Abstracts summary

Posters session | 5:00 – 8:00

Seoyong Kim

The Role of Emotions in Nuclear Energy Acceptance: A Risk Perception Study

This study investigates the role of emotions in nuclear energy acceptance among the South Korean public. Drawing on the risk perception paradigm, we examine how perceived benefits, perceived risks, trust, and knowledge influence nuclear acceptance, with particular focus on emotional factors as moderating variables. Nine emotional dimensions are analyzed: helplessness, anxiety, fear, anger, guilt, depression, despair, indifference, and confusion.

A nationwide online survey was conducted from June 19 to July 1, 2025, targeting 2,000 respondents aged 16 and above across 17 provinces/cities in South Korea. The sample was proportionally allocated based on gender, age, and regional demographics to ensure national representativeness.

The research aims to understand how these emotional variables influence nuclear energy acceptance and examine their moderating effects on the relationship between risk perception variables and acceptance outcomes. This study contributes to the growing literature on the psychological determinants of public attitudes toward nuclear technology, providing insights for policymakers and stakeholders in energy governance and public communication strategies.

Laura Kiely

New Zealand Wildfire Hazard Potential

We have created spatial layers showing wildfire hazard potential for New Zealand: a combination of the likelihood of a wildfire occurring and the potential severity of the fire if it were to occur. The data layers are probabilistic and come from landscape scale fire simulations using weather streams from days with a Fire Weather Index in the 95th-96th percentile. The gridded data layers include ignition probability, calculated by combining historic ignition locations and suspected drivers of ignitions, a burn probability index, and the maximum simulated fire intensity and rate of spread for each grid cell. Amongst other things the data can be used for strategic planning, landscape level risk assessments, emergency preparedness and resource allocation.

Annick Masselot & Silke Clausing

Responding to gender-based violence with disaster law in Aotearoa

International and New Zealand research shows that gender-based violence (GBV) increases following disasters, with recent crises such as the Canterbury earthquakes, COVID-19 pandemic, and Cyclone Gabrielle linked to spikes in police reports and service demand. Despite this evidence, disaster management law and family violence legislation remain disconnected.

This research examines legal gaps at the intersection of emergency management and GBV. Drawing on international obligations under the Sendai Framework and CEDAW, and qualitative insights from key stakeholders, the study proposes reforms to embed GBV considerations into disaster risk management. Recommendations include a national strategy on disaster and gender, integration of GBV expertise in emergency response, and dedicated resources for post-crisis support. Addressing these gaps is essential to protect women's rights and safety post-disaster.

Rosie Matthews

Quantitative Assessment of Wildfire Risk and Building Vulnerability for Adaptation in New Zealand's Wildland-Urban Interface

Wildfire risk is increasing across Aotearoa New Zealand as climate change intensifies fire weather and urban development expands into flammable landscapes. Communities at the wildland–urban interface (WUI) are particularly exposed, as fires transitioning from vegetation into built environments can cause rapid, large-scale losses. Despite this, quantitative methods for assessing building vulnerability are limited, and wildfire models inadequately represent fire behaviour and damage once fire enters communities. This limitation constrains our ability to assess risk, validate predictive models, and evaluate the effectiveness of mitigation strategies.

This research will focus on a quantitative assessment of wildfire risk for mitigation of building damage in New Zealand's Wildland-Urban Interface. Three objectives are proposed. The first will quantify building fragility by developing probabilistic relationships between heat flux and firebrand density, and the likelihood of ignition or damage for typical New Zealand residential structures. The second integrates and validates building-to-building fire spread within the wildfire spread model Inferno, evaluating model performance against real wildfire events. The third objective applies the integrated model to the New Zealand WUI to evaluate mitigation strategies, including fuel management, defensible space, and building hardening, under current and future climate scenarios.

Maria Victoria Enriquez

Preparedness of Small and Medium Enterprises to Earthquakes: A Comparative Study of Legal and Policy Frameworks from New Zealand, Japan and the United States.

In New Zealand, Small and Medium Enterprises (SMEs) represent 97 percent of all enterprises, employing over 29 percent of the workforce and contributing more than a quarter of the nation's gross domestic product. At the same time, SMEs are highly vulnerable to earthquakes: buildings may be damaged, production may cease, and staff may be unable to work. These disruptions extend beyond the business itself, affecting employees and the broader communities that depend on them. Hence, SMEs' capacity to recover from earthquakes is not only essential for their survival but also critical for

the broader economic and social recovery of communities and the country.

However, SMEs are generally unprepared for earthquakes. For example, a 2018 study conducted in Napier and Dunedin found that SMEs had undertaken very few earthquake risk mitigation actions, indicating poor preparedness. Similarly, research following the 2011/12 Canterbury Earthquake Sequence showed SMEs were unprepared when the earthquakes hit, and the majority had not developed and implemented business continuity plans post-earthquakes. More broadly, research by MBIE in 2023 found that SMEs are not generally undertaking actions to build resilient organisations.

The research will examine and compare the legal and policy frameworks developed by New Zealand, Japan, and the United States to enhance SMEs' earthquake preparedness. The aim of the research is to identify legal and policy frameworks in the latter countries that New Zealand could consider for potential improvement to achieve a more resilient SME sector.

Sehyok Jeon

Analysis of Acceptance Factors for High-Level Radioactive Waste Repositories : Trust or Profit? Focusing on Regional Acceptance

The siting of high-level radioactive waste repositories (HLWRs) represents one of the most challenging cases of facility acceptance due to its profound physical, environmental, and social impacts on host communities. While strong local opposition frequently arises in the form of the "Not In My Backyard" (NIMBY) phenomenon, expectations for economic benefits and regional development coexist. This study investigates whether the acceptance of HLWRs is primarily grounded in public trust in government and institutions or in anticipated economic benefits.\

Drawing upon the risk perception paradigm and the Theory of Planned Behavior (TPB), the research examines how psychological, cognitive, and social factors interact with trust and profit considerations in shaping regional acceptance. Using data from the 2025 National Energy Opinion Survey (N=2,000), which employed proportional quota sampling by region, gender, and age, we conducted frequency and regression analyses. The results indicate that perceived benefits, subjective knowledge, and negative emotions are closely related to acceptance. Among TPB variables, subjective norms and perceived behavioral control significantly influence attitudes, reflecting the role of social pressure and perceived autonomy. Trust factors—particularly government trust and community consciousness—exert strong positive effects, highlighting the importance of institutional and social trust-building. Conversely, regional self-interest reduces acceptance, whereas emotional bonds can increase it. Demographic variables show minimal effects compared to cognitive and relational factors. These findings suggest that enhancing HLWR acceptance requires a multidimensional strategy that goes beyond economic compensation, emphasizing transparent governance, institutional trust, and community-based engagement to foster legitimacy and reduce conflict.

Energy Justice and High-Level Radioactive Waste Repository Acceptability: Does Justice Prevail Over Convenience?

This study examines the interplay between perceived benefits and the growing importance of a just energy transition in shaping public acceptance of high-level radioactive waste (HLW) disposal facilities. As societies increasingly emphasize the fairness and sustainability of energy transitions, energy justice emerges as a critical key to guiding public debate and policy design. Dimensions such as distributive, recognitional, intergenerational, and restorative justice highlight concerns about how risks and burdens are shared, how ecological rights are respected, and how responsibilities to future generations are

addressed. While personal, regional, and national benefits are often considered in facility acceptance, they provide only a partial explanation without integrating justice-based perspectives. The rising public awareness of justice principles underscores the necessity of embedding fairness into HLW management strategies. Moreover, the global discourse on sustainability and equity calls for aligning national decisions with international norms and collective commitments. This approach expands theoretical discussions by positioning energy justice as a cornerstone of the just energy transition, while offering practical implications for policymakers aiming to secure legitimacy and trust. Ultimately, advancing HLW management requires balancing technical safety with social fairness, and now is the critical moment to gather shared recognition and global will to move forward responsibly.

Miri Kim

Exploring the Determinants of Public Acceptance of High-Level Radioactive Waste Repositories: Focusing on Types of Psychological Distance

The construction of high-level radioactive waste (HLW) repositories is not only a technical challenge but also a critical social issue involving public acceptance. In South Korea, where existing nuclear power plant storage facilities are nearing saturation, the failure to secure suitable repository sites highlights the urgent need to address societal resistance. Prior policies have largely focused on physical distance, compensation, and information provision, yet overlooked how individuals psychologically perceive the issue as personally relevant.

This study applies Construal Level Theory (CLT) to examine how three types of psychological distance—temporal, spatial, and hypothetical—affect acceptance of HLW repositories. Building on existing literature on risk perception, perceived benefit, vulnerability, subjective knowledge, and trust in government, this research compares the relative influence of psychological and traditional factors.

Using data from a 2025 national online survey (N=2,000), the study conducts structural equation modeling and regression analyses. Findings show that trust in government, perceived benefit, spatial distance, and hypothetical distance positively influence public acceptance, while perceived vulnerability and subjective knowledge negatively affect it. Temporal distance was not statistically significant but showed conditional effects in moderation analyses.

This research contributes to the literature by empirically validating psychological distance as a determinant of risk acceptance. Practically, it offers policy implications for risk communication strategies by emphasizing the need to address citizens' psychological perceptions, rather than relying solely on external incentives or information provision.

Determinants of Meat and Plant-Based Dietary Orientation: An Expanded Health Belief Model Approach

As the climate crisis intensifies, changes in individual dietary behavior have gained attention as a form of climate action. In particular, reducing meat consumption and adopting plant-based diets are recognized as effective strategies to lower greenhouse gas emissions. However, despite growing awareness, most individuals continue to follow meat-centered diets, and actual plant-based practices remain limited. Existing policies and campaigns have primarily focused on raising awareness or providing information, yet have failed to account for deeper psychological and lifestyle-related factors

such as personal values, consumption tendencies, and behavioral cues.

This study aims to identify the determinants of dietary orientation by extending the Health Belief Model (HBM) with lifestyle factors based on the VALS (Values and Lifestyles) framework. The model incorporates traditional HBM components—perceived severity, susceptibility, benefits, barriers, and self-efficacy—alongside behavioral cues (media exposure, social influence), and lifestyle factors such as value orientation, consumption orientation, and relational orientation. The dependent variables are meat and plant-based orientations, each assessed through both intention and behavioral dimensions. A structured questionnaire comprising 47 items has been developed.

A nationwide survey will be conducted among Korean adults, and data will be analyzed using multiple regression. This research is expected to contribute theoretically by expanding the applicability of the HBM and offer practical insights for designing tailored policy interventions and communication strategies to promote sustainable dietary transitions.

David H Good

Racial and ethnic disparities in the incidence of vulnerable road user fatalities

The literature on environmental justice has identified many disparities about exposures to environmental risk that many perceive as inequitable or unfair. This research examines similar risks associated with mobility, particularly for vulnerable road users beginning with trends from 2010 to 2023. Fatalities for the occupants of motor vehicles increased by slightly less than 15%. Over the same period, pedestrian fatalities increased by nearly 75%. And, fatalities among cyclists has by 86%. This shows that physically vulnerable road users have benefitted less from improvements in mitigation technology then their in-vehicle counterparts.

The victims' demographics, their social vulnerabilities, are also related to fatalities. Males are eight times more likely than females to die from a cycling crash and more than twice as likely for pedestrians. Average age gradually climbs from 45 to 48 for pedestrians and 41 to over 48 for cyclists. This study uses information on death certificates, often based on the victim's appearance, as the basis for these demographics. The trends are still disturbing. Black Americans increased their share of pedestrian fatalities from 20% in 2010 to 27% in 2023 and 19% to 24% for Hispanics. For cyclist fatalities, the percentage of Black Americans and Hispanics fatalities remained at 15% and 16%, approximately their population shares.

The research examines additional locational and behavioral factors such as urbanization, safety infrastructure use of alcohol/drugs and safety equipment to better understand the causation of these trends and to offer guidance about what types of mitigation strategies are likely to be fruitful.

Brandy Alger

From Experience to Action: Community-based Preparedness Solutions for Older Persons in Southland

Older adults are often framed in disaster discourse as inherently vulnerable, yet many possess valuable experience, local knowledge and community connections that can strengthen preparedness. This research, based in Invercargill, Southland, challenges deficit-based narratives by recognising older adults as capable and informed partners in natural hazard preparedness, using a participatory

co-design approach that supports self-efficacy and locally driven action.

In collaboration with Age Concern Southland and Emergency Management Southland representatives, a series of workshops was held with older residents to identify priorities, barriers and locally appropriate strategies for disaster preparedness. The workshops facilitated shared decision-making, practical lived experience and local hazard information. Together, participants co-created a printed preparedness resource tailored to the Southland context, addressing hazards such as earthquakes, flooding and severe storms, and emphasising independence, self-sufficiency and accessible non-digital solutions.

This presentation outlines the participatory process, highlights how older adults reframed preparedness messaging and discusses the practical and cultural insights embedded in the co-designed resource. It also reflects on the benefits and challenges of participatory design in a disaster risk reduction context, particularly with a demographic often excluded from the design and decision-making stages.

The project contributes to broader debates on risk communication, social capital and community-led disaster preparedness. By recognising older adults as competent contributors with the ability to take meaningful action, the research offers an alternative model for engagement that enhances local resilience and can be adapted for other communities in Aotearoa New Zealand and beyond.

Nohah Forde

Climate Risk Governance and the Role of Inter-Professional Communication

Society faces unprecedented governance challenges as risks cross boundaries of expertise, authority, and institutions. Climate adaptation exemplifies these challenges, where distributed expertise, uncertain authority, and fragmented institutional arrangements create barriers and coordination challenges that complicate effective risk management.

Specifically, we ask how communication between professionals enables or constrains coordination within distributed adaptation governance systems. What role does inter-professional communication play in creating or reducing complexity in climate risk governance? How do communication practices intersect with authority, expertise, and institutional mandates to shape adaptation outcomes?

Drawing on qualitative interviews with 14 adaptation professionals across government, consultancy, and community sectors in Aotearoa New Zealand, the thematic analysis focuses on how communication practices intersect with authority, expertise, and institutional mandates.

Four critical drivers of governance complexity emerged: unclear responsibilities, with professionals reporting fundamental ambiguity about authority for adaptation decisions; professional identity dynamics, where ""technical"" vs ""non-technical"" positioning determines whose expertise gets prioritised in risk assessments; implementation gaps, showing persistent disconnect between formal governance processes and actual practice; and institutional fragmentation, as climate adaptation and disaster risk reduction remain siloed despite overlapping risk mandates.

Together, these findings reveal that inter-professional communication can either exacerbate or mitigate governance complexity. In doing so, this study demonstrates that communication is not only important for coordination, but a constitutive element of how climate adaptation governance is achieved.

Marcelle Scadden

Worldviews and values: Inclusion of Indigenous perspectives in climate risk assessments

Indigenous communities often experience disproportionate risks from climate change, yet their perspectives remain marginal in many climate risk assessments. Risk itself is not objective but constructed through values and worldviews. Without shared understandings of what is at risk and why it matters, assessments may misrepresent threats and leave communities underprepared.

In countries with Indigenous populations, risk must be understood through diverse worldviews, intergenerational knowledge, and lived experience with structural and environmental change. The challenge is that dominant assessment frameworks tend to privilege technocratic or institutional perspectives, leaving Indigenous understandings sidelined.

To examine this gap, we reviewed climate risk and vulnerability assessments self-submitted to the Carbon Disclosure Project (CDP) by a range of international cities. Our analysis asked: to what extent do these assessments recognise and engage Indigenous perspectives and values?

Findings show that while some reports acknowledged the disproportionate risks faced by Indigenous communities, few examined the deeper causes, such as historical inequities or differences in how risk itself is understood. Socio-cultural aspects, public engagement, community values, or place-based knowledge systems, were limited and largely subsumed within prevailing technocratic paradigms. Indigenous perspectives were often translated into the dominant risk framework rather than recognised as distinct worldviews. As a result, multiple understandings of risk, consequence, and adaptation were overlooked. Addressing this gap requires moving beyond procedural inclusion toward frameworks capable of engaging relational, place-based, and Indigenous ways of knowing.

Naoko Kato-Nitta

What information do people use in performing risk-averse behaviours under a new pandemic? Conjoint and Clustering Analyses in the UK, Japan, and Taiwan

People's risk perceptions toward the COVID-19 pandemic have been well documented, but the understanding of how pandemic-related information elicits public health behaviours and how different cultural, geographic, and policy contexts influence them is still limited. This study aimed to identify similarities and differences among the UK, Japan, and Taiwan to empirically investigate how people evaluate COVID-19-related information when deciding whether to take risk-averse behaviour. It also explored whether subgroups exist among the public that share similar characteristics related to attitude change on COVID-19 situations. Comparative regional surveys incorporating identical conjoint experimental design were administered. A conjoint analysis conducted on each region's data found that people in Japan and Taiwan decided whether to perform risk-averse behaviour based on the nationwide number of new daily infections, while those in the UK placed the most importance on the situation of direct contact via the presence of infections in their workplace or home. Statistical clustering using a finite mixture model revealed two distinctive sub-groups across each region: a risk-taking class with a low frequency of risk-averse behaviour, comprising predominantly young men and vaccine-hesitant individuals with low trust in governmental health policy; and a prudent class with a high frequency of risk-averse behaviour, comprising individuals with higher science literacy. The study's findings can contribute to policymakers' and medical experts' deeper understanding of the relationship between information provision and behaviours related to a new infectious disease, as well as emphasise that data-driven analysis can be leveraged to gain deeper insights into complex societal behaviours.

Katherine Booker

Integrating urban and climate futures: improving urban growth modelling to plan for future climate uncertainty

Urban planners are facing tough decisions amid the uncertainty surrounding our future climate and the dynamic nature of climate-related hazards. Projections of future hazards under alternative climate scenarios are available but pairing those with current urban form fails to consider how future urban growth will change exposure, whether by new development, intensification, infrastructure investment, or greenspace strategies. In this research we explore how long-term changes in urban morphologies might be envisioned under alternative future climate and hazard scenarios, particularly if different paths for adaptation and mitigation are followed. We outline how urban growth modelling (UGM) can generate long-term climate-related urban growth scenarios if a specific set of methodological choices are selected. Application of an existing model to a study area in Aotearoa-New Zealand illustrates how UGM can incorporate a of plurality of economic, climate, and policy scenarios to help decision-makers manage the complexity of future implications and potential trade-offs. However, the technical promise of UGM does not necessarily indicate its utility for urban planning. Results from our survey and interviews with A-NZ practitioners reveal that a lack of funding, data, skilled resources, and confidence in model functionality are significant barriers to uptake of UGM within local government. We conclude that stronger direction from central government is required to create a robust methodology for integrating urban futures with climate futures. Decision-makers need fit-for-purpose tools and a mandate for longer-term risk-based spatial planning that balances development needs with sustainability and resilience to a changing climate.

Logan Brunner

Metrics matter: How infrastructure risk metrics influence priorities around climate adaptation planning

Traditional risk assessments for infrastructure disruptions typically focus on direct physical damage and immediate impacts. However, this approach systematically underestimates the cascading consequences that ripple through interdependent systems and affect our communities. This research develops an integrated model that connects infrastructure network failure and restoration with physical, social, and economic outcomes across time, space, population, and businesses. Using a coastal flooding case study in Christchurch, New Zealand, we model cascading failures through electricity, water, and wastewater networks, tracking property-level recovery trajectories and their differential impacts on demographic groups and business sectors. A detailed look at the socioeconomic impacts highlights how Māori, Pasifika, children, and the elderly are more at risk across several metrics relative to their population size. From the economic-disruption analysis, we find that service-oriented business sectors like food and retail are relatively more impacted than others. These disparities persist under future sea-level rise scenarios, highlighting how current risk assessment approaches may perpetuate inequities in adaptation planning. We then perform a correlation analysis across the output consequence metrics, which reveals weak relationships between direct impact measures and cascading consequences, showing that exposure-focused assessments may systematically misrepresent systemic risk. More specifically, the metric chosen fundamentally shapes priorities for climate adaptation policy and planning. The findings underscore the critical need for multidimensional consequence metrics that capture direct and indirect impacts and distributional burdens to inform more equitable and effective resilience strategies for complex, interdependent systems.

Darcy Glenn

The Perfect Storm: How longer appointments, flooding, and migration could break the primary healthcare system

Climate change is one of the largest health risks of the next century. Unfortunately, there is a primary healthcare crisis, and people cannot get in to see a doctor. How will climate change further degrade access to primary care?

We will examine the impacts of patient displacement due to flooded clinics under near-term sea-level rise. We will also simulate a black swan migration scenario, analogous to the Syrian refugee crisis. Finally, we will proxy the impact of increased health concerns by adjusting appointment times. As patients require between 1 and 25 additional minutes of their doctors' time every year, currently full clinics may find themselves overbooked.

Our initial analysis of climate impacts suggests that spending a handful of minutes more with your doctor may cause wider-ranging indirect impacts to access than the more dramatic flooding of clinics or climate migration. The changes in appointment times are small but insidious. Doctors at currently full clinics may eventually have to drop current patients, or accept being overworked and eventually burned out. Either way, patients are harmed.

The primary healthcare system is already on the brink of collapse due to its limited flexibility and redundancy. Access is no longer primarily driven by distance; it is dictated by whether you are able to see a doctor at all. When the system is running so close to maximum capacity, spending a handful of minutes more with your doctor can cause more disruption than a major flood or a once-in-a-lifetime migration event.

Lea Desallas

Hybrid Flood Prediction for Urban Mobility and Early Warning Systems

Rapid and accurate prediction on flood obstructions is critically important for continuation of urban mobility during flooding events, particularly given the increasing frequency and intensity of extreme rainfall events projected under climate change. Conventional physics-based hydraulic models, while providing high-fidelity simulations, often require computationally intensive calculations, hindering their applicability for real-time forecasting and dynamic decision-making during flood events. This research aims to address this challenge by developing a framework that utilise machine learning algorithms trained using physics-based flood simulation data, predicting climate scenario flood depth and velocity across the urban transport network. These predictions are integrated into an urban mobility model to identify potential isolated areas and determine alternative routes, thereby enhancing emergency response and traffic management. The methodology involves utilisation of climate-projected rainfall intensity into Infoworks ICM to generate robust flood scenarios; these datasets are then used to train machine learning tools, with their predictions calibrated against the physics-based simulations using R-squared and Root Mean Square Error (RMSE). The predicted flood obstruction data are then applied to analyse the impact on urban mobility, assessing network disruptions and rerouting efficacy. The integrated approach demonstrates significant applicability for developing advanced early warning systems and supports crucial urban mobility decisions, contributing to more effective flood management and enhanced urban resilience in climate challenges.

Lucia Danzi

Tourism Disaster Management: A Social Network Analysis of Nature-based Destinations in Aotearoa New Zealand

Remote nature-based tourism destinations face heightened disaster risk due to exposure to natural hazards, fragile infrastructure, and limited emergency capacity. Collaboration between tourism and emergency management organizations is critical for the safety of tourists and the communities they visit.

This study uses a mixed-methods social network approach to examine inter-organizational collaboration in two destination-level disaster preparedness groups: the Fiordland Hazard Working Group in Piopiotahi/Milford Sound and the Tourism Operator Responders of Queenstown in Tāhuna/Queenstown. Semi-structured interviews with 29 stakeholders explored how collaboration is understood and practiced, identifying five types of relational ties: acquaintance, communication, resource sharing, business relations, and formal agreements. These categories informed a network survey of 41 affiliated organizations (58% response rate), which mapped the structural characteristics of tourism disaster management collaboration.

Findings show that networks in both Milford Sound and Queenstown exhibit a dense core–periphery structure, with Emergency Management Organizations and Regional Tourism Organizations acting as central and brokering actors, linking otherwise disconnected actors. Theoretically, the results provide quantitative evidence that RTOs/DMOs have evolved beyond marketing to assume strategic management roles in disaster preparedness. Practically, the study highlights that tourism stakeholders are integral to effective emergency planning and should be formally recognised within disaster management frameworks.

Session 1 | 10:45 – 12:15

Sandra Seno-Alday

Exploring the Impact of Climate Buffers on Business Risk and Resilience: Lessons from Typhoon Haiyan

As Southeast Asia braces for increasingly severe climate disruptions—from rising sea levels to intensified typhoons— climate buffer infrastructures have emerged as critical climate risk management and climate adaptation strategies. Green infrastructure (mangrove restoration), grey buffers (seawalls), and hybrid adaptation systems are not just environmental tools; they are strategic investments in coastal community resilience. Yet, these interventions carry significant tensions that must not be overlooked. Tacloban City in the Philippines presents an interesting context to explore the impact of climate risk management and climate adaptation strategies specifically on micro-, small- and medium-sized enterprises (MSMEs). The city was devastated by Typhoon Haiyan in 2013, washing out communities, livelihoods, and businesses. In response to the devastation brought about by Haiyan and in recognition that super typhoons would continue to increase in frequency and intensity, Tacloban City led important climate adaptation initiatives: the construction of a seawall and the restoration of mangroves. These grey and green infrastructure solutions were aimed at lowering vulnerability to storm surges and restoring ecological function. While there has been significant research into the impact of typhoons on households and helping communities become more resilient in the face of climate change, little has been done to understand the impact of typhoons on the MSMEs that drive the economy. This study offers insights into strategies to ensure MSME climate resilience that in turn assures the resilience of local economies.

Barry Evans

Navigating Wildfire Threats: A Probabilistic Model for Transportation Risk Assessment

Wildfires pose increasing risks to communities, with recent events across Europe in 2025 highlighting increases in severity and frequency due to climate change. Although modelling tools can predict potential wildfire spread, they are susceptible to uncertainties including land characteristics, weather conditions, and origin of the fire. It is crucial to account for these uncertainties when assessing risks to mobility, as fire propagation can render roads impassable.

This paper outlines a novel methodology to assess risks posed to people traversing the road network during a wildfire event, using a time-series probabilistic approach. Semi-empirical wildfire models are used to create a lookup catalog of simulated events, each corresponding to different ignition points and weather scenarios. At each time interval Radiant Heat Flux (RHF) generated by the fire is recorded and mapped along road segments. If the RHF exceeds a predefined safety threshold (e.g. 4.7kW/m2), the road section is marked as impassable, and the time of exceedance is recorded. Results are stored within lookup tables that contain Ignition ID, Weather Scenario ID, Road Segment ID, and Exceedance Time. Using this information during a wildfire event, a subset of the ensemble data relating to approximate area of ignition and a range of similar weather conditions can be selected. From this subset, time-series exceedance probability curves for impassable regions within the road network are thus derived.

The comprehensive range of simulated scenarios, probabilistic risks, and potential strategies can be visualised to support effective choices for evacuation and mobility planning, through collaboration with

key decision-makers.

Annemarie Christophersen

Managing risk to coastal infrastructure in a changing climate: A case study for the Kauaeranga Spillway in Hauraki Plains using Bayesian networks

Climate-driven sea level rise and shifting rainfall patterns are increasing the likelihood of coastal inundation across Aotearoa New Zealand. Traditional flood models, while robust, are often too computationally intensive for real-time decision-making. To address this, we trialled a Bayesian Network (BN) approach to forecast the operation of the Kauaeranga Spillway—a flood diversion structure on State Highway 25 (SH25) near Thames, Coromandel Peninsula.The spillway protects residential and commercial zones but temporarily closes SH25, disrupting access to essential services including the regional hospital. Although activated infrequently (13 times between 1990–2020), its use demands rapid response from regional authorities following heavy rain warnings.Our pilot BN model estimates the probability of spillway operation within six hours of a warning, using rainfall data over 1, 24, and 120-hour intervals, alongside river height and flow rate. The model was trained on ~30 years of data between 1990-2019 and validated using five years of more recent data (2020–2025). We extend the analysis to include coastal water level observations and future projections to assess storm surge-induced inundation risk mid and end century.This approach offers a computationally efficient tool for real-time risk assessment, supporting infrastructure planning, early warning systems, and communication strategies around road closures. It also provides insight into the change in frequency of spillway activation under future climate scenarios.

Lynette Smith

Tail ends and black swans: Analysing hazard-impact linkages, outliers, and compounding and cascading risks

Water sector organisations need to identify and analyse climate risks, with skill, in their local or regional domain of governance. That analysis must include tail-end risks, hazard-impact linkages, outlier events, and compounding and cascading risks. At this level and for these types of risks, though, statistical methods and certain types of models are not effective.While top-down techniques are well-developed, the use of bottom-up techniques is hampered by assumptions that data and methods are ‘soft,’ ‘anecdotal,’ or not ‘rigorous.’ On the other hand – and in a somewhat inconsistent way – we see advocacy for ‘values’ or narratives. This leaves practitioners stranded when it comes to making strategic and operational decisions.Other techniques are needed so that policy makers and planners can form reasonable expectations about how climate events and conditions could, would or might affect people, catchments, infrastructures, practices and living systems in their domain of governance. These techniques must be a bridge between system-level and local-level knowledge and information. They must generate information so that decision makers can identify linkages and follow through chains of inquiry. And they must allow decision makers to integrate information and knowledge from a range of sources and evaluative frameworks.This presentation will discuss recent work where the author used counterfactual reasoning and spatial mapping with a client, to identify and analyse climate risks in a water corporation’s domain of governance in a way that meets the criteria listed above.

Naoko Kato-Nitta

What information do people use in performing risk-averse behaviours under a new pandemic? Conjoint and Clustering Analyses in the UK, Japan, and Taiwan

People's risk perceptions toward the COVID-19 pandemic have been well documented, but the understanding of how pandemic-related information elicits public health behaviours and how different cultural, geographic, and policy contexts influence them is still limited. This study aimed to identify similarities and differences among the UK, Japan, and Taiwan to empirically investigate how people evaluate COVID-19-related information when deciding whether to take risk-averse behaviour. It also explored whether subgroups exist among the public that share similar characteristics related to attitude change on COVID-19 situations. Comparative regional surveys incorporating identical conjoint experimental design were administered. A conjoint analysis conducted on each region's data found that people in Japan and Taiwan decided whether to perform risk-averse behaviour based on the nationwide number of new daily infections, while those in the UK placed the most importance on the situation of direct contact via the presence of infections in their workplace or home. Statistical clustering using a finite mixture model revealed two distinctive sub-groups across each region: a risk-taking class with a low frequency of risk-averse behaviour, comprising predominantly young men and vaccine-hesitant individuals with low trust in governmental health policy; and a prudent class with a high frequency of risk-averse behaviour, comprising individuals with higher science literacy. The study's findings can contribute to policymakers' and medical experts' deeper understanding of the relationship between information provision and behaviours related to a new infectious disease, as well as emphasise that data-driven analysis can be leveraged to gain deeper insights into complex societal behaviours.

Amelia Lin

Integrating national-scale hazard models to assess multi-hazard exposure across New Zealand

Recent advances in natural hazard research have produced national-scale hazard models for New Zealand, covering seismic ground shaking, liquefaction, earthquake- and rainfall-induced landslides, coastal flooding, fluvial flooding, and tsunami inundation. This study integrates these individual hazard layers to provide insight into the multi-hazard exposure of New Zealand. A key challenge lies in the different spatial resolutions of the models, ranging from 10 m to 10 km, and their diverse output formats, such as flood depth or peak ground velocity. To address this challenge, all datasets were resampled to a 100 m resolution, which is appropriate for both national and regional assessments. Hazard-specific thresholds were then applied to define exposed areas; for example, flood depths ≥ 0.05 m or ground shaking ≥ 0.2 g. Multi-hazard exposure was assessed across a range of return periods. Results show that landslides are the most widespread hazard nationwide. Certain coastal areas, particularly along the west coast of the South Island and the east coast of the North Island, show exposure to multiple hazards even at relatively short return periods (100 years). Conversely, Northland shows extensive areas with little or no exposure to any of the assessed hazards, even for long return periods (1000 years). These findings highlight the spatial variability of multi-hazard exposure in New Zealand and provide a foundation for future risk analysis and resilience planning.

Astrid Vachette

Are we still surprised by disasters?

Media frequently employ terms such as 'unanticipated', 'unexpected', and 'unprecedented' when reporting on disaster events. These terms partly contribute to shaping how disaster risks are perceived by different stakeholders. This study aimed to critically explore media narratives within disaster risk communication and management by examining the use of surprise-related terms. Based on a systematic review of 460 news articles covering a range of Australian disasters, emergencies, and escalating risk conditions over the last 10 years, we explored linguistic and temporal variations in narrative construction, and how framing varies depending on the perspective (community voices, emergency professionals, decision-makers, reporters). The study uncovered distinctive framing strategies deployed by different actors, lack of coherence within articles regarding the unprecedented

nature of disasters, and inconsistency in emphasis across time, types of disaster, and locations. This study highlighted the contribution of media narratives to the broader complexities inherent to disaster communication and risk governance.

Alberto Ardid

Large Language Model Prompting for Hazard Forecasting: A Prototype Approach to Warning Design

New Zealand faces a dynamic hazard landscape that includes volcanic eruptions, floods, and wildfires. Effective warning systems are necessary to help communities prepare for and respond to these threats, yet designing warnings that are timely, clear, and actionable remains a complex challenge. Traditional social science methods evaluate warning efficacy through controlled experiments with human participants, assessing outcomes such as comprehension, perceived urgency, and intended behaviour. While robust, these approaches often require lengthy ethics approval processes and are limited in scale and speed.This study explores the use of Generative Artificial Intelligence (AI) as a surrogate for human participants in the early stages of warning design. Large Language Models (LLMs) were pre-prompted to adopt specific personas, such as trusting vs. sceptical, or informed vs. uninformed, to simulate different audience types. Hazard warnings were then tested against these AI personas, with responses analysed for clarity, urgency, and intended actions. In an extension, paired AI subjects were allowed to “discuss” warnings before making decisions, simulating social dynamics.While AI-based experiments cannot replace real-world validation - particularly where cultural context and behavioural variability are critical- they offer a rapid, low-cost method for prototyping and refining communication strategies before engaging with human participants. Our findings suggest that generative AI can complement traditional risk communication research, accelerate the development of more effective hazard warnings and supporting innovation in managing complexity across multi-hazard contexts.

Session 2 | 1:00 – 2:30

Marcelle Scadden

Worldviews and values: Inclusion of Indigenous perspectives in climate risk assessments

Indigenous communities often experience disproportionate risks from climate change, yet their perspectives remain marginal in many climate risk assessments. Risk itself is not objective but constructed through values and worldviews. Without shared understandings of what is at risk and why it matters, assessments may misrepresent threats and leave communities underprepared. In countries with Indigenous populations, risk must be understood through diverse worldviews, intergenerational knowledge, and lived experience with structural and environmental change. The challenge is that dominant assessment frameworks tend to privilege technocratic or institutional perspectives, leaving Indigenous understandings sidelined.To examine this gap, we reviewed climate risk and vulnerability assessments self-submitted to the Carbon Disclosure Project (CDP) by a range of international cities. Our analysis asked: to what extent do these assessments recognise and engage Indigenous perspectives and values? Findings show that while some reports acknowledged the disproportionate risks faced by Indigenous communities, few examined the deeper causes, such as historical inequities or differences in how risk itself is understood. Socio-cultural aspects, public engagement, community values, or place-based knowledge systems, were limited and largely subsumed within prevailing technocratic paradigms. Indigenous perspectives were often translated into the dominant risk framework rather than recognised as distinct worldviews. As a result, multiple understandings of risk, consequence, and adaptation were overlooked. Addressing this gap requires moving beyond procedural inclusion toward frameworks capable of engaging relational, place-based, and Indigenous ways of knowing.

Sarra Ekladios

Comparative Approaches to Tsunami Casualty Estimation: Models, Metrics, and Influencing Factors

Estimating human casualties from tsunamis is critical for risk assessment, emergency planning, and motivating resilience strategies. This study reviews four primary modelling approaches: empirical, simulation-based, analytical, and physically derived vulnerability functions used to estimate tsunami fatalities. Drawing on events such as the 2004 Indian Ocean and 2011 Great East Japan tsunamis, we examine how hazard intensity measures (e.g., inundation depth, wave height, flow velocity) and impact metrics (e.g., fatality rate, structural damage) are applied across models.Empirical models reveal strong correlations between hazard metrics and mortality but are constrained by event-specific data. Simulation-based models, particularly agent-based approaches, capture evacuation dynamics and infrastructure limitations but require extensive calibration. Analytical models offer scalable estimates using simplified assumptions, while physically derived functions provide biomechanical thresholds for human stability under tsunami flows.In New Zealand, substantial progress has been made in seismic casualty modelling; however, tsunami-specific approaches remain limited. This gap requires attention, given the country's exposure to tsunami sources, particularly near-field. Key findings highlight that inundation depths exceeding 1.5–2.0 metres sharply increase fatality risk, and that evacuation timing, route accessibility, and demographic factors (e.g., age, mobility) critically shape survival outcomes. The study concludes with recommendations to strengthen tsunami casualty modelling in the New Zealand context.

Zeb Etheridge

Broad boundary climate shock risks to irrigated dairy farming

Extreme weather events and increasing climate variability are the most immediate and significant effects of global heating. Our research explored the impact of current climate variability on irrigated dairy farms in Canterbury under the MPI-funded SLMACC programme.Historic weather data cannot reliably be used to understand current climate variability, given the influence of climate change and the need for decades of observations in a static climate to characterise variability. To address this, we generated a large ensemble of synthetic 10-year weather and climate series using statistical analysis of Weather@Home Regional Climate Model outputs combined with a stochastic weather generator. These datasets were used to drive a pasture growth model, with outputs linked to a dynamic dairy farm system model that incorporated surplus feed storage and adaptive responses to feed shortages, such as supplementary feed imports, drying-off, and culling.The model projected farm financial performance under varying debt levels, interest rates, fixed costs, and milk payout prices. Results quantified both the probability of adverse climate event sequences and their financial consequences, revealing strong compounding risks from climate variability, farm cost structures, and market volatility. We also evaluated adaptation options such as stocking-density adjustments, on-farm irrigation-water storage, and dynamic water-allocation policies. Investment in water storage increased risks in many instances, whereas lower stocking densities reduced risks significantly.This work demonstrates that accounting for multiple, interacting boundary stresses is essential for realistic climate-risk assessment in agricultural systems

Edith Arndt

Using evaluation to strengthen biosecurity risk management

Biosecurity systems are inherently complex and dynamic due to the many biosecurity activities and measures that are applied pre-border, at the border and post-border and the interactions between the components of the system and its participants. Biosecurity systems are also shaped by influences such as human behaviour and changing risk profiles. Within this complexity, biosecurity risk managers must ensure that individual programs achieve their intended outcomes and broader impacts, a responsibility that requires systematic evaluation of performance. Evaluation plays a critical role in managing biosecurity risk. It provides evidence on whether biosecurity measures are achieving intended results and reducing risk, while also informing the adaptation of investment strategies to changing threats. Beyond effectiveness, evaluation strengthens transparency and accountability which cultivates stakeholder trust in government decision making.We present a six-step evaluation framework designed for ex-post impact assessment of biosecurity programs. The framework builds on a theory of change, which is a description of how a program intends to achieve its expected results. Drawing on examples from Australia's international agricultural research collaborations, we illustrate the framework's utility in assessing the value of investments, highlighting gaps, and identifying opportunities for improvement. In pre-border biosecurity, evaluation findings can help ensure that programs and policies are effective in reducing threats and therefore biosecurity risk to Australia. However, our evaluation framework is broadly applicable, not only across the entire biosecurity system but also to environmental management more generally.

Sarah Harrison

Perceptions of risk and willingness to remain in flood-prone areas when flood frequency increases - insights from Aotearoa New Zealand

Flooding is Aotearoa New Zealand's most frequent and consistently damaging hazard, causing significant damage to infrastructure and property and disruption to everyday lives. As part of 'Mā te

Haumuru ō te Wai - Towards a more flood-resilient Aotearoa New Zealand' a 5-year research programme, we explored the cascading societal impacts of repeat flood events through three community case studies. Our case studies cover rural and urban catchments and a range of flood events varying by magnitude and frequency of rainfall. Based on 53 semi-structured qualitative interviews we developed case-specific causal loop diagrams which were used to identify common features and patterns of impact over time. An obvious feature of all three causal loop diagrams was the slow erosion of the ability and willingness of individuals and communities to tolerate flood events, especially when the time between events is reduced. In this presentation we will explore the fluid nature of tolerance, exposing the factors that influence tolerance and how these may interact. We focus in particular on how tolerance to flooding varies in relation to the cumulative impacts from repeated historical events, or the threat of repeated future flooding. We note that without sufficient time between flood events to fully recover and experience life as normal, the trauma from flooding accumulates and the desire to remain in place diminishes. We will conclude the presentation with observations for policy-makers and planners who need to grapple with what a fluid tolerance to events means for the future of communities in flood-prone regions.

Lynette Smith

Water security in an Australian capital city: a clash of evaluative frameworks?

How can decision makers agree on the best way to manage a risk, when "experts or stakeholders do not know or cannot agree on … how to weigh and value desirable alternative outcomes"? Often seen as immaterial or post factum, our evaluative frameworks instead constitute what counts as a reasonable expectation, action or behaviour.

Lynette argues that differing evaluative frameworks were consequential in a recent decision by the NSW regulator to reject Sydney Water's proposal to increase the price of water from 2025, based, in part, on an independent consultant's assessment. Sydney Water sought the increase to fund capital works which would improve water security in a changing climate. When it talked about uncertainty, it meant threats to the system from extreme weather and 'unforeseen' global events.

When the consultant used the word, on the other hand, it meant the economic kind, such as 'two significant sources of uncertainty in the cost estimations' relate to the investment stage in the capital works program. Lynette argues that the consultant used a paradigm of 'enterprise risk' whereas Sydney Water sought to manage what might be called 'state-significant risk'. The implications of that difference will be unpacked in the presentation. Their relevance to the management of physical climate risks will be discussed.

Anca Hanea

Estimating impacts of climate change on indigenous life-style and cultural values: The test case of Ovalau Island, Fiji

Many iTaukei communities in Fiji maintain traditional village lifestyles reliant on small-scale agriculture and fisheries. Their close connection to the environment makes them highly vulnerable to climate change. Changes in seasonal weather patterns, rainfall and drought may directly impact fisheries and agricultural production, which in turn will affect cultural values and practices.This study pilots a methodology to assess how recent climate change has affected traditional subsistence lifestyles and cultural values, and to project potential future impacts. There is often a lack of historical data quantifying past productivity and cultural values in the Pacific, therefore we use an elicitation approach to estimate historical changes in subsistence and cultural values. Using the local knowledge of indigenous communities from six villages on Ovalau, we quantify perceived recent changes to agricultural production, fisheries, water security, and 10 measures relating to cultural values and

practices (e.g., social cohesion and wellbeing, food sharing/Veiwasei within villages, connection to land/Vanua, etc.).A large majority of participants identified reductions across all measures, with participants often identifying loses of over 50% for each measure within just the last 20 years. Perceived changes to subsistence production and cultural values are integrated with historical climate data for Ovalau within a Bayesian Network (BN) modelling framework, enabling projections of future impacts under different climate scenarios. This study pilots an innovative method to estimate historical climate impacts, and predict future impacts based on the experiences, knowledge and expertise of indigenous communities.

Logan Brunner

Metrics matter: How infrastructure risk metrics influence priorities around climate adaptation planning

Traditional risk assessments for infrastructure disruptions typically focus on direct physical damage and immediate impacts. However, this approach systematically underestimates the cascading consequences that ripple through interdependent systems and affect our communities. This research develops an integrated model that connects infrastructure network failure and restoration with physical, social, and economic outcomes across time, space, population, and businesses. Using a coastal flooding case study in Christchurch, New Zealand, we model cascading failures through electricity, water, and wastewater networks, tracking property-level recovery trajectories and their differential impacts on demographic groups and business sectors. A detailed look at the socioeconomic impacts highlights how Māori, Pasifika, children, and the elderly are more at risk across several metrics relative to their population size. From the economic-disruption analysis, we find that service-oriented business sectors like food and retail are relatively more impacted than others. These disparities persist under future sea-level rise scenarios, highlighting how current risk assessment approaches may perpetuate inequities in adaptation planning. We then perform a correlation analysis across the output consequence metrics, which reveals weak relationships between direct impact measures and cascading consequences, showing that exposure-focused assessments may systematically misrepresent systemic risk. More specifically, the metric chosen fundamentally shapes priorities for climate adaptation policy and planning. The findings underscore the critical need for multidimensional consequence metrics that capture direct and indirect impacts and distributional burdens to inform more equitable and effective resilience strategies for complex, interdependent systems.

Session 3 | 3:00 – 4:30

Tom Logan

Assessing Risk In and Across Complex, Interdependent Systems: A Research Agenda for Systemic Risk

Engineering risk assessment has traditionally focused on direct impacts to individual assets or systems. However, as risks increasingly emerge through interdependent systems, propagating across space, time, and sectors, conventional methods often fail to capture cascading and emergent consequences. This paper introduces a three-tier taxonomy of risk assessment methods, defined by the types of consequences and systemic behaviours they are capable of evaluating. Tier 1 methods are those capable of assessing direct, localized impacts; Tier 2 methods capture cascading effects in interconnected systems; Tier 3 methods address emergent, transformative, and uncertain dynamics. We identify key system traits and epistemic challenges that complicate assessment as risk propagates, and we use the tiered framework to clarify the limitations and capabilities of existing approaches. We then outline six research priorities necessary to advance risk assessment in systemic contexts: analyzing consequences, structuring uncertainty, evaluating trade-offs, strengthening causal inference, ensuring defensibility, and communicating results. This agenda aims to align future research, promote methodological coherence, and support assessments that are transparent, adaptive, and capable of informing decisions under deep uncertainty.

Matt Boyd

Bridging Fragmented Silos: An Integrative Analysis Across Six Domains Driving Global Risk

Background: Humanity faces escalating global catastrophic and existential risks, yet prevention and mitigation strategies remain inadequate due to institutional and theoretical fragmentation. Decision-makers respond to symptoms—climate disasters, pandemics, economic crises—without engaging systemic interactions or the mechanisms that repeatedly generate crises. Despite extensive literature, six domains remain siloed: (1) disaster risk reduction (e.g., the Sendai Framework), (2) catastrophic and existential risk studies, (3) interacting (polycrisis) and cascading (systemic) risk analysis, (4) human behavioural drivers, (5) metacrisis drivers (evolutionary and game-theoretic determinants of human systems), and (6) root cause analysis.Aim: This project aimed to produce the first integrative review linking these domains.Methods: Using integrative review methodology, we synthesised empirical and theoretical literature across all six domains, mapped paradigms and blind spots, traced feedback loops and causal pathways, and analysed grey literature such as National Risk Assessments and UN policy frameworks.Results: Fragmentation across silos obscures the game-theoretic, evolutionary, and cultural dynamics driving converging crises. Critical but underexplored convergence points may explain why competitive dynamics and accelerating technologies generate risks faster than assessment capacity, and why current risk reduction efforts fail. Integrated analysis shows how individually rational decisions lead to collectively destructive outcomes, creating “systemic traps” that block effective coordination on global risks. Yet also reveals potentially modifiable root causes and provides decision-makers with shared vocabulary and systems-level understanding. Implications: Without addressing connections across silos and the deep generative mechanisms of risk, responses will remain fragmented and reactive, while risks regenerate, potentially leading to a civilisational “hard landing.”

Paula Blackett

Cascading risk archetypes as a way to explore chains of cause and effect regarding climate change risk.

We know from observation, experience and previous research that the impacts and implications of climate change and hazards will propagate as cascades across physical and human systems, moving across time and space. These impacts can compound and combine to generate new impacts and risks or exacerbate existing risks. This occurs because of the interdependencies between elements within coupled natural and socio-economic systems, and is the product of a shock to a complex system. However, these important interdependencies are not usually considered in a standard climate change risk assessment, where the focus is usually on direct risks. Consequently, this leads to risk being underestimated, resulting in an inadequate adaptation responseIn this presentation we will present research from Aotearoa-New Zealand where we have established some ways to account for indirect risk and have developed several archetypes of cascading risk that we hypothesise could be generally applicable and simple enough to apply in a range of settings and scales. The archetypes are a) A disruption cascade – where too much of something (e.g., soil or water) where disruption begins the chain of cause and effectb) A contestation cascade with competition for a scare resources (e.g., water) generating effects that move across time and spacec) Irreversible change, where a shift in baseline conditions causes change or loss within the system We will describe the archetypes in detail and overview how their application can improve risk assessment practice.

Lu-Yi Wang

Benefits of pre-border capacity-building for biosecurity

Pre-border biosecurity is a key pillar in protecting Australia from invasive species. It delivers substantial returns on investment and generating significant benefits for partner countries, yet these benefits are often assumed rather than formally evaluated. Here, we systematically assessed the impacts of Australian government's investments in pre-border biosecurity through three case studies: rabies control in Timor-Leste, classical swine fever (CSF) control, and foot-and-mouth disease (FMD) testing capacity in Indonesia. Using both quantitative and qualitative approaches, combined with counterfactual analysis, we demonstrated substantial economic benefits. Returns on investment were estimated at 33 and 38 times for the rabies and CSF case studies respectively, while a 1% reduction in the FMD outbreak risk was projected to avoid approximately AUD$90 million in damages. In-country interviews further revealed diverse environmental, social, and cultural impacts within local communities arising from pre-border initiatives. Drawing on these evaluations, we present a comprehensive framework for biosecurity investment assessment, incorporating multidimensional impacts, and validated it through application to the Australian Fumigation Accreditation Scheme to demonstrate adaptability and applicability. Our findings provide systematically tested evidence of the importance and cost-effectiveness of pre-border biosecurity investments, underscoring their value for Australia, partner countries, and local communities.

Session 4 | 9:30 – 11:00

Darcy Glenn

Identifying breeding grounds of discontent- how climate change can affect access and lead to violence

Climate change will strain local governments with two simultaneous challenges: 1) maintain essential services despite increasing climate disruptions, and 2) integrate climate migrants into the community without disrupting social cohesion. Initial work in Europe indicates that how efficiently a government can tackle the first hurdle is a leading indicator of whether the second hurdle will end in violence. Our work focuses on New Zealand, whose proximity to small island nations makes it a climate refuge.We will explore local government efficiency (LGE) in New Zealand. LGE is measured based on their ability to deliver access to essential services, with consideration to constraints based on size, hardship, and available tax revenue. We focus on access to primary healthcare, schools, and transportation. We will apply climate impacts such as future sea rise and increased doctor's visits (due to heat stroke, vector-borne disease, etc.) to current access levels. We will also apply a migration surge analogous to Germany's Syrian refugee crisis, adjusted to the New Zealand population. In Germany and the Netherlands, LGE has been demonstrated as a leading indicator of potential anti-immigrant violence. Anti-immigration sentiment has been demonstrated in New Zealand. There is a history of targeting Pacific communities, who may increasingly immigrate to New Zealand due to its status as a future "climate haven". Identifying areas where LGE is expected to decline due to changes in access is crucial for maintaining social cohesion while integrating new populations. If local government inefficiencies are addressed early, we limit the breeding grounds of discontent.

Nicholas Moran

Biosecurity pathway risk analysis – case study for rodents on Rakiura, Aotearoa

Effective border biosecurity requires an understanding of the risks associated with pest introduction pathways (e.g., air and marine transport, plant and animal products). The likelihood of pest incursions from specific pathways may be estimated from factors such as pathway volume, likelihood of contamination for a unit of volume, and the effectiveness of biosecurity pathway interventions and surveillance measures. Often, data to directly estimate all factors are limited or unreliable. This talk presents a general methodology that addresses statistical and data limitations by integrating modelling with existing data and structured expert judgement, illustrated through a case study on rodent incursions into Rakiura (Stewart Island) in southern New Zealand.This case study, conducted in collaboration with Predator Free 2050, Predator Free Rakiura, the Department of Conservation and Zero Invasive Predators, develops a pathway risk model for a future rat- and mouse-free Rakiura and evaluates surveillance systems to provide recommendations for managing predator biosecurity risks.

Andrew Allison

Identifying agent classes for climate change adaptation simulation using a serious online game

Agent-based models simulate the actions of autonomous agents interacting with their environment. The Future Coasts Aotearoa research team have devised a novel way to obtain quantitative data to populate agents – through a serious online game called the Future Coasts Aotearoa Game. The game is an interactive simulation of four interacting hazards – sea level rise, groundwater, coastal storms and fluvial (river) flooding – impacting a rural community in New Zealand. Players selected one of five characters and choose adaptation actions to attempt to avoid or mitigate the impacts of a changing climate.Data is collected for every action players take. A K-means cluster analysis groups players together into agent classes – groups of people who behave a similar way in response to hazards. The

agents will have preferred adaptation strategies and will implement these strategies according to rules observed in the online game-play data.The model will be tested using robust decision-making – stress-testing the adaptation strategies of different agent groups against multiple plausible future climate states to identify which adaptation strategies perform best for each scenario, and across the suite of scenarios.This project will shed light on the drivers of adaptation, different classes of adaptation preference and different and evolving adaptation strategies over time. The end result of this process will be stress-tested adaptation strategies that are robust against future uncertainty and will allow New Zealanders living in rural coastal lowlands to better understand how the decisions they make today impact their future physical, social, cultural and economic well-being.

Juliane Spaak

Navigating Seismic Risk: Evaluating Earthquake-Prone Buildings Under Uncertainty

Understanding the balance between the cost of seismic mitigation and the benefit of reducing life safety risks is essential for managing earthquake-prone buildings across Aotearoa New Zealand. This study evaluates the potential impacts of strengthening buildings, using a comparative modelling approach with a range of annual probability of exceedances (APoEs). The unique APoE approach, enables a closer examination of low-probability, high-consequence events and supports more nuanced insights into risk exposure across different building types, various exposure levels and urban contexts. A building inventory of over 5,000 buildings was developed to support both the APoE-based and traditional cost-benefit analyses. While both offer insights, impacts from these potentially, high impact but low likelihood occurrences are not well addressed by a traditional CBA approach, hence may support inaction in seismic resilience. There is a need to consider intangible benefits, like reducing deaths in larger events.Strengthening measures for both unreinforced masonry (brick) buildings and multi-story vulnerable concrete buildings offer significant potential to reduce life safety risks during earthquakes. Loss estimates must be interpreted cautiously due to limited historical data and other baseline uncertainties. Assumptions, such as uniform shaking across population centres, must be thoughtfully reviewed, as during real earthquakes, not all buildings are similarly affected, and even similar buildings do not all perform the same.Decision-making should extend beyond economic metrics to include socio-economic impacts and recovery potential to ensure equitable and resilient outcomes. Despite limitations, the modelling provides valuable insights into relative trends and supports more informed, equitable, and resilient decision-making.

Charlotte Brown

Let’s Talk About Risk Tolerance: a framework for eliciting public perspectives on risk tolerance

Risk tolerance serves as the critical bridge between technical risk assessment and policy implementation in hazard management, yet limited research exists on how to effectively capture and integrate public perspectives into these decision-making processes. This gap is particularly problematic as risk governance extends beyond technical considerations to encompass social values, equity, and community capacity.This paper presents findings from a Natural Hazards Commission-funded study addressing this research gap through empirical investigation of community engagement approaches. Using semi-structured interviews with practitioners, comparative case studies, and focus group methodology, we documented and categorized diverse methods for eliciting public perspectives on risk tolerance ranging from deliberative approaches (citizen juries) to experiential methods (serious games) to traditional surveys.Our analysis identified key 'scoping factors' influencing engagement effectiveness, that categorise: the nature and scale of risk, decision-making process characteristics, and community context. We developed a theoretical framework mapping these factors against elicitation methods, providing systematic guidance for practitioners to select appropriate tools for different contexts. The research also examines approaches for synthesizing public input to ensure meaningful integration into governance processes.The findings contribute to risk governance theory by

demonstrating how participatory approaches bridge technical assessment and community values. The framework offers evidence-based guidance for designing inclusive risk tolerance processes that enhance both legitimacy and effectiveness of hazard management decisions. This work supports more equitable risk governance by ensuring diverse community voices meaningfully inform decisions about acceptable risk levels and management strategies, addressing a critical gap in contemporary risk governance practice.

Lea Dasallas

Hybrid Flood Prediction for Urban Mobility and Early Warning Systems

Rapid and accurate prediction on flood obstructions is critically important for continuation of urban mobility during flooding events, particularly given the increasing frequency and intensity of extreme rainfall events projected under climate change. Conventional physics-based hydraulic models, while providing high-fidelity simulations, often require computationally intensive calculations, hindering their applicability for real-time forecasting and dynamic decision-making during flood events. This research aims to address this challenge by developing a framework that utilise machine learning algorithms trained using physics-based flood simulation data, predicting climate scenario flood depth and velocity across the urban transport network. These predictions are integrated into an urban mobility model to identify potential isolated areas and determine alternative routes, thereby enhancing emergency response and traffic management. The methodology involves utilisation of climate-projected rainfall intensity into Infoworks ICM to generate robust flood scenarios; these datasets are then used to train machine learning tools, with their predictions calibrated against the physics-based simulations using R-squared and Root Mean Square Error (RMSE). The predicted flood obstruction data are then applied to analyse the impact on urban mobility, assessing network disruptions and rerouting efficacy. The integrated approach demonstrates significant applicability for developing advanced early warning systems and supports crucial urban mobility decisions, contributing to more effective flood management and enhanced urban resilience in climate challenges.

Ruby Clark

Partnering with communities for Coastal Hazard Adaptation Planning in Christchurch New Zealand

Rationale:
Christchurch is highly exposed to coastal hazards, with around NZ$14 billion in private property and NZ$3.2 billion in public infrastructure at risk from sea-level rise this century. Addressing these risks is challenging due to the uncertainty, diverse stakeholder interests, and an evolving statutory framework.

Approach:
Christchurch City Council adapted national guidance to pilot a locally tailored Coastal Hazards Adaptation Plan. Central to this was a Coastal Panel of diverse community members, including local rūnanga representatives. Supported by technical specialists and informed by targeted community engagement, the Panel developed asset-specific, risk-based adaptation pathways for their area. These pathways balanced cultural, social, environmental, economic, and practical considerations and were recommended to Council for decision-making.

Results and discussion:
In 2025, Council unanimously endorsed the plan, adopting the Panel's pathways with minor amendments. Public submissions showed strong community support, and post-process surveys indicated that participants viewed the process as valuable and robust. This presentation reflects on

these indications of success, lessons learned, and the challenges we face as we look to apply this process in a more densely populated part of the city.

Implications:
As global adaptation planning evolves, this case study offers transferable lessons for building authentic partnerships, designing scalable engagement, and balancing short- and long-term needs. Christchurch's approach provides a potential model for other cities to build upon and highlights opportunities for future research and collaboration between practitioners and academics.

Kevin Quigley

The Future of Tourism for People with Disabilities: Scenario Planning to Examine Critical Uncertainties

The future of tourism for people with disabilities (PWD) is fraught with uncertainty. On the one hand, at $58 billion worldwide, PWD who travel constitute a lucrative market; many Western countries also have legal protections to ensure PWD can be accommodated when traveling. On the other hand, PWD, one in six worldwide, face significant physical, information, attitudinal and systemic barriers. There are concerns over what constitutes appropriate supports, inconsistent definitions of disability and lower income levels among those with disability that limit their ability to travel. As the population among those most likely to travel ages, the disabilities community will grow, and these challenges will become more pronounced.

The IRGC framework identifies scenario planning as a process to address such complex variables with such uncertain outcomes. In autumn 2023 in Halifax, Canada and again in winter 2025 in Glasgow, Scotland we used the Intuitive Logics method to structure scenario planning sessions with accessible tourism stakeholders, including people with disabilities, members of the tourism industry, academics and government representatives. The scenario exercises identified factors that drive the sectors and different plausible futures to which the organizations must react. The scenario sessions explored critical uncertainties and the underlying causes of social and organizational vulnerabilities. We identified criteria by which to evaluate new programs and policies in light of these uncertain futures.
Solutions lie in recognizing the rights of people with disabilities, developing a culture of respect and committing to continuous improvement. While individual businesses—mostly SMEs in tourism with limited resources—have an important role to play, solutions also lie in community-wide changes that engage business, government, the not-for-profit sector and the citizenry as a whole, including those with disabilities, and incorporating the learning from people with disabilities into the sector.

Session 5 | 11:30 – 1:30

Anna Kosovac and Klaus Jahn

Ethics and Morals of Risk Communication: can we manipulate without meaning to?

At the SRA Europe conference in 2025, risk communication scholars came together to discuss the ethical implications of how we communicate risk to the public: the power dimensions, and also what is/is not appropriate within our sphere. An aspect that was not discussed were the philosophical debates occurring in this space. This presentation aims to cover some of these gaps by covering off the main philosophical theories related to conveying risk information as experts, ultimately asking the question: can we still remain morally justified in using persuasive and psychological techniques in encouraging safer approaches to community action? Will consequentialists always prevail in the discipline? We explore these themes further by bringing together risk theory through a philosophical lens.

Mitchell Anderson

Spatial Multi-Criteria Decision Analysis for Community Risk Prioritisation: An Integrated Framework for Evidence-Based Resilience Planning

Spatial multi-criteria decision analysis (MCDA) provides a systematic framework for prioritising risks across geographic areas, enabling evidence-based resource allocation for community resilience. This methodology integrates multiple risk factors, including natural hazards, vulnerability indicators, and adaptive capacity, within spatially explicit decision-making processes.The approach combines geospatial data layers through weighted overlay analysis and analytical hierarchy processes. Key benefits include transparent prioritisation through explicit criteria weighting, stakeholder integration enabling community and expert input, scalable application from local to regional planning, and dynamic updating capabilities as new data emerges.Traditional risk assessments struggle with multiple, interacting factors across space. Spatial MCDA addresses this challenge by combining quantitative hazard data with qualitative vulnerability assessments, creating comprehensive risk surfaces that identify priority intervention locations.The framework transforms complex, multi-dimensional risk information into accessible visualisations and rankings, enabling planners to optimise limited resources by focusing on areas of greatest need and potential impact. This systematic approach ensures decision-makers can justify resource allocation through transparent, repeatable processes.Applications demonstrate significant value for infrastructure investment decisions, emergency response prioritisation, and climate adaptation planning. The methodology's flexibility accommodates diverse risk contexts while maintaining scientific rigour essential for effective risk governance and community resilience enhancement.

Nohah Forde

Climate Risk Governance and the Role of Inter-Professional Communication

Society faces unprecedented governance challenges as risks cross boundaries of expertise, authority, and institutions. Climate adaptation exemplifies these challenges, where distributed expertise, uncertain authority, and fragmented institutional arrangements create barriers and coordination challenges that complicate effective risk management.Specifically, we ask how communication

between professionals enables or constrains coordination within distributed adaptation governance systems. What role does inter-professional communication play in creating or reducing complexity in climate risk governance? How do communication practices intersect with authority, expertise, and institutional mandates to shape adaptation outcomes?Drawing on qualitative interviews with 14 adaptation professionals across government, consultancy, and community sectors in Aotearoa New Zealand, the thematic analysis focuses on how communication practices intersect with authority, expertise, and institutional mandates.Four critical drivers of governance complexity emerged: unclear responsibilities, with professionals reporting fundamental ambiguity about authority for adaptation decisions; professional identity dynamics, where "technical" vs "non-technical" positioning determines whose expertise gets prioritised in risk assessments; implementation gaps, showing persistent disconnect between formal governance processes and actual practice; and institutional fragmentation, as climate adaptation and disaster risk reduction remain siloed despite overlapping risk mandates.Together, these findings reveal that inter-professional communication can either exacerbate or mitigate governance complexity. In doing so, this study demonstrates that communication is not only important for coordination, but a constitutive element of how climate adaptation governance is achieved.

Katherine Booker

Integrating urban and climate futures: improving urban growth modelling to plan for future climate uncertainty

Urban planners are facing tough decisions amid the uncertainty surrounding our future climate and the dynamic nature of climate-related hazards. Projections of future hazards under alternative climate scenarios are available but pairing those with current urban form fails to consider how future urban growth will change exposure, whether by new development, intensification, infrastructure investment, or greenspace strategies. In this research we explore how long-term changes in urban morphologies might be envisioned under alternative future climate and hazard scenarios, particularly if different paths for adaptation and mitigation are followed. We outline how urban growth modelling (UGM) can generate long-term climate-related urban growth scenarios if a specific set of methodological choices are selected. Application of an existing model to a study area in Aotearoa-New Zealand illustrates how UGM can incorporate a of plurality of economic, climate, and policy scenarios to help decision-makers manage the complexity of future implications and potential trade-offs. However, the technical promise of UGM does not necessarily indicate its utility for urban planning. Results from our survey and interviews with A-NZ practitioners reveal that a lack of funding, data, skilled resources, and confidence in model functionality are significant barriers to uptake of UGM within local government. We conclude that stronger direction from central government is required to create a robust methodology for integrating urban futures with climate futures. Decision-makers need fit-for-purpose tools and a mandate for longer-term risk-based spatial planning that balances development needs with sustainability and resilience to a changing climate.

Siyu Yao

Structural Resilience and Effectiveness of Emergency Collaboration in Megacities: A Network Analysis of Official Documents on Shanghai's Flood and Typhoon Prevention Efforts

Abstract: In the context of global climate change, megacities face increasingly severe challenges from extreme weather and urgently need to enhance the structural resilience and effectiveness of cross-departmental and cross-regional emergency collaboration. This study focuses on flood and typhoon prevention efforts in Shanghai, a megacity in China, innovatively utilizing official documents

issued by governments and departments between 2023 and 2025 as objective behavioral data. Through social network analysis (SNA) and text mining techniques, we constructed and thoroughly analyzed the structural characteristics and dynamic evolution of Shanghai's cross-regional collaborative network for flood and typhoon prevention. The research aims to empirically reveal how network-wide structure, centrality distribution, community structure, and structural holes influence the resilience (e.g., network robustness, resource availability) and efficiency (e.g., response time, information flow efficiency) of citywide emergency response. The findings demonstrate that Shanghai's flood and typhoon prevention collaboration network exhibits significant core-periphery structures and functional community characteristics, identifies key nodes serving as critical information intermediaries, and reveals potential collaboration barriers between communities. The theoretical contribution lies in introducing objective behavioral data to deepen the empirical application of network governance theory in emergency management of megacities. Furthermore, it provides a novel analytical framework based on network structure for urban resilience studies. Practically, the results offer scientific evidence and concrete policy recommendations for optimizing emergency coordination mechanisms and enhancing overall resilience and efficiency in flood and typhoon prevention in Shanghai, with important reference value for other megacities facing similar challenges.Keywords: Megacity; Emergency Collaboration; Social Network Analysis; Structural Resilience

Liz Varga

Intersection of risk and resilience

Modern narratives on resilience, broadly the capability to adapt to and absorb hazards and threats, are challenging the comprehensiveness of risk management, assessment, and analysis (RiMAA). Whilst RiMAA considers the probabilities of future events upon a gamut of outcomes, such as productivity, financial stability, operational safety, environmental impacts, etc, it tends to overlook the outcome of resilience. Furthermore, risks such as single supply chains, reliance on national utilities, rebound effects from decisions, and others that reduce the ability to adapt to and absorb hazards and threats, are not identified as risks, and when they are, they are not prioritised or elevated as strategic risks and managed appropriately. It is not surprising that resilience management, assessment, and analysis (ReMAA) has flourished to address this underdeveloped area of RiMAA. ReMAA is also raising the profile of uncertainties (as opposed to quantifiable risks in RiMAA) because resilience needs to deal with interactions between complex systems, such as climate, natural environments, and socio-technical systems, which have multiple contingencies and interdependencies. Creating clarity about the intersection of risk and resilience is critical to avoid oversights, misunderstanding and duplication.

Dagyum Jung

The Multidimensionality of Climate Change Behaviors and the Heterogeneity of Their Determinants

This study examines the multidimensionality of climate change behavior by distinguishing between public and private domains and analyzing their heterogeneous determinants. The analytical framework incorporates three sets of independent variables: the Value–Belief–Norm (VBN) theory, the risk perception paradigm, and behavioral barriers and facilitators. This classification reflects the view that internal values and beliefs, perceptions of risk, and external contextual conditions represent distinct dimensions in shaping climate-related actions. In addition, resource factors—including economic, social, and policy resources—are introduced as moderating variables to assess the conditional role of resource availability in translating attitudes and perceptions into concrete behaviors.Using survey data

collected from Korean citizens, the study applies quantitative research methods to empirically explore which determinants promote public actions (e.g., policy participation, collective campaigns) and private actions (e.g., energy conservation, eco-friendly consumption, resource saving), and how these determinants operate differently depending on levels of resources.The contributions of this study are twofold. Theoretically, it extends the VBN and risk perception paradigms by integrating behavioral barriers and facilitators as well as resource-based moderation into a multidimensional model. Practically, it emphasizes that climate policies should move beyond generalized information campaigns and adopt differentiated strategies: strengthening institutional trust and risk communication to foster public engagement, while reducing economic and social barriers and enhancing resource accessibility to encourage private practices. Importantly, since the determinants of public and private actions differ, distinct policy approaches are required to effectively promote climate change behaviors across domains.

Christina Magill

Strategic Risk Assessment to Optimise Emergency Response

FENZ and GNS Science have developed an advanced decision-support tool that enhances how emergency services deploy resources and coordinate responses. By analysing comprehensive operational data, and integration of demographic, building and probabilistic natural hazard datasets, the tool delivers nine integrated risk models that strengthen response capability and improve service delivery. Risk models have been created for legislated response activities – building fire, wildfire, incidents involving hazardous substances, and traffic accident rescue, as well as additional functions – medical emergencies, natural hazard response (earthquake, volcanic eruption, landslide, flood). Behind each risk model is a trained algorithm, allowing us to predict risk for every building, road segment and land parcel within the country. This approach offers significant operational benefits for infrastructure operators and emergency management organisations seeking evidence-based capability enhancement.

Brandy Alger

From Experience to Action: Community-based Preparedness Solutions for Older Persons in Southland

Older adults are often framed in disaster discourse as inherently vulnerable, yet many possess valuable experience, local knowledge and community connections that can strengthen preparedness. This research, based in Invercargill, Southland, challenges deficit-based narratives by recognising older adults as capable and informed partners in natural hazard preparedness, using a participatory co-design approach that supports self-efficacy and locally driven action.In collaboration with Age Concern Southland and Emergency Management Southland representatives, a series of workshops was held with older residents to identify priorities, barriers and locally appropriate strategies for disaster preparedness. The workshops facilitated shared decision-making, practical lived experience and local hazard information. Together, participants co-created a printed preparedness resource tailored to the Southland context, addressing hazards such as earthquakes, flooding and severe storms, and emphasising independence, self-sufficiency and accessible non-digital solutions.This presentation outlines the participatory process, highlights how older adults reframed preparedness messaging and discusses the practical and cultural insights embedded in the co-designed resource. It also reflects on the benefits and challenges of participatory design in a disaster risk reduction context, particularly with a demographic often excluded from the design and decision-making stages.The project contributes to broader debates on risk communication, social capital and community-led disaster preparedness. By recognising older adults as competent contributors with the ability to take meaningful action, the

research offers an alternative model for engagement that enhances local resilience and can be adapted for other communities in Aotearoa New Zealand and beyond.

Lucia Danzi

Tourism Disaster Management: A Social Network Analysis of Nature-based Destinations in Aotearoa New Zealand

Remote nature-based tourism destinations face heightened disaster risk due to exposure to natural hazards, fragile infrastructure, and limited emergency capacity. Collaboration between tourism and emergency management organizations is critical for the safety of tourists and the communities they visit.

This study uses a mixed-methods social network approach to examine inter-organizational collaboration in two destination-level disaster preparedness groups: the Fiordland Hazard Working Group in Piopiotahi/Milford Sound and the Tourism Operator Responders of Queenstown in Tāhuna/Queenstown. Semi-structured interviews with 29 stakeholders explored how collaboration is understood and practiced, identifying five types of relational ties: acquaintance, communication, resource sharing, business relations, and formal agreements. These categories informed a network survey of 41 affiliated organizations (58% response rate), which mapped the structural characteristics of tourism disaster management collaboration.

Findings show that networks in both Milford Sound and Queenstown exhibit a dense core–periphery structure, with Emergency Management Organizations and Regional Tourism Organizations acting as central and brokering actors, linking otherwise disconnected actors. Theoretically, the results provide quantitative evidence that RTOs/DMOs have evolved beyond marketing to assume strategic management roles in disaster preparedness. Practically, the study highlights that tourism stakeholders are integral to effective emergency planning and should be formally recognised within disaster management frameworks.