how insurance systems can fall short when not adequately aligned with resilience goals. While EQC offered limited coverage for natural disasters, its tangible output has been on post-disaster recovery rather than proactive risk reduction. Homeowners were not incentivised to retrofit their properties or adopt resilience measures, leaving significant gaps in the country's preparedness and a long and protracted recovery path following a natural disaster. The newly introduced NHIA and rebranded Natural Hazards Commission (NHC) provides an opportunity to reimagine the role of insurance in disaster preparedness. By incorporating elements such as parametric triggers, and premium incentives for retrofitting

and/or resilience, Aotearoa New Zealand could develop a hybrid insurance model that addresses current gaps while fostering proactive resilience. These parametric triggers can also aid in providing a measurable event and coverage for long-term tenants who form an increasing portion of the Aotearoa New Zealand property market (TVNZ, 2024) and who do not own a damaged property but are just as impacted by natural hazard disruption as a homeowner.

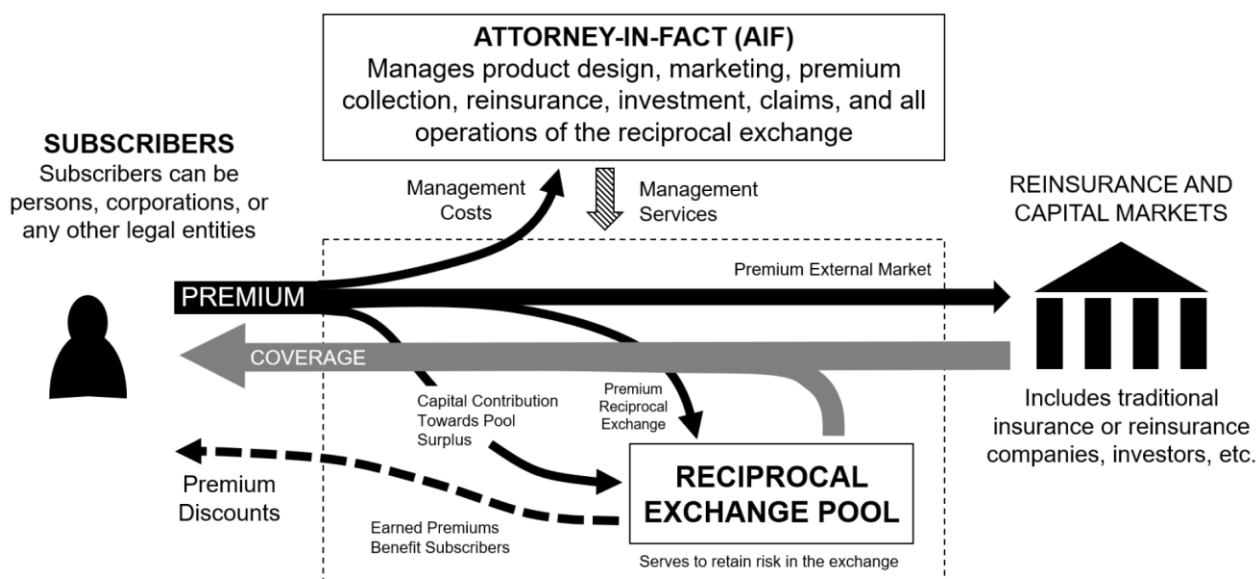


Figure 1. A reproduction from Franco et al. (2024) showing the fundamentals of a reciprocal exchange.

Modern insurance schemes provide more than a financial safety net; when creatively implemented they can serve as instruments for embedding resilience into society. Whether through parametric payouts, community risk-sharing, or incentivised retrofitting, innovative insurance models offer scalable solutions that can reduce the impact of natural hazards while empowering individuals and communities to take ownership of their risk.

2.3 Public-Private Partnerships

Public-private partnerships (PPPs) have emerged as a further tool for enhancing resilience, leveraging the expertise and resources of both sectors to address complex challenges. In the Netherlands, the Room for the River program exemplifies the potential of PPPs in mitigating natural hazards (Kay, 2022). This initiative involves collaboration between government agencies, private landowners, and businesses to reduce flood risks while enhancing ecological and recreational values. By creating designated areas where rivers can safely overflow, the program reduces the likelihood of catastrophic flooding. Importantly, the initiative integrates private stakeholders into the decision-making process, ensuring that their needs and perspectives are considered. The program's success demonstrates the value of combining public oversight with private innovation to achieve resilience goals.

Japan's Disaster Prevention Day provides another example of effective PPPs. Held annually in September, this nationwide event brings together government agencies, businesses, and communities to conduct disaster drills, promote awareness, and assess preparedness (Ministry of Foreign Affairs of Japan, 2025). The participation of private companies in these activities not only strengthens community resilience but also fosters a culture of shared responsibility. By involving multiple stakeholders, Japan ensures that resilience is a collective effort, reducing the burden on any single entity.

2.4 Evidence from the NIBS Report

The *Natural Hazard Mitigation Saves* report by the National Institute of Building Sciences provides compelling evidence for the economic and societal benefits of proactive resilience measures. The report evaluates various mitigation strategies, including retrofitting buildings, implementing flood defences, and updating building codes, demonstrating their cost-effectiveness across multiple hazard types. According to the report, investments in seismic retrofitting of existing buildings yield particularly high returns, with every dollar spent saving an average of \$13 over the building's lifetime (NIBS, 2019). These savings are realised through reduced repair costs, diminished insurance claims, and lower societal disruption and an excerpt is shown in Figure 2.

The report also highlights the broader benefits of mitigation, such as reduced displacement and faster recovery times. For example, homes retrofitted to withstand earthquakes are less likely to suffer extensive damage, enabling families to remain in their homes and communities during recovery. This stability reduces the economic and social costs associated with temporary housing and community dislocation. Furthermore, resilient buildings contribute to environmental sustainability by minimising construction waste and reducing the need for energy-intensive repairs.

The findings of the NIBS report underscore the importance of integrating cost-benefit analyses into resilience planning. By quantifying the long-term benefits of mitigation, policymakers can make informed decisions about where to allocate resources. This approach ensures that investments in resilience are not only effective but also equitable, addressing the needs of vulnerable populations who are often disproportionately affected by natural hazards. The lessons from the NIBS report provide a valuable framework for Aotearoa New Zealand as we seek to enhance our resilience to natural disasters – to move from reactive to proactive.

	ADOPT CODE	ABOVE CODE	BUILDING RETROFIT	LIFELINE RETROFIT	FEDERAL GRANTS
Overall Benefit-Cost Ratio	11:1	4:1	4:1	4:1	6:1
Cost (\$ billion)	\$1/year	\$4/year	\$520	\$0.6	\$27
Benefit (\$ billion)	\$13/year	\$16/year	\$2200	\$2.5	\$160
 Riverine Flood	6:1	5:1	6:1	8:1	7:1
 Hurricane Surge	not applicable	7:1	not applicable	not applicable	not applicable
 Wind	10:1	5:1	6:1	7:1	5:1
 Earthquake	12:1	4:1	13:1	3:1	3:1
 Wildland-Urban Interface Fire	not applicable	4:1	2:1	not applicable	3:1

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Figure 2. A summary of the benefit-cost ratios for various natural hazard types and mitigation strategies as presented in the 'NIBS Natural Hazard Mitigation Saves' report.

3 PART TWO: CONTEXTUALISING RESILIENCE IN AOTEAROA NEW ZEALAND

3.1 The Aotearoa New Zealand Context

Our unique geographical and societal context requires a tailored approach to resilience. Located on the Pacific Ring of Fire, our country experiences frequent seismic activity, including earthquakes, volcanic eruptions, and tsunamis. Compounding these natural threats are climate-related hazards such as floods and landslides, which are increasing in frequency and severity due to climate change. This confluence of risks places huge pressure on Aotearoa New Zealand's infrastructure, housing stock, insurance sector, and emergency management systems.

Despite these challenges, Aotearoa New Zealand's approach to resilience has historically been reactive rather than proactive. The NHC was established in 1945 (then the Earthquake and War Damage Commission) to provide insurance for natural disasters and war damage, but its focus has largely been on post-disaster recovery rather than incentivising risk reduction. While the recently introduced NHIA represents a step forward, its provisions for encouraging resilience remain limited aside from through research and public education. This section examines how international best practices can be adapted to Aotearoa New Zealand's unique context and evaluates potential strategies through the lens of people, planet, and prosperity.

3.2 Case Studies

3.2.1 Christchurch Rebuild

The 2010-2011 Canterbury earthquakes were a stark reminder of Aotearoa New Zealand's vulnerability to seismic events. The devastation caused by these earthquakes highlighted significant weaknesses in our country's building stock, particularly older unreinforced masonry structures. The rebuild process that followed introduced stricter building standards, but these were largely mandated rather than incentivised. Homeowners and businesses faced significant financial burdens in retrofitting or rebuilding properties, with lengthy settlements and limited additional financial support available.

While the regulatory changes have improved the resilience of new buildings, the lack of financial incentives for retrofitting older structures remains a critical gap. Drawing on international examples, such as California's EBB program and Japan's HQAA, Aotearoa New Zealand could introduce grants or insurance/tax incentives to encourage retrofitting. This approach would not only enhance the resilience of older buildings but also reduce the financial strain on property owners, fostering greater community buy-in.

3.2.2 Aotearoa New Zealand's Earthquake-Prone Building Program

Aotearoa New Zealand's program for identifying and strengthening earthquake-prone buildings offers valuable insights into the challenges and opportunities of incentivising resilience. Under this program, building owners are required to assess and strengthen their properties within a specified timeframe. While the initiative has raised awareness about seismic risks, its implementation has faced resistance due to the high costs associated with compliance. The author has observed many building owners, particularly those in low-income areas, struggling to finance the required upgrades, leading to delays and, in some cases, non-compliance.

To address these challenges, Aotearoa New Zealand could adopt a tiered approach to incentivisation. For example, grants or low-interest loans could be offered to property owners who undertake resilience measures within a set timeframe, with additional incentives for those who exceed minimum compliance standards. This approach would help to accelerate progress while ensuring that resilience efforts are equitable and inclusive.

3.2.3 Indigenous Perspectives on Resilience

Our bicultural heritage, grounded in Te Tiriti o Waitangi (the Treaty of Waitangi), offers a unique lens through which to approach resilience. Māori communities have long demonstrated resilience through principles such as kaitiakitanga (guardianship) and manaakitanga (hospitality). These values emphasise the interconnectedness of people, the environment, and well-being, aligning closely with the triple-bottom-line framework.

One example is the response of Ngāi Tahu, a South Island iwi, to the Canterbury earthquakes. Ngāi Tahu mobilised quickly to provide shelter, food, and resources to affected communities, demonstrating the importance of community-led responses (Kenney et al., 2015). Incorporating these indigenous perspectives into national resilience strategies could enhance their cultural relevance and effectiveness. For instance, co-designing resilience initiatives with iwi and hapū could ensure that policies reflect local knowledge and priorities, fostering stronger community engagement.

3.3 Evaluating Outcomes Through the Triple-Bottom-Line Framework

3.3.1 People

Resilience strategies must prioritise the well-being of individuals and communities. In Aotearoa New Zealand, this means addressing disparities in vulnerability and ensuring that resilience measures are accessible to all. Programs that provide financial support for low-income homeowners and long-term renters, for example, can help to bridge the gap between one-size-fits-all policy and practice. More extensive public education campaigns, similar to Japan's Disaster Prevention Day, could also play a crucial role in empowering communities to take proactive steps toward preparedness.

Equity is another critical consideration. Rural and remote communities often face unique challenges in accessing resources and support for resilience measures. Tailored strategies that account for these differences are essential to ensuring that no one is left behind. Parametric insurance measures can enable an expedited financial response which can then be targeted to where it is needed most in these rural and remote areas. Additionally, engaging local communities in the design and implementation of resilience initiatives can foster a sense of ownership and collaboration, enhancing their long-term sustainability.

3.3.2 Planet

Environmental sustainability must be integrated into resilience planning. In Aotearoa New Zealand, this could involve promoting green infrastructure, such as permeable pavements and rain gardens, to manage flood risks while enhancing urban biodiversity. Retrofitting buildings with sustainable materials and incorporating energy-efficient designs can also reduce the environmental footprint of resilience measures. Moreover, improved resilience can avoid a repeat of the approximately 8 million tonnes of debris sent to landfill following the Canterbury Earthquake Sequence (Exton and Banks, 2023).

The use of indigenous ecological knowledge could further enhance the environmental outcomes of resilience initiatives. For example, restoring wetlands and native forests can act as natural buffers against flooding and erosion, while also supporting biodiversity and carbon sequestration. By aligning resilience strategies with broader environmental goals, Aotearoa New Zealand can address multiple challenges simultaneously, creating co-benefits for people and the planet.

3.3.3 Prosperity

Economic resilience is a cornerstone of disaster preparedness. Incentivising resilience through financial mechanisms, such as insurance premium reductions or tax breaks, can reduce the financial strain on individuals and businesses while encouraging broader adoption of risk-reduction measures. For example,

integrating resilience standards into the NHIA could create a direct link between mitigation efforts and financial rewards, driving greater participation.

The economic benefits of resilience extend beyond individual savings. By reducing the scale and cost of disaster recovery, resilience measures can ease the strain on public resources and foster long-term economic stability. Moreover, investments in resilience can create jobs and stimulate innovation in sectors such as construction, engineering, and technology. These benefits underscore the value of adopting a holistic approach to resilience that considers both immediate and long-term economic outcomes.

4 CONCLUSION: A CASE FOR ACTION

With the recent introduction of the NHIA, Aotearoa New Zealand stands at a critical point in its journey to natural hazard resilience. The risks posed by earthquakes, floods, and other natural disasters are not hypothetical; they are an inevitable reality of life in our geologically active and climatically volatile nation. This paper has demonstrated that the country's current reactive, market-driven approach is insufficient to address the escalating risks and costs associated with these hazards. Instead, a proactive, incentive-based framework is urgently needed to safeguard communities, protect the environment, and ensure long-term economic stability.

Drawing on international best practices, this paper has highlighted the substantial benefits of incentivising resilience. Examples from Japan, the United States, and the Netherlands underscore the effectiveness of financial incentives, regulatory frameworks, and public-private partnerships in fostering preparedness. Programs such as Japan's HQAA and California's EBB initiative demonstrate how targeted investments can yield significant returns, both financially and socially. Similarly, findings from the National Institute of Building Sciences (NIBS) show that every dollar spent on mitigation can save up to \$13 in recovery costs, offering a compelling economic case for proactive risk reduction.

In the Aotearoa New Zealand context, these lessons provide a roadmap for integrating resilience into public policy and private practice. By incorporating provisions for grants, tax incentives, and premium reductions into the NHIA, this legislation could become an even more powerful tool for driving resilience at both the individual and community levels. Furthermore, engaging local stakeholders, including iwi and hapū, in the co-design of resilience initiatives ensures that these efforts are culturally relevant and inclusive, addressing disparities in vulnerability and access to resources.

The environmental benefits of resilience are equally compelling. By integrating green infrastructure, promoting sustainable building practices, and leveraging indigenous ecological knowledge, Aotearoa New Zealand can simultaneously reduce hazard risks and enhance environmental sustainability. Initiatives such as restoring wetlands and using renewable materials in construction not only mitigate the impacts of natural disasters but also contribute to broader goals of biodiversity conservation and carbon reduction.

From an economic perspective, incentivising resilience offers a pathway to long-term prosperity. Reducing the costs of disaster recovery eases the financial burden on individuals, businesses, and the government, while investment in resilience creates jobs, stimulates innovation, and attracts further investment. These outcomes align closely with the triple-bottom-line framework, demonstrating that resilience is not merely a cost but an opportunity to build a more equitable, sustainable, and prosperous society.

Ultimately, incentivising resilience is about rethinking how Aotearoa New Zealand prepares for the future. It requires a shift from short-term, reactive thinking to a long-term, adaptive approach that prioritises risk reduction, community well-being, and environmental stewardship. The time to act is now, as the frequency and intensity of natural hazards continue to grow. By embracing proactive resilience strategies, Aotearoa New Zealand can not only reduce the impacts of disasters but also strengthen our communities, protect our environment, and secure our economic future for generations to come.

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