

EQC grant reference number: 15/U712

INSTITUTIONALISING RISK GOVERNANCE AND RESILIENCE PLANNING IN NEW ZEALAND: POLICY AND PROFESSIONAL PRACTICE IMPERATIVES

Research team: Paul Schneider, Bruce Glavovic

Organisation: Massey University

Key words: Risk, resilience, governance, policy, adaptation

Summary

Communities in New Zealand face escalating natural hazard risk due to legacy development decisions and demographic and development patterns in the face of global change and climate change in particular. Solutions are elusive and problems are characterised by complexity, deep uncertainty, turbulence, surprise and contestation (Berkes, 2007; Glavovic, et al., 2015; Reid, et al., 2010; Rockström, et al., 2009). Institutional barriers impede risk reduction and resilience building, both of which are fundamental to sustainable development. Bridging theory and institutionalising 'best practice' is vital for communities to reduce risk and build resilience. Parallel efforts to reduce disaster risk, adapt to climate change and foster sustainability need to be integrated and institutionalised, as highlighted in the recent Sendai Framework for Disaster Risk Reduction (DRR) 2015 – 2030.

1. Introduction

The research undertaken over the past three years as part of a postdoctoral fellowship in conjunction with funding from the *Resilience to Nature's Challenges* National Science Challenge identified ways to institutionalise integrated approaches to risk reduction and resilience planning based on comparative case study analysis of the Coromandel Peninsula and the Hawke's Bay region, informed by key informant interviews and document and narrative analysis. The research undertaken complemented, deepened and extended other related research, including the EQC Biennial Contestable Grants Programme 2010 research on natural hazards governance and streamlining non-natural hazard specific institutions, policies and laws; the *Resilience to Nature's Challenges* National Science Challenge, which incorporates a focus on resilience governance; the QuakeCoRE initiative that focuses on seismic resilience, and the Resilience Planning Continuing Professional Development (CPD) which provided introductory training in Resilience Planning in Nelson, Waimakariri, and Auckland. The research enabled methodological innovations by undertaking comparative case study analysis drawing on a range of methods including ethnography and narrative analysis through participatory action research as part of a collaborative process of co-design, co-production and co-implementation.

This research's distinctive focus was in:

- i. the integration and institutionalisation of risk reduction and climate change adaptation at the local community level (e.g., making communities resilient and sustainable, combat the adverse effects of climate change, and halt land and environmental degradation);
- ii. a targeted consideration of institutional interactions within government at the local level; as well as between government actors and other networks and other actors in seeking to realise the potential of existing legislative and policy goals on risk reduction, resilience and sustainability;
- iii. a comparative analysis of institutional barriers and enablers for resilience in the Hawke's Bay Region and the Coromandel Peninsula and how lessons learnt can be incorporated into an active risk and resilience communication process in order to assist in reaching wider actors and networks that play an important role in shaping risk and resilience;
- iv. an examination of multiple interconnected and compounding factors, including a high magnitude focussing event, environmental changes and trends, and social factors.

A key distinguishing factor from other work undertaken over the past in this field was in this research's methodology. Comparative case study analysis made it possible to understand the key factors influencing risk reduction and resilience building in local decision-making. A participatory action research approach enabled co-design and co-production. The selection of case study sites was carried out in dialogue with key stakeholders and fellow researchers. Due to the development of the Hawke's Bay's 2120 Strategy as part of 'The Edge' Resilience to Nature's Challenge National Science Challenge there was a real need for comparative insights into real-world barriers that maximize social learning and practical application of research findings. The participatory action research included in-depth key informant interviews that provided practice-relevant insights from key stakeholders and decision-makers who shape risk and resilience prospects, including experienced planning practitioners, council politicians and NZTA representatives. Institutional barriers and opportunities were identified by means of narrative analysis to enable a negotiated inquiry of how to reduce risk and foster resilience and sustainability. The strategic selection of both the Hawke's Bay and the Coromandel Peninsula as case studies was also informed by the range of natural hazards in New Zealand, and the specific and distinctive institutional characteristics of the case study communities. Both regions face vexing risk issues due to development pressures coupled with the prospect of rising sea levels, changes in frequency and magnitude of extreme meteorological events, increasing environmental pressures as well as changing socio-economic and demographic factors that complicate decision-making in the face of environmental changes.

The research undertaken over the past three years resulted in seminal manuscripts in various stages of the publication process. These manuscripts took advantage of opportunities that arose from collaboration with researchers from the National Science Challenge Resilience to Nature's Challenges as well as synergies in research interests and expertise. The manuscripts are outlined under Section 3 in the *Conclusions and Key Findings* Section.

2. Objectives

The research aim of identifying ways to institutionalise integrated approaches to risk reduction and resilience planning based on comparative case study analysis and informed by key informant interviews and narrative analysis was met through both conceptual and applied research objectives. The five objectives were: (1) natural hazard risk in the 21st Century, (2) lessons from governance scholarship, (3) translating key concepts and international agreements into practice, (4) integrating and institutionalising risk reduction, climate change adaptation and sustainable development goals, and (5) legacy vs. prospective development imperatives.

Objectives 1, 2 and 3 were all addressed within the research's first year by means of a critical review of scholarship and international agreements

Objectives 4 and 5 were addressed through co-designed, co-produced and co-implemented case study research that extends and complemented the EQC Biennial Contestable Grants Programme 2010, the *Resilience to Nature's Challenges* National Science Challenge and the Resilience Planning CPD. This included in-depth key informant interviews with a mix of actors who shape planning outcomes and are directly confronted with institutional barriers and enablers to risk reduction and climate change adaptation. These included organisations, politicians, property developers, and key council decision makers, to name but a few. A total of 29 stakeholders were conducted: 10 participants across council elected officials, council technical staff from planning and engineering, community groups, regional asset companies (airport and port), cultural and coastal engineering advisors were interviewed in the Hawke's Bay and 19 participants were interviewed on the Coromandel Peninsula. Further, participant observations, document and content analysis, narrative analysis and social network analysis made up the specific methods used.

While the specific methods used are well established governance and institutional analysis techniques and research methodologies (e.g., institutional analysis by Ostrom (2010), social network analysis (Wasserman & Faust, 1994) narrative analysis applied in planning settings (Habermas, 1992)), these approaches have not yet been developed and applied by the research community to the governance of natural hazard risks and climate change adaptation in New Zealand. The research over the past three years reviewed these approaches and techniques and developed and applied a robust methodological framework to the overarching research question. Thus adding stretch to methods applied in behavioural sciences; organisational studies; and social sciences in field of disasters and natural hazard risk in New Zealand and research envisaged elsewhere.

The following sub sections provide a brief ‘snapshot’ of the according research objectives with the key questions that guided the research over the past three years. Section three details the key findings of each objective and also links the research outputs to the objectives.

2.1 Natural hazard risk in the 21st century (Objective 1)

Key question: what has been learned about reducing risk and building resilience in the face of complexity, deep uncertainty, turbulence, surprise, contestation, and the long time frames inherent in planning in the face of global change?

The research was founded on an understanding of the nature of risk in the 21st century. This was achieved through the lens of German sociologist and founder of the risk society school Ulrich Beck and British sociologist Anthony Giddens. The concept of the *risk society* scrutinises the ubiquity of risk and its influence on social and economic patterns in modernity as society constructs new risk prospects. This conceptual objective was to explore manufactured risks associated with what we have come to know and understand as ‘natural’ risk.

2.2 Lessons from governance scholarship (Objective 2)

Key question: Different arenas of governance scholarship reveal distinctive insights about institutionalising risk reduction and resilience planning, so how can lessons from governance be institutionalised to realise the promises made by resilience planning, risk reduction, climate change adaptation and sustainable development initiatives?

Reviewing the foundational work of Beck and Giddens (Objective 1) enabled the exploration of what has been learned about reducing risk and building resilience in the face of complexity, deep uncertainty, turbulence, surprise, contestation and the inherently long time frame accompanying planning for global change at the local level. Through the review and distillation of lessons from governance scholarship it then became possible to link the manufacturing of risk in the 21st century, risk and resilience with governance in a way that further strengthened the conceptional research foundation.

2.3 Translating key concepts and international agreements into practice (Objective 3)

Key question: How can agreements reached (i.e. Sendai Framework for DRR 2015-2030, the UNFCCC 2015 and the Sustainable Development Goals post 2015) be institutionalised and translated into practical reality in New Zealand?

With institutionalisation and the modelling of a New Zealand specific framework in mind, insights from the international DRR agenda 2015-2030 (i.e., Sendai Framework), the climate agreement under the United

Nations Framework Convention on Climate Change 2015 (UNFCCC) and the United Nations Sustainable Development Goals post 2015 were reviewed. Particular attention was focused on translating these documents into New Zealand's risk reality by focusing on practical enablers and barriers to risk reduction and resilience at the local community level.

2.4 Integrating and institutionalising risk reduction, climate change adaptation and sustainable development goals (Objective 4)

Key question: What are the institutional barriers and opportunities in practice as identified by key governance actors at the local community level and what needs to be done to realise the potential of New Zealand's legislative and policy goals on risk reduction, resilience and sustainability at the local level?

Through co-designed, co-produced and co-implemented case study research, including in-depth key informant interviews with a mix of actors who shape planning outcomes it became possible to explore the key institutional barriers and opportunities at the heart of community resilience and adaptation. This approach confirmed the need to develop a robust methodological framework to the overarching research question.

2.5 Legacy vs. prospective development imperatives (Objective 5)

Key question: How can an active risk and resilience communication process employing an innovative approach (e.g., short film and social media) assist in reaching wider target groups that play an important role in shaping risk and resilience?

Resulting from a storm impact in January 2018 on the Coromandel Peninsula's west coast with a 0.5% return period, a decision was made to take advantage of this opportunity to research to potential a high magnitude impact has on risk reduction and long-term planning.

3. Conclusions and key findings

The key findings of the research over the past three years are best structured along the 5 key objectives. The following sub-sections also contain abstracts to manuscripts and describe the way this research took advantage of opportunities and synergies that arose during the past three years (e.g., with the 'Edge' Resilience to Nature's Challenges National Science Challenge as well as the Resilience Governance 'toolbox'). The two key findings that stand out most are: (1) the barriers identified to the reduction of risk and the way these are context specific and (2) the power of using a methodology that does justice to the local context and (3) the potential of a window of opportunity as focussing event to avoid a re-doubling of efforts to reduce risk and build resilience.

3.1 Natural hazard risk in the 21st century

This objective was met through a systematic review of literature in the field of 21st century risk and its relation to 'natural' and 'man-made' hazards. The following summary captures the essence of the key findings of the literature review followed by a summary of the key output relating to this objective.

21st century risk refers to the way our globalized industrial society inadvertently manufactures and alters existing risks. On a local level, 21st century risk is often compounded by a 'defend at all costs' mentality that has tended to prevail, and persists despite efforts to strengthen policy provisions and guidance aimed at avoiding and reducing risk.

While Beck and Giddens applied the risk concept from a discursive vantage point and not so much to 'real' or 'natural' hazards, it was insightful to learn from the way Beck and Giddens alert to the way the future is calculated. Both scholars emphasize that risk is about assessing hazards in relation to future possibilities yet without knowing the actual 'riskiness' involved. In today's world this is only part of the picture though: 21st century risk is part of the context in which it unfolds which is shaped by deleterious societal processes, thus making risk "systemic". The societal processes have resulted in alarming outcomes. These include but are not limited to climate change, economic uncertainty, population pressure pushing arable lands to exhaustion, rising food costs and the rising costs of living leading to wide-spread poverty. All these factors have a fundamental bearing on risk. Humans are bringing planetary biorhythms out of alignment while rapid technological progress coupled with the maximization of financial profits further contribute to the risk-scape. While humans are highly adaptable and certainly "equipped to deal with change" (Flyvbjerg, 2014), meeting objective 1 shaped the way this research was conceptualised

and approached. While the global perspective Beck and Giddens provide is somewhat 'distant' from the local risk reality communities in New Zealand are grappling with, it is important to take understand the bigger picture: local choices 'construct' risk by developing choices which in turn affect exposure and vulnerability.

Before society transitioned into modernity, impact phenomena were associated with fate, god(s) or demons. Put simply, risk was beyond human control (Beck, 1992; Beck & Holzer, 2007). What is more, risk was external by nature and consequently detached from problems created by humanity such as techno-economic human advances (Beck & Holzer, 2007). With the turn to the 20th century, the process of simplifying, numerically defining, and placing risk in the context of probability and effects, dose and response and agent and consequences began (Renn, Klinke, & Van Asselt, 2011). Based on this premise, the standard risk concept remains a combination of hazard(s) x exposure to the hazard(s) (of people or assets) x the vulnerability (of people or assets) to the hazard(s). Standard risk definitions continue to have their place and remain the dominant understanding of risk in risk literature and practice. However, it is increasingly acknowledged that numerically defined risk distributions explain only part of the 'risk problem' as high levels of complexity within risk have become the norm (Aven & Renn, 2009; Berkes, Colding, & Folke, 2003; Meyers, Nel, O'Farrell, Sitas, & Nel, 2015).

Beck (1986, 1992) and Giddens (1990) identified a key point of relevance to the research: they made clear that society manufactures risk. Giddens (1991, p. 133) built on this notion by referring to "cultivated risk" being a key component within "modernity's unsettling character". In their view, modernity is therefore responsible for creating fundamentally new risks thus putting into question the notion of risk being a quantifiable function of the probability and consequences of an activity or event (Kaplan & Garrick, 1981) or even a combination of a physical peril and vulnerable people (Thomalla, Downing, Spanger-Siegfried, Han, & Rockström, 2006). We now know that risk in the 21st century is characterized by complex interdependencies displaying "extreme non-linearity" where "literally everything depends on everything else" (Ritchey, 2011, p. 7). The interconnectedness and the ripple effects through which initially unrelated fields become entangled through a myriad of transmission nodes and pathways transmitting information, materials and capital is mind-boggling (Goldin & Vogel, 2010; Hellstroem, 2001).

Both Beck (1992) and Giddens (1994b) went on to criticize modernity for a disintegration and de-rationalization of the social fabric. In addition, globalization, environmental degradation, economic and technological advances as well as scientific development are to be held accountable for technological risks, a transition from realist to social constructivist perspectives, changes in risk

distribution (spatially, demographically and temporally), as well as an increasing gap between actual and perceived risk. Giddens (1991, p. 122) wrote that “even half a century ago humanity did not suffer from the same kind of threat” and attributes the risks we have and are creating to “the dark side of modernity”. Both Beck and Giddens describe the risks we are surrounded by as exceptional. They both highlight the need to understand the integrated nature of the global risk society in which man-made risks are ubiquitous and there is a time-space distancing (Giddens, 1994a): generational boundaries of the risks we create are increasingly dissolved. Future generations will, in many cases, bear the brunt of modernity’s short-termism, ranging from the effects from the destruction and pollution of the biosphere to the atmosphere. Examples range from the cumulative effects of chemicals and the way they conspire to produce carcinogenic synergies affecting future generations most strongly (Beck, 1992; Goodson et al., 2015) to climate change which represents an “urgent and potentially irreversible threat to human societies and the planet”(UNFCCC, 2015, p. 1). Coming to terms with what this changing face of risk means in today’s world and the “hugely complex threats of the 21st century” is not only a “major challenge” but also a problem “that needs to be addressed as a matter of urgency” and with a long-term perspective (Clark et al., 2016; OECD, 2003, p. 3).

Not only the physical characteristics of risk have changed fundamentally over time: as a society, we embed ourselves into the future by calculating risk while, simultaneously, change is accelerating and rendering many of the institutions we have come to take for granted (and to a varying degree depend upon) void. The nation, the family or the workplace have changed fundamentally. And so have global geopolitics. The refugee dilemma, as an example, reminds us of the humanitarian change taking place and makes us rethink the purpose and the justification for borders. Divorce rates and workplace security tell very similar stories of rapid change. Giddens uses the term ‘shell institutions’ as institutions that have undergone rapid change and are not well equipped to keep pace with such change (2011, p. 19). Financial institutions are a further example: Indeed, finance as the “most developed and best equipped global governance system” is failing to come to terms with “the new vulnerabilities associated with globalization in the 21st century”(Goldin & Vogel, 2010, p. 4). Through intense integration of markets, trade and finance, globalization is increasingly becoming like nothing seen before. Risk has become borderless and dramatic social, institutional, and political changes have occurred over time.

A further key characteristic of the manufactured risk that Beck and Giddens describe and that has become ubiquitous in our lives is that we are mostly unaware of the degree of risk involved. Climate change serves as ideal example: By the time humans understand the true risk of an inadvertent increase in global temperatures through greenhouse gas emissions, it will be too late

to do anything about it due to the inherent lag time and the difficulty to foresee tipping points. Tipping points as such are not a new invention, but the 'manufactured' global large scale tipping points are what will characterize the 21st century. At the risk of repetition, it needs to be highlighted that global changes are occurring at increasing speeds and we are approaching dangerous thresholds on a host of different levels, including population growth; the economy (including magnitude and distribution); resource use (especially for production of energy); transport and communication, land use and land cover; urbanization; globalization; coastal ecosystems; atmospheric composition; riverine flow; the nitrogen cycle; the carbon cycle; the physical climate; marine food chains; and biological diversity (cf. Steffen et al., 2004). Again, all these levels are interlinked, they cannot be seen or treated in isolation and we have fundamentally messed with all of them through unsustainable human activity.

While the future cannot be foreseen, there are certain aspects about risk that society can be relatively sure of as these are already apparent. They include that (1) risk can neither be attributed to a perpetrator (which makes new risks challenging to insure if not uninsurable, as Beck (1999) argues), (2) that the "cone of light cast by the nation state streetlamp" cannot capture the transboundary nature of 21st century risk and beyond (Beck, 2006, p. 345), (3) knowledge cannot be used to predict the outcome of the situation, (4) boundaries between invisible, visible and virtual risks, between natural and technological risks and between real and socially constructed risk no longer exist (Ekberg, 2007). These three aspects also have in common that "damage is irrevocable, aftercare impossible, consequences no longer limited in time and space, and measurement abandoned" (Ormrod, 2013, p. 730).

Giddens (2011) argues that an application of the risk society framework requires the proclamation and publicizing of the associated risk and raising awareness. One reason for this being the case is that they are "socially invisible" and that the "transmissions and movements of hazards are often latent and immanent, that is, often invisible and untrackable to everyday perceptions" (Beck, 2000, p. 219). Beck (ibid.) confirms the need to bring risk to the fore as it is "unlike many other political issues" and that it can only "constitute an actual threat" when "brought to the consciousness". At the same time, Giddens (2011) warns of accusations of scaremongering if the risk turns out to be minimal. With climate change, this means that as powerful interests continue to downplay the risk for the sake of short term decision making, they not only increase the likelihood that they will have much to answer for in the future but they maintain a power construct which favours certain types of knowledge of risk and keeps others under cover. Beck (1999, p. 122) refers to this as "selective reception and transmission of the knowledge of risk".

While in many cases it is impossible to know for sure when receiving and transmitting knowledge of risk is actually scaremongering and when it is not, this should not to be mistaken with any deliberate withholding of knowledge about risk and uncertainty in the interest of short term interests. A further factor adding to the danger of manipulating knowledge in any way is “the less risks are publicly recognized, the more risks are produced” (Beck, 2000, p. 220). Or, put differently, risks are spread and amplified through a neglect of risk information (Beck, 2000). Beck (1999) also acknowledges the powerful interests involved in risk information against the background of economic power which is confirmed in his reference to the “power matrix” through which institutions generate and profit from risk. An example of “selective reception and transmission of knowledge” is discussed at length by Manbiot (2016) who writes about the way powerful fossil fuel interests are protected from democratic scrutiny while also avoiding conflict: Don’t name the Devil for fear that you’ll summon him. As it stands, this “selective reception and transmission” goes hand in hand with another form of risk unawareness identified by Beck which is the “unwillingness to know”. In a society which is pacified with endless streams of entertainment and distraction, misleading political directives and positive projections of the future, selective transmission has become the norm (Lasn, 2012). Awakening society to the real world risks may well require a transformation of societal and political structures or major impacts to occur.

Merely 25 years ago Beck (1992, pp. 97 - 98) still argued that natural hazards including fire, floods and hurricanes were ‘strokes of fate’ outside of human influence. Climate change has changed this premise fundamentally and brings a “new riskiness to risk” (Giddens, 2011). The fifth assessment of the IPCC (2014) conveys a sobering view of what can be expected and makes clear that climate change is a game changer when it comes to risk. Indeed, not only hazards that have always existed but climate change in addition are rendering human settlements “increasingly vulnerable” (Tierney, 2012, p. 346). Tierney (ibid., p. 347) argues that the reduction of risk therefore must become a “key foci”. Economic interests, as we have argued, make this difficult by both benefiting from risk as well as by exerting power through the way risks are communicated or information withheld. To complicate matters, the dominant public discourse is that an “ecology of fear, danger and uncertainty” is created “while reassuring ‘the people’ (or rather, the population) that the techno-scientific and socio-economic elites have the necessary tool-kit to readjust the machine such that things can stay basically as they are” (Swyngedouw, 2013, pp. 10-11). The result is that there is not only unwillingness to engage with “difficult-to-control dangers” (Beck, 2000) and how this will get out of hand in the future, but society appears to actively dismiss the fact that we are playing a global endgame. Beck himself draws attention to the fact that we deny a “hopelessly hazardous situations” with all our might (Beck, 1995, p. 48).

The fact that natural hazards and anthropogenic activity are increasingly difficult to distinguish make this premise the principle hallmark of Beck's idea of modern risk (di Floristella, 2016). Risks are "man-made hybrids" as we live in a hybrid society through which we watch, describe, value and criticize our own hybridity (Beck, 2000, p. 221). Underlying this hybridity is the fact that modernization has led to distancing from the natural world of which we are undeniably part. This keeps us believing that science and technology will help us out of the riskiness we have created, no matter what comes.

3.2 Outputs relating to Objective 1:

3.2.1 How climate change disrupts notions of natural hazard risk in institutional cultures

S. Bremer, P. Schneider, B. Glavovic

Oxford Research Encyclopedia of Natural Hazard (Book chapter)

Status: Submitted for review

Abstract:

Rapid climatic, natural and societal changes, from global to local scales, are altering the ways natural hazard risks are represented in society, and in turn disrupting the ways people respond to these hazards. This poses an important challenge to how society (re-)builds institutions for governing or controlling these risks. Institutions are systems of rules, norms and decision-making processes that structure our social interaction and practices. They organise how people define, plan for and manage natural hazard risks; indeed, they create notions of risk. Going deeper, sociologists have defined institutions by the underlying 'culture' on which rules are built; the symbols, principles, core beliefs and cognitive scripts that give institutions 'meaning'. The culture structures how institutions represent the intertwined natural and social world that gives rise to natural hazard risks; framing certain natural processes as harmful to society and in need of control. Cultures work as a script for classing and responding to perils; giving people cues on how to understand and interpret the dangerous situations they find ourselves in. Modern institutions are increasingly shaped by techno-scientific cultures, defining hazards and risks as a technically-framed probability of physical harm, and the associated consequences often expressed in terms of loss and damage. This risk quantification, and aspirations for precision, can give a false sense of understanding and control, including technical responses like hard-engineered solutions, such as stopbanks designed to control floods. But climatic change is already undermining, and threatening

to undo, many of the long-held representations of natural and social order (and risk to this order) that steer institutions, with this disruption threatening to worsen in the face of accelerating environmental and societal change.

Current case study research, in different places around the world, shows how climatic change impacts are changing the way institutions interpret the natural hazards they manage; in Bangladesh, New Zealand and Norway for example. Dramatic climate change is fundamentally altering the natural rhythms institutions follow and confounding the systems of statistical quantification pervading their culture. It shakes institutional claims and efforts to control natural hazard risks, and confounds public trust in these institutions. And it changes the ways institutions define and class hazards, so that ordinary hazards are amplified as extra-ordinary. Faced with risks that are going outside our experience and control, it also compels institutions to unreflexively amplify their response in a precautionary way, with at times unforeseen and disastrous consequences. Cases in Bangladesh and Norway both show how rushed river engineering works can have damaging ecological and agricultural impacts. Emergency coastal protection projects also have deleterious long-term social-ecological impacts, even if they offer a margin of safety in the short-term, as experience shows in New Zealand.

Scholars and practitioners alike recognise a need for critical reflection on institutional cultures as they relate to the shifting terrain of natural hazard risks under climatic and wider societal and global change. This reflection is ongoing. It is practical work that effects how people operate in institutions every day. It is structural work, as institutions change their rules as they learn more about risks. It is work of social change, with social groups inside and outside institutions increasingly vocal in their criticism of hazards and risk framings in a world of climate, environmental, technological, socio-economic, political and institutional change. Case study research illustrates processes of social change, but equally, the resistance of institutions to change their cultures and notions of risk.

3.3 Lessons from governance scholarship

Contemporary decision-making has to reconcile multiple competing risk reduction, resilience building and adaptation agendas within a very political and contested context. Therefore, it is important to recognise that there may be significant variations in how governance is framed and operationalized. Invariably, contending ‘facts’ and ‘values’ shape governance agendas, processes and outcomes, with important resilience implications for individuals, communities, societies, and humanity as a whole.

Governance is best understood as a descriptive label for how society understands and addresses its problems, including risk problems: the way these are defined, 'solutions' are formulated and actions are taken to resolve problems (Voß & Bornemann, 2011). As such, governance reflects the changing nature of politics, policy, and power, and associated institutional dynamics. These are foundational to the way risk is not only manufactured but also addressed and any solutions navigated or 'steered'. Governance provides an analytical lens that moves beyond traditional state-oriented structures of authority, to focus on the diversity of actors and networks involved in making public choices, most notably within the private sector and civil society (Kooiman, 2003; Pierre & Peters, 2000; Rhodes, 1997). These actors became the key informants in the collaborative process of co-design, co-production and co-implementation. The key governance lessons that contributed to the research's conceptual foundation included (1) risk governance, which "pertains to the various ways in which many actors, individuals, and institutions, public and private, deal with risks surrounded by uncertainty, complexity, and/or ambiguity" (van Asselt and Renn, 2011, p. 432), (2) environmental governance as a "set of regulatory processes, mechanisms and organizations through which political actors influence environmental actions and outcomes (Lemos & Agrawal, 2006, p. 298); (3) adaptive governance which refers to "a range of interactions between actors, networks, organizations, and institutions emerging in pursuit of a desired state for social-ecological systems" (Chaffin, Gosnell, & Cosens, 2016, p. 56); and (4) reflexive governance which "refers to the problem of shaping societal development in the light of the reflexivity of steering strategies – the phenomenon that thinking and acting with respect to an object of steering also affects the subject and its ability to steer. Reflexive governance thus implies that the foundations of governance (the concepts, practices and institutions by which societal development is governed) must be questioned and that alternatives are envisioned and reinvented or (Voß & Kemp, 2006, p. 4).

The lessons learnt from governance scholarship are predominantly that power and agency are not limited to the visible hierarchical governmental institutions or regulations, but rather may be contained in multiple networks and informal collaborations, interacting in a complex manner over different scales and spaces. By analysing the complex interactions at play it becomes possible to reveal how particular ways of working, and the roles played by different governance actors and networks, can frame both the nature of the problem and the societal choices mooted in response. From this perspective we can see how norms and values may play a significant shaping role. Kooiman & Jentoft (2009: 818) explain that they "underpin all decisions since they inspire those who govern how to think and make judgements about how the world works and how to act in particular situations".

3.4 Outputs relating to Objective 2:

3.4.1 Linking the Resilience Governance and the Living at the Edge (EDGE) National Science Challenge programmes with research on resilience barriers on the Coromandel Peninsula

J. Lawrence, P. Schneider, B. Glavovic

National Science Challenge Newsletter (15.11.2018): <http://resiliencechallenge.nz/governance-programme/resilience-governance-in-practice/>

Status: Published

Summary:

The RNC National Science Challenge *Resilience Governance* and the *EDGE* research programmes are being conducted in tandem. The former is advancing our understanding about resilience governance as a concept and how to operationalise it (link to other article). The latter focuses on how to reduce risk, adapt and build resilience in the dynamic coastal environment, based on the development of the *Clifton to Tangoio Coastal Hazards Strategy* in the Hawke's Bay. Both programmes are complemented by postdoctoral research, funded by the Earthquake Commission (EQC), that examines ways to reduce risk and build resilience on the Coromandel Peninsula.

Understanding the role that governance plays in enabling resilience outcomes over timeframes of "at least 100 years" (as required by the New Zealand Coastal Policy Statement), including barriers and enablers for implement adaptive actions, is the key link between these three research programmes (each of which are due for completion by mid-2019).

Decision tools have been applied for the Hawke's Bay coasts that enable robust decisions to be made —Dynamic Adaptive Policy Pathways planning (DAPP), to identify short-term actions and long-term options, and, through the use of Real Options Analysis, for conducting sensitivity testing and costing of the pathways. The Strategy formulation process has had a unique collaborative governance arrangement—a Joint Councils' Committee comprising Hawke's Bay Regional Council, Napier City and Hastings District Council working closely with community assessment panels. This governance arrangement has enabled a strategy to be developed that has wide support, and which is now at the implementation stage.

A series of severe coastal storms along the Coromandel Peninsula has brought coastal hazard risk to the fore, especially in the face of rising sea levels. A coastal management strategy aimed at increasing coastal resilience was recently approved by the Thames Coromandel District Council.

Questions remain about how to coordinate resilience building efforts between different governing authorities on the peninsula, and how to mobilise coastal communities so that proactive and sustained risk reduction measures can be put in place. Comparative research examined the different coastal resilience building approaches underway on the Coromandel Peninsula and in the Hawke's Bay region. This research demonstrated what is happening 'on the ground', and how barriers and enablers to risk reduction and resilience building unfold. Key factors identified include the local political leadership on climate-related perils, community norms and values, the 'appetite' for addressing coastal concerns, and institutional barriers and enablers for formulating and implement long-term risk reduction strategies. Comparative local experience provides practical insights about how to tailor decision-making on the coast in ways that can overcome barriers and leverage opportunities to build resilience.

3.4.2 Resilience Governance: The foundation for navigating stress and shock in the Anthropocene

B. Glavovic, I. White, J. Lawrence, P. Schneider

Journal: Environmental Science and Policy

Status: Reviewers comments are currently addressed

Abstract:

Stress and shock are pervasive. In response, resilience has shot to prominence as a desirable trait and policy imperative. However, the deleterious trends and risks shaping human prospects stem from flawed societal systems and decision-making processes that are themselves resilient to change. Realizing the 'promise of resilience' therefore raises pivotal questions: Resilience to what and for whom; why, where, when and how? Seldom are these questions brought into focus, concealing ideologies and institutions that can perpetuate vulnerability. Here we propose the conjoined concept of Resilience Governance, with an explanatory framework, to address these questions. The framework offers a 'fit-for-purpose' approach that reveals which governance interaction (competitive, authoritarian, collaborative or emancipatory) can address distinctive problem-types (from 'tame' to 'wicked') given the interplay of facts and values. In doing so, we reveal why resilience is critiqued and difficult to operationalize, and design an approach to chart resilient development pathways in the face of global change.

3.4.3 In Search of ‘Resilience Governance’: A Systematic Literature Review

P. Schneider, I. White, J. Lawrence, B. Glavovic, R. Pond

Journal: Environmental Science and Policy

Status: Manuscript in preparation (approx. 85% completed)

Abstract:

Resilience and governance are widely used in literature (albeit siloed). Both terms have been applied as theoretical frameworks as well as managerial tools in different scholarly arenas. Resilience has become an operating mantra for managing risk mainly focusing on engineering definitions of resilience, but increasingly being used as a desirable trait and policy imperative. Governance has been applied widely across many domains of interest and encompasses legitimate authority, political oversight and regulatory power, and community engagement with the processes of power and values. Insufficient attention has been given to cross-scalar linkages between the problem at hand and the politics, polities and praxis associated with particular governance interactions. These aspects of human endeavor are fundamental to all arenas in which resilience and governance are applied, problems framed and interventions shaped. This is reflected in an underdevelopment if not a gap of the combined term “resilience governance”. The conceptualization of resilience and governance links the type of problem to the most appropriate governance modality. To examine to what extent such a combined term has been used in the literature we undertook a systematic literature review.

3.5 Translating key concepts and international agreements into practice

This objective was met through a review of the Sustainable Development Goals, the climate change ‘Paris Agreement’ under the UNFCCC, the Sendai Framework for Disaster Risk Reduction and the Aichi Biodiversity Targets which, together, confirmed high-profile international attention to risk in the wider sense. Given the conceptual nature of the work relating to this objective, no manuscripts were produced for publication. The following summary captures the essence of the key findings.

Considering the challenges of institutionalising international risk synergies in the context of New Zealand’s risk society makes sense. The proliferation of manufactured risk is set to affect life as we know it. More so than ever before, there is not only the pressing need but also the opportunity for countries to draw on such synergies and incorporate latest thinking, experience and knowledge

into the way they address and manage risk. There is much potential in capitalising on synergies between these four processes and that New Zealand has conducive governance arrangements at its disposal for institutionalising risk. Actively implementing international agreements is promising in order to prepare New Zealand for escalating future risk.

The year 2015 saw three key international risk and resilience processes take place. The Sendai Framework for Disaster Risk Reduction (or 'Sendai' framework) adopted in March 2015, the Sustainable Development Goals (SDGs) adopted in late September 2015 and the new climate change agreement under the UNFCCC established at the 21st Conference of the Parties (COP 21) in Paris in December 2015. While these three processes are divided thematically into disaster risk reduction, sustainability and climate change accordingly, they are directly relevant to the reduction of risk as well as climate change adaptation.

The three processes are further relevant to the risk society framework as they are a consequence of human endeavours which have contributed to the manufacturing of risk with the prospect of loss and damage. Roberts et al. (2015, p. 1024) summarize the synergies between these three processes as “a collective means to avoid loss and damage that can be avoided, and implement approaches to address unavoidable loss and damage”. In the context of human endeavors and unsustainable practices in particular, the integrity of the biosphere is integral. For this reason, it was found that the Aichi Biodiversity Targets ratified in 2010 must also form an integral part of international risk synergies. After all, many hazard risks the world is confronted by today stem from ecosystem degradation compromising biodiversity. A deterioration of the natural world, ecosystem processes and the 'goods and services' we depend and rely on and which provide human welfare bears its own risk. According to Daily (1997, p. 3), “[...] ecosystem services are the actual life-support functions, such as cleansing, recycling and renewal [...]”. Examples range from healthy forests providing stable catchments and therefore reducing the risk for people living in hilly mountainous areas, intact dune systems providing an essential buffer for coastal impacts or natural vegetation cover along rivers serving as 'sponge' during flood events.

Increasingly also, international agreements acknowledge the range of factors impacting on risk in the wider sense. Through the Sendai Framework disaster risk and losses are addressed. Importantly, and this further confirms the connection with the risk society framework, disasters from both human and natural origin are included in the Sendai Framework. For example, the Sendai Framework for Disaster Risk Reduction 2015-2030 states as its aim to:

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational,

environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.

The 17 United Nations global SDGs with 169 targets also acknowledge the economic, social and environmental factors in a quest to “shift the world onto a sustainable and resilient path” (United Nations General Assembly (UNGA), 2015, p. 2). The SDGs address are crucial to addressing risk. SDG 13, for example, specifically focuses on the manufactured risk associated with climate change. SDG 13 also highlights the imperative for countries to “take action to combat climate change and its impacts” (United Nations General Assembly (UNGA), 2015). It is pointed out that addressing the effects of climate change must be built on regional and local policies and plans. These reduce local risk and help households and communities to cope with unavoidable losses.

The ‘Paris Agreement’ strengthens the linkages between climate change, loss and damage, mitigation and adaptation and makes provisions for addressing the relevant issues both temporally and spatially. The ‘Paris Agreement’ further recognizes that climate change represents an “urgent and potentially irreversible threat to human societies and the planet” (UNFCCC, 2015, p. 1). Coming to terms with what this changing face of risk means in today’s world and the “hugely complex threats of the 21st century” is not only a “major challenge” but also a problem “that needs to be addressed as a matter of urgency” (OECD, 2003, p. 3). Climate change must be seen as a game changer in the context of risk. Not only does it change the physical nature of physical risks ranging from meteorological risks to the spread of diseases or the acidity in the ocean, it is a risk that is entirely of our own making. As such, climate change adds “a new riskiness to risk” (Giddens, 2011). The fifth assessment of the IPCC (2014) conveys a sobering view of what can be expected as human settlements are becoming “increasingly vulnerable” (Tierney, 2012, p. 346).

All four international risk synergies that contributed to this research’s conceptual foundation acknowledge the risk associated with climate change. The point that stands out is that no hazard can be seen or treated in isolation any longer as the atmosphere is changing and the biosphere is deteriorating (e.g., forest cover, coral reefs, flood deltas). Again, natural hazards and anthropogenic activity are more and more difficult to distinguish and are therefore the “principle hallmarks of Beck’s idea of modern risk” (di Floristella, 2016). What is more, a “spatial, temporal and social de-bounding” is contributing to risks spiraling out of control (Beck, 2002, p. 24).

Roberts et al. (Roberts et al.) highlight that while the need to identify risk and resilience synergies in the international risk reduction efforts is highlighted, there has been limited focus on how to operationalize the synergies. When it comes to the implementation of international agreements in

New Zealand, different government bodies take responsibility. MCDEM is the key player for risk reduction with the United Nations. International agreements received little to no attention prior to the 2015 Sendai Agreement. The 2007 Civil Defence Emergency Management Strategy is being reviewed in order to be replaced by the National Disaster Resilience Strategy with better alignment with the Sendai Agreement.

The manifestation of manufactured risk is beginning to shape the provisions and practices around risk reduction in areas predicted to be negatively affected by future risk. For example, Basher (2016) points out that the Sendai Framework for Risk Reduction, unlike its predecessor the Hyogo Framework for Action, will be actively implemented in New Zealand. 'Natural' hazards are now omnipresent and have affected political institutions while bringing politics to areas previously considered un-political (Beck, 1999). Risk related functions were traditionally carried out by government activities including legislation, policy and planning. Increasingly though, the private sector and civil society entities play an active part in shaping risk problems and are ultimately a reflection of large-scale societal changes (Tierney, 2012). Increasingly also, international agreements acknowledge the range of factors impinging on risk.

3.6 Outputs relating to Objective 3

3.6.1 *Diverse perceptions and pathways of climate change adaptation: Reflections on experience on New Zealand's Coromandel Peninsula*

P. Schneider and B. Glavovic

Oxford Research Encyclopedia of Natural Hazard Science (Book chapter)

Status: Manuscript in preparation (90% complete) to be submitted by March 15, 2019

Summary:

Coastal hazard risk is compounded by climate change. The promise and prospects of adaptation to escalating coastal hazard risk is fraught, even in a country like New Zealand that has laudable provisions for local authorities to be proactive about adaptation to climate change. The resistance of local authorities to do the inevitable and make long-term planning decisions in the face of amplifying risk is linked to key barriers. Continuing investment in low-lying coastal areas is resulting in contested adaptation pathways. What can be done to overcome barriers and facilitate adaptation? Is a transformation of the current mismatch between short-term planning and development aspirations, long-term societal goals, dynamic coastal processes and

well-intended legislation and policy goals even possible? Or are solutions elusive? What are adaptation barriers telling us? As it stands, coastal communities are not adapting to climate change in ways that to justice to future needs, there is an absence of leadership, and there is little local consensus on the need for adaptation let alone how to implement it. Insights into the diversity of perceptions is limited and the risks that come with maintaining the status quo are locally downplayed. New Zealand's Coromandel Peninsula serves as an exemplary case study. What are the barriers in place that result in a lock-in into maladaptive pathways in which a 're-doubling' of efforts becomes inevitable? The focus lies on three key climate change adaptation barriers confirmed by literature: long-term climate change impacts vs. short-term decision-making cycles, the reliance on scientific models, and the uncertainties related to climate change projections. Through the exploration of key stakeholder insights the findings from the literature are reinforced and put into local context thus making the otherwise abstract barriers locally relevant. By matching and aligning adaptation theory with local reality can assist in advancing inquiry and policy practice to govern complex adaptation challenges.

3.7 Integrating and institutionalising risk reduction, climate change adaptation and sustainable development goals

This fourth objective led to the comparative research into risk reduction and adaptation barriers on the Coromandel Peninsula and the Hawke's Bay region. Further, the collaboration with fellow researchers from 'The Edge' Resilience to Nature's Challenge National Science Challenge resulted in two key publications relevant to the work undertaken as part of the EQC funded research.

3.8 Outputs relating to Objective 4

3.8.1 Anticipating Staged Managed Retreat at the Coastal Margins.

S. Owen, J. Lawrence, E. Ryan, P. Kench, R. Bell, H. Rennie, P. Blackett, P. Schneider

Journal: Planning Quarterly, 06/2018

Summary:

Managed retreat in coastal areas involves the landward relocation of existing and planned development to reduce exposure to hazards. The hazard risk is reduced or removed entirely, leaving the coast to respond to natural processes.

3.8.2 Co-creating resilience solutions to coastal hazards through an interdisciplinary research project in New Zealand

P. Kench, E. Ryan, S. Owen, R. Bell, J. Lawrence, B. Glavovic, P. Blackett, J. Becker, P. Schneider, M. Allis, M. Dickson, H. Rennie

Journal: Journal of Coastal Research Special Issue 85 - Proceedings of the 15th International Coastal Symposium 2018

Abstract:

Coastal communities ‘living at the edge’ face intensification and acceleration of coastal hazard risk in the face of climate change. Communities will need to be adaptive in reducing these risks now and over long timeframes. Developing coastal hazard adaptation pathways requires co-production of interdisciplinary knowledge between scientists, policy makers and communities. However, there remains little guidance and limited dialogue about the research practices and frameworks that underpin co-created research. In a first for New Zealand, a co-created research programme is underway titled ‘Living at the Edge’ that aims to improve the resilience of coastal communities to coastal hazards. This paper provides novel insights into the complexities underpinning the formative stages of co-created research, drawing on practical experience from the Living at the Edge project. We explore the enablers and shapers that led to co-created shifts in the research project objectives and framework. Notions of integration, trust, and flexibility are three fundamental aspects that influenced the early stages of co-creation. The importance of bridging interactions with actors early on in co-created projects is exemplified.

3.8.3 Overcoming barriers and harnessing enablers for transforming coastal decision making in the face of climate change: a comparative analysis from Aotearoa New Zealand

P. Schneider, J. Lawrence, B. Glavovic

Journal: Climate Risk Management

Status: Manuscript in preparation (approx. 90% complete)

Abstract:

Diverse and contested local adaptation interests make adaptation anything but straightforward. We focus on local adaptation voices, asking the question: What role do local barriers and enablers

play in adaptation action? We examine this question using two different coastal situations in New Zealand – on the Coromandel Peninsula and at the Hawke’s Bay coast. We examined the differences, similarities and their implications between localities using mixed qualitative methods. We found that adaptation prospects and resilience governance are fundamentally shaped by the barriers and opportunities that arise at a point in time and that opportunities can become barriers and vice versa—divergent opinions, leadership, needs and interests can be barriers in one location, while acting as enablers in the other. These findings were governed by differences in perceptions of the problem, trust and legitimacy which lead to different levels of community engagement in both locations which led to advancement of adaptation in one location and a constrained advancement in the other. We conclude that well-governed local engagement opens up the adaptation prospect and that implementation of adaptation could be facilitated by national leadership through coordinating mechanisms for planning and funding alignment that could bring greater consistency of adaptation action nationally, while still retaining local characteristics.

3.8.4 Making sense of ethnographic principles and practices: Methodological experiences in climate change adaptation research in Aotearoa New Zealand

P. Schneider, B. Glavovic, T. Farrelly

Book: Localizing climate change: Global changes – local responses

Status: chapter submitted for review

Abstract:

This chapter describes the research journey of a non-anthropologist making sense of ethnographic principles and practices in an attempt to identify the barriers to addressing coastal hazard risk compounded by climate change. We demonstrate how ethnographic principles are applied in ongoing research on the Coromandel Peninsula in Aotearoa New Zealand since 2010. The research underpinning the methodological experiences was first as part of a Master of Planning, then part of a Ph.D. in Planning and lastly part of postdoctoral research into institutional risk governance and resilience planning. Participants from three case study communities in the same region, Te Puru, Te-Whanganui-o-Hei/Mercury Bay, and Harataunga/Kennedy Bay as well as local authorities and lifeline providers fundamentally contributed to this place-based research. Participants are found to have highly diverse adaptation understandings, needs and interests. This is despite their location in or association with the same region. Poor understanding of what climate change means for those at the ‘coalface’ of adaptation reality is commonplace. Notwithstanding progressive

legislative provisions and laudable guidance, the translation of adaptation rhetoric and implementation of responsible decision-making are overshadowed by responses that are reactive and locked into static protection when more anticipatory, dynamic and flexible responses are required. Through place-based, ethnographic case study research, valuable insights were derived about contestations on the ground and opportunities created to 'give voice' to concerns that would otherwise go unheard. A key motivation for the research journey described in this chapter was how best to navigate the complex adaptation terrain, do justice to local community reality and explore approaches that go beyond short-term 'techno-fixes'. We demonstrate that ethnographic case study research is well suited for doing justice to the contested community realities revealed through thematic analysis. The key finding from this journey is that ethnography in combination with case study research can enable deep and meaningful insights about how to facilitate community-based adaptation.

3.9 Legacy vs. prospective development imperatives

Due to the high magnitude storm event that hit the Coromandel Peninsula's west coast on the 5th of January 2018, the research was lead into the direction of the potential of a focussing event as window of opportunity for policy change. The key research outputs from this part of the research was an invitation to present at the **Sixth Annual Conference of the Italian Society for Climate Science October 17th-19th, 2018 at Ca' Foscari University (Venice)**. The focus of this conference was on "*Recent trends in climate sciences, adaptation and mitigation*" with the aim of connecting scientists, researchers, economists, practitioners, business leaders, and policy makers, whose activities are focused on different aspects of climate change, its impacts and related policies.

3.10 Outputs related to Objective 5

3.10.1 Can an extreme storm event change anything? Reconciling divergent views on coastal adaptation pathways on the Coromandel Peninsula, Aotearoa / New Zealand

P. Schneider and B. Glavovic

Journal: Global Environmental Change

Status: Manuscript in preparation (approx. 70% completed)

Abstract:

Escalating coastal hazard risk, epitomized by more frequent high magnitude storm impacts, is compounded by climate change. Charting adaptation pathways that meet the needs of current and future generations is challenging. What can be done to reduce the risk and build resilience? Efforts to address such challenges are far from straightforward and no single adaptation pathway promises a 'way out' of the coastal conundrum. A high magnitude storm impact has the potential to open up a 'window of opportunity' for adaptive action, and even transformation, but only if enabling conditions and processes are in place. If not, it is likely that the devastation caused by such an event changes little; and could even result in a re-doubling of efforts to maintain the status quo. We focus on the potential of such a 'window of opportunity' opening up after a major coastal storm event, and explore ways to create opportunities for charting adaptation pathways that reduce coastal hazard risk and build resilience. Our study is located on the west coast of Aotearoa / New Zealand's Coromandel Peninsula, known as the Thames Coast. On the 5th of January, 2018, a high magnitude storm event caused extensive local damage to properties and infrastructure. The storm impacts, which came as a surprise even for Civil Defence and Emergency Management, prompted debate about what to do to reduce coastal hazard risk in a changing climate. We carried out long-term place-based ethnographic fieldwork to understand divergent viewpoints and to explore challenges and opportunities for reducing risk and building resilience in the long run. The Thames Coast area includes low-lying communities at high risk because of legacy planning decisions, steep and rugged terrain with a narrow coastal strip, and unfavorable climate change projections that are beginning to render business as usual unviable. For some government actors, such as the local council, maladaptive path-dependency is seemingly impossible to overcome and high magnitude impacts such as the January 5 event are regarded as part of coastal community's lived reality. Government narratives at both a local and central government level appear to be rooted in a culture of stepwise, siloed and reactive decision-making that frames coastal hazard risk as a static 'technical' problem. For the New Zealand Transport Authority, tasked with managing the scenic State Highway 25, the only road along the narrow coastal strip, the sole viable option seems to be to restore and strengthen the Peninsula's 'lifeline' as quickly as possible after a storm event, even if it takes over half a year and more than 100,000 tons of rocks to 'hold back the sea,' for now. Many coastal property owners are demanding government intervention and 'protection' against the damaging impacts of coastal storms; privileging short-term private interests over long-term public interests, rights, resilience and sustainability. A growing number of people are questioning efforts to maintain the status quo and persist with business as usual practices. Some community leaders describe the latest storm event as a 'game changer' that requires more than restorative actions and a new pathway. There are many divergent and

contending ‘voices’ in government, the private sector, the diverse communities affected as well as the scientific community about the best way forward. Although static ‘protective’ responses to dynamic coastal risks continue for the time being, there is change in the air. There is a call for enabling regulatory provisions to put an end to ‘defend at all costs’-type responses serving narrow, short-term interests. We explore the range of recommendations being made to take practical action to improve prospects for the Thames Coast. We explore how the prevailing response trajectory lines up with the recent recommendations set out by New Zealand / Aotearoa’s Climate Change Adaptation Technical Working Group, tasked with providing adaptation guidance to the government. We identify challenges and opportunities for developing and implementing a practical and enabling action plan to overcome path dependency and institutionalise proactive adaptation planning. Particular attention is focused on the roles and responsibilities that can be played by key governance actors.

4. Impact

The main impact of the research undertaken over the past three years lies in the identification of locally relevant and context-specific barriers and enablers and what role these play in risk reduction and adaptation action. By drawing on key informant insights from two different coastal situations in New Zealand – on the Coromandel Peninsula and at the Hawke’s Bay coast it became possible to examine the differences, similarities and their implications between localities. Risk reduction and adaptation prospects and resilience governance are fundamentally shaped by the barriers and opportunities that arise at a point in time. An key insight here lies in the fact that opportunities can become barriers and vice versa—divergent opinions, leadership, needs and interests can be barriers in one location, while acting as enablers in the other. Differences in perceptions of the problem, trust and legitimacy all lead to different levels of community engagement which in turn lead to advancement of risk reduction and adaptation in one location and a constrained advancement in the other. This is very important information to have for local decision-makers, planners and politicians. Consequently, this research reduces the impact of natural disaster on people and property by exemplifying that well-governed local engagement opens up risk reduction and adaptation prospects while implementation is facilitated through leadership.

5. Future work

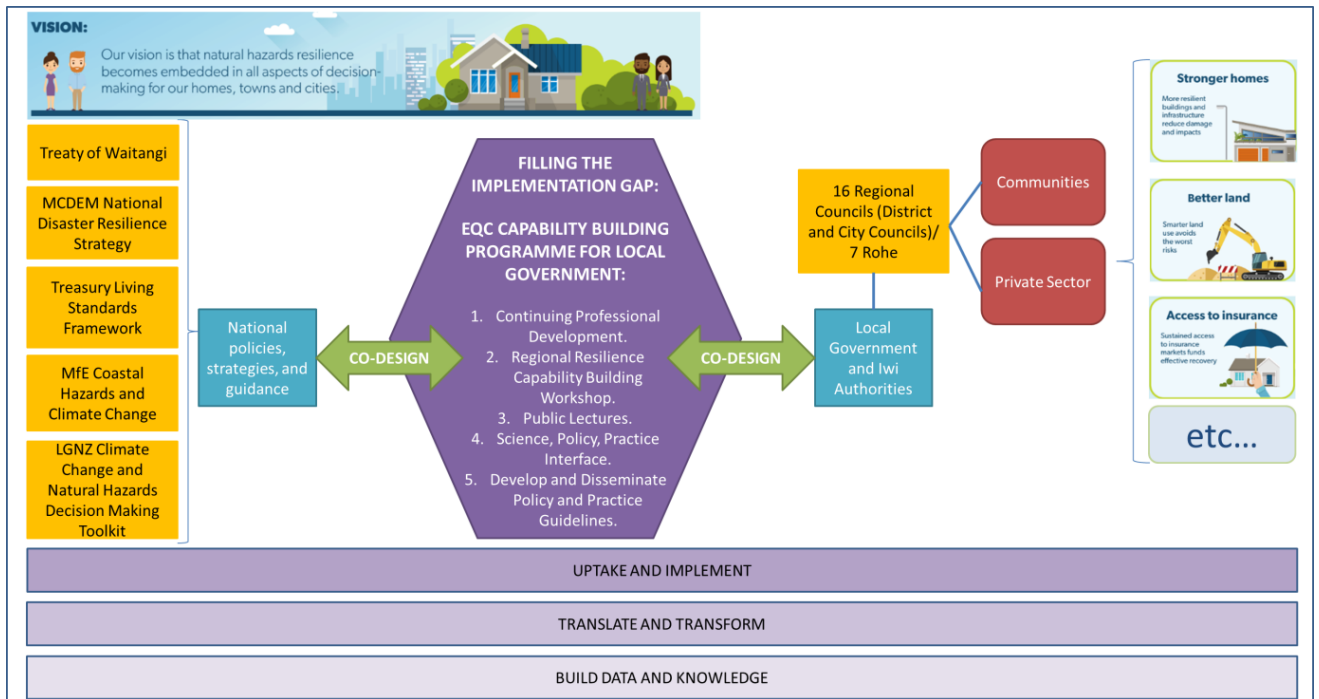
The most promising way to leverage the research of the past three years is to make best practice national level risk reduction guidance locally and regionally relevant and applicable in order to identify ways to implement resilience goals by bridging the gap between national policies, strategies, and guidance and local government practice.

The objective for doing so would be to translate the knowledge gained on the Coromandel and in the Hawke's Bay (both through the EQC-funded postdoc work and the National Science Challenge research) and help to translate this knowledge into action.

Key advantages of such work would be:

- Building on postdoc work as well as the resilience CPD research intentions (i.e. this doesn't have to be set up from scratch but builds on the insights and connections already in place)
- Closing the gap between national level guidance (MFE) and the resilience needs at the regional level
- Providing insight into the question currently unanswered: how to implement resilience 'on the ground'
- Building mid-range support to translate the latest guidance into action (this is a need identified by regional/local authorities)
- Internally focused capability building

An auspicious way to achieving the above would be through Regional Resilience Capability Building workshops with local authorities in each of New Zealand's 16 regions. The target audience for these workshops would be local government staff (Regional, District, City Councils, and Iwi Authorities). Such workshops would best be delivered by a post-doctoral researcher and/or a Ph.D. student.



Acknowledgements

EQC is gratefully acknowledged for funding for this research. Particular thanks to all research participants for their generous contribution to this research. We also thank the contributing authors to all forthcoming publications related to this research, including Dr Judy Lawrence, Dr Trisia Farrelly, Dr Rachael Pond, Prof Iain White, and Dr Scott Bremer.

References

- Aven, T., & Renn, O. (2009). The role of quantitative risk assessments for characterizing risk and uncertainty and delineating appropriate risk management options, with special emphasis on terrorism risk. *Risk Analysis*, 29(4), 587-600.
- Basher, R. (2016). High Stakes - Disaster Risk in New Zealand. *Policy Quarterly*, 12(3), 25-29.
- Bavinck, M., Jentoft, S., Pascual-Fernández, J. J., & Marciniak, B. (2015). Interactive coastal governance: The role of pre-modern fisher organizations in improving governability. *Ocean & Coastal Management*.
- Beck, U. (1986). *Riskogesellschaft: Auf dem Weg in eine andere Moderne*. Frankfurt (Main): Suhrkamp.
- Beck, U. (1992). *Risk Society: Towards a New Modernity*. London: Sage.
- Beck, U. (1995). *Ecological Politics in an Age of Risk*. Cambridge: Polity Press.
- Beck, U. (1999). *World Risk Society*. Cambridge: Polity.
- Beck, U. (2000). Risk Society Revisited: Theory, Politics and Research Programmes. In B. Adam, U. Beck, & J. Van Loon (Eds.), *The Risk Society and Beyond* (pp. 211-229). London: Sage.
- Beck, U. (2002). The terrorist threat world risk society revisited. *Theory, Culture & Society*, 19(4), 39-55.
- Beck, U. (2006). Living in the world risk society: A Hobhouse Memorial Public Lecture given on Wednesday 15 February 2006 at the London School of Economics. *Economy and society*, 35(3), 329-345.
- Beck, U., & Holzer, B. (2007). *Organizations in World Risk Society*.
- Berkes, F. (2007). Understanding uncertainty and reducing vulnerability: lessons from resilience thinking. *Natural Hazards*, 41(2), 283-295. doi:10.1007/s11069-006-9036-7
- Berkes, F., Colding, J., & Folke, C. (Eds.). (2003). *Navigating social-ecological systems: building resilience for complexity and change*. Cambridge New York: Cambridge University Press.
- Brown, T. C., Bergstrp, J. C., & Loomis, J. B. (2007). Defining, valuing, and providing ecosystem goods and services. *Nat. Resources J.*, 47, 329.
- Chaffin, B. C., Gosnell, H., & Cosens, B. A. (2016). A decade of adaptive governance scholarship: synthesis and future directions.
- Clark, P. U., Shakun, J. D., Marcott, S. A., Mix, A. C., Eby, M., Kulp, S., . . . Plattner, G.-K. (2016). Consequences of twenty-first-century policy for multi-millennial climate and sea-level change. *Nature Clim. Change*, 6(4), 360-369. doi:10.1038/nclimate2923
<http://www.nature.com/nclimate/journal/v6/n4/abs/nclimate2923.html#supplementary-information>
- Daily, G. (1997). Introduction: What are ecosystem services? In *Nature's services: societal dependence on natural ecosystems*: Island Press.
- De Marchi, B. (2003). Public participation and risk governance. *Science and Public Policy*, 30(3), 171-176. doi:10.3152/147154303781780434
- di Floristella, A. P. (2016). Dealing with natural disasters: Risk society and ASEAN: a new approach to disaster management. *The Pacific Review*, 29(2), 283-305.
- Ekberg, M. (2007). The Parameters of the Risk Society: A Review and Exploration. *Current Sociology*, 55(3), 343-366. doi:10.1177/0011392107076080
- Flyvbjerg, B. (2014) *Projects, Power and Politics: A Conversation with Bent Flyvbjerg/Interviewer: J. Pagh & M. Freudendal-Pedersen*. (Vol 3), Twentyfirst.
- Giddens, A. (1990). *The Consequences of Modernity*. Cambridge, UK: Polity Press.
- Giddens, A. (1991). *Modernity and Self Identity: Self and Society in the Late Modern Age*. Cambridge, UK: Polity Press.
- Giddens, A. (1994a). *Beyond left and right: The future of radical politics*: Stanford University Press.
- Giddens, A. (1994b). Living in a Post-Traditional Society. In U. Beck, A. Giddens, & S. Lash (Eds.), *Reflexive Modernization: Politics, Tradition and Aesthetics in The Modern Social Order*. Cambridge: Polity Press.
- Giddens, A. (2011). *Runaway world*. London: Profile books.

- Glavovic, B. C. (2014). Disaster Recovery: The particular governance challenges generated by large-scale natural disasters. In J. Boston, J. Wanna, V. Lipski, & J. Pritchard (Eds.), *Future-Proofing the State: Managing Risk, Responding to Crises and Building Resilience*. Canberra, Australia: ANU Press.
- Goldin, I., & Vogel, T. (2010). Global governance and systemic risk in the 21st century: Lessons from the financial crisis. *Global Policy*, 1(1), 4-15.
- Goodson, W. H., Lowe, L., Carpenter, D. O., Gilbertson, M., Manaf Ali, A., Lopez de Cerain Salsamendi, A., . . . Hu, Z. (2015). Assessing the carcinogenic potential of low-dose exposures to chemical mixtures in the environment: the challenge ahead. *Carcinogenesis*, 36(Suppl 1), S254-S296. doi:10.1093/carcin/bgv039
- Habermas, J. (1992). *Postmetaphysical Thinking*. Cambridge, MA: MIT Press.
- Hellstroem, T. (2001). Emerging technological and systemic risk: three cases with management suggestions. Contribution to the OECD international futures project on emerging systemic risks. In (pp. 132): Paris: OECD.
- Helm, P. (2013). *Risk & Resilience: A Systems Approach for National Security*. Paper presented at the IRGC International Conference, Tsinghua University, Beijing. http://www.irgc.org/wp-content/uploads/2012/10/7.-Patrick-HELM_Balancing-Risk-and-Resilience_IRGC-Beijing-2013.pdf
- Hutter, G., Kuhlicke, C., Glade, T., & Felgentreff, C. (2013). Natural hazards and resilience: exploring institutional and organizational dimensions of social resilience. *Natural Hazards*, 1-6.
- ICNZ. (2014). *Protecting New Zealand from Natural Hazards*. Retrieved from Wellington, NZ: <http://www.ew.govt.nz/PageFiles/26012/protecting-new-zealand-from-natural-hazards.pdf>
- IPCC (Ed.) (2014). *Climate Change 2014: Synthesis Report*. Geneva, CH: IPCC.
- Juda, L. (1999). Considerations in developing a functional approach to the governance of large marine ecosystems *Ocean Development and International Law*, 30, 89-125.
- Kaplan, S., & Garrick, B. J. (1981). On The Quantitative Definition of Risk. *Risk Analysis*, 1(1), 11-27. doi:10.1111/j.1539-6924.1981.tb01350.x
- Kohler Riessman, C. (2013). Analysis of personal narratives. In A. E. Fortune, W. J. Reid, & R. L. Miller (Eds.), *Qualitative Research in Social Work* (pp. 168 -191). New York: Columbia University Press.
- Kooiman, J. (2003). *Governing as Governance*. London: Sage.
- Lasn, K. (2012). *Meme Wars: The Creative Destruction of Neoclassical Economics: a Real World Economics Textbook*: Penguin.
- Lawler, S. (2002). Narrative in Social Research. In T. May (Ed.), *Qualitative Research in Action* (pp. 242-258). London: Sage.
- Lemos, M. C., & Agrawal, A. (2006). Environmental Governance. *Annual Review of Environment and Resources*, 31(1), 297-325. doi:doi:10.1146/annurev.energy.31.042605.135621
- Manbiot, G. (2016). *How Did We Get Into This Mess?: Politics, Equality, Nature*. New York: Verso.
- Marden, M., Herzig, A., & Basher, L. (2014). Erosion process contribution to sediment yield before and after the establishment of exotic forest: Waipaoa catchment, New Zealand. *Geomorphology*, 226, 162-174. doi:<http://dx.doi.org/10.1016/j.geomorph.2014.08.007>
- McNay, L. (2000). *Gender and Agency: Reconfiguring the Subject in Feminist and Social Theory*. Cambridge: Polity.
- Moser, S. C. (2010). Now more than ever: The need for more societally relevant research on vulnerability and adaptation to climate change. *Applied Geography*, 30, 464-474.
- New Zealand Trade and Enterprise. (2016). Agribusiness. Retrieved from <https://www.nzte.govt.nz/en/buy/our-sectors/agribusiness/>
- NZ Planning Institute. (2012). The RMA Quality Planning Resource. *Cliamte Change*. Retrieved from <http://www.qualityplanning.org.nz/index.php/planning-tools/climate-change>
- OECD. (2003). *Emerging Risks in the 21st Century: An Agenda for Action*. Retrieved from Paris: <https://www.oecd.org/futures/globalprospects/37944611.pdf>
- Ormrod, J. S. (2013). Beyond World Risk Society? A Critique of Ulrich Beck's World Risk Society Thesis as a Framework for Understanding Risk Associated with Human Activity in Outer

- Space. *Environment and Planning D: Society and Space*, 31(4), 727-744.
doi:10.1068/d16511
- Ostrom, E. (2010). The Institutional Analysis and Development Framework and the Commons. *Cornell Law Review*, 95(4).
- Parliamentary Commissioner for the Environment. (2015). *Preparing New Zealand for rising seas*. Retrieved from <http://www.pce.parliament.nz/media/1380/preparing-nz-for-rising-seas-web-small.pdf>
- Renn, O. (2008). *Risk Governance: Coping with Uncertainty in a Complex World*. London: Earthscan.
- Renn, O., Klinke, A., & Van Asselt, M. (2011). Coping with Complexity, Uncertainty and Ambiguity in Risk Governance: A Synthesis. *Ambio*, 40, 231-246.
- Renwick, J. A., Anderson, B., Greenaway, A., Ngaru King, D., Mikaloff-Fletcher, S., Reisinger, A., & Rouse, H. (2016). *Climate change implications for New Zealand*. Retrieved from Wellington, NZ:
- Reyers, B., Nel, J. L., O'Farrell, P. J., Sitas, N., & Nel, D. C. (2015). Navigating complexity through knowledge coproduction: Mainstreaming ecosystem services into disaster risk reduction. *Proceedings of the National Academy of Sciences*, 112(24), 7362-7368.
doi:10.1073/pnas.1414374112
- Ritchey, T. (2011). Wicked Problems and Genuine Uncertainty. In *Wicked Problems – Social Messes: Decision Support Modelling with Morphological Analysis* (pp. 19-29). Berlin, Heidelberg: Springer Berlin Heidelberg.
- Roberts, E., Andrei, S., Huq, S., & Flint, L. (2015). Resilience synergies in the post-2015 development agenda. *Nature Climate Change*, 5(12), 1024-1025.
- Rockström, J., Steffen, W., Noone, K., Persson, A., Chapin, F. S., Lambin, E. F., . . . Foley, J. A. (2009). A safe operating space for humanity. *Nature*, 461(7263), 472-475.
- Saunders, W., Grace, E., Beban, J., & Johnston, D. (2015). Evaluating Land Use and Emergency Management Plans for Natural Hazards as a Function of Good Governance: A Case Study from New Zealand. *International Journal of Disaster Risk Science*, 6(1), 62-74.
doi:10.1007/s13753-015-0039-4
- Steffen, W., Andrae, M. O., Bolin, B., Cox, P. M., Crutzen, P., Cubasch, U., . . . II Turner, B. L. (2004). Abrupt Changes - The Achilles' Heel of the Earth System. *Environment*(April), 1-20.
- Swyngedouw, E. (2013). Apocalypse Now! Fear and Doomsday Pleasures. *Capitalism Nature Socialism*, 24(1), 9-18. doi:10.1080/10455752.2012.759252
- Thomalla, F., Downing, T., Spanger-Siegfried, E., Han, G., & Rockström, J. (2006). Reducing hazard vulnerability: towards a common approach between disaster risk reduction and climate adaptation. *Disasters*, 30(1), 39-48. doi:10.1111/j.1467-9523.2006.00305.x
- Tierney, K. (2012). Disaster Governance: Social, Political, and Economic Dimensions. *Annu. Rev. Environ. Resour.*, 37, 341-363.
- UNFCCC. (2015). *Adoption of the Paris Agreement*. Retrieved from Paris:
- United Nations General Assembly (UNGA). (2015). *Resolution adopted by the General Assembly on 25 September 2015: Transforming our world: the 2030 Agenda for Sustainable Development*. Retrieved from
- Voß, J.-P., & Kemp, R. (2006). Introduction: Sustainability and reflexive governance. In J.-P. Voß, D. Bauknecht, & R. Kemp (Eds.), *Reflexive governance for sustainable development*. Cheltenham: Edward Elgar.
- Wasserman, S., & Faust, K. (1994). *Social Network Analysis*. Cambridge, UK: Cambridge University Press.
- Wells, K. (2015). Natural disasters in Australia. Retrieved from <http://www.australia.gov.au/about-australia/australian-story/natural-disasters>
- Winslade, J., & Monk, G. (2000). *Narrative Mediation: A New Approach to Conflict Resolution*. San Francisco: Jossey-Bass.