

## *The Interplay of Climate and Disaster in Men's Stories of the 2016 Kaikōura Earthquake in Aotearoa New Zealand<sup>1</sup>*

Ashleigh Rushton , *The University of the Fraser Valley*  
Suzanne Phibbs  and Christine Kenney , *Massey University*  
Cheryl Anderson , *National Emergency Management Agency*

This paper contributes to the emerging field of men, masculinities, and disasters by drawing on narratives of men's accounts of the 2016 Kaikōura earthquake, including how stories of the earthquake intersect with experiences and understandings of extreme weather and climate change. A qualitative methodology was employed, and semi-structured interviews were conducted with 19 men who experienced the 7.8 magnitude earthquake. This article offers an examination of the complexity of disaster experiences and recovery, as well as how people make sense of hazards and risks. We argue that ongoing exposure to climate hazards informed participant's responses to other infrequent natural hazard events, such as the Kaikōura earthquake. The research identified that men construct their own understandings and responses to natural hazards through a hierarchy of risk perception and probability based on personal experience.

### Introduction

Calls for further inquiry into men's personal accounts of disaster have been prompted by two decades of gender and disaster scholarship that has been dominated by an examination of women's lived experiences in disaster (Enarson and Pease 2016; Rushton et al. 2020). The developing literature on men and disasters explores how sets of understandings about masculinities shape how men perceive risk, make decisions, and cope in disasters (Alston and Kent 2008; de Alwis 2016; Parkinson and Zara 2016; Rushton et al. 2021a, 2021b). This article contributes to the novel discourses on men, disaster risk, and well-being and brings together masculinities, disasters, and climate to examine rural men's perceptions of natural hazard risks in Aotearoa New Zealand.

New Zealand is vulnerable to natural hazards and frequent extreme weather events. The 2010–2011 Canterbury earthquakes and the 2016 Kaikōura earthquake were stark reminders of seismic risk. The qualitative research drawn on in this paper focuses on men's ontological stories of the 2016 7.8 magnitude Kaikōura earthquake. Conducted with men across Marlborough and North Canterbury in New Zealand's South Island, the research explored the challenges rural men faced and the strengths they employed in coping with the aftermath of the large earthquake event and subsequent tsunami and aftershocks. The lenses of gender, climate, and past experiences of disaster were brought to the analysis of the research data to capture the everyday climate and disaster concerns of rural men in the South Island. Although the narratives that inform the discussion in this article are taken from research focusing on a seismic event, participants referred to climate-related risks.

*Sociological Inquiry*, Vol. 0, No. 0, 2024, 1–18

© 2024 The Authors. *Sociological Inquiry* published by Wiley Periodicals LLC on behalf of Alpha Kappa Delta: The International Sociology Honor Society.

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

DOI: 10.1111/soin.12605

Examination of the qualitative data suggests that some participants were prepared for the earthquake precisely because they expected and had prepared for extreme weather. Thus, men construct their own understandings and responses to natural hazards through a hierarchy of risk perception and probability that is grounded in experience. This article places emphasis on the accumulation of risks and individual and collective impacts of both sudden and slow-onset disasters in rural Aotearoa New Zealand.

### *Men and Disaster: An Emerging Scholarship*

There is growing literature that highlights how sets of understandings of masculinities, which include sets of expectations, attributes, and behaviors specifically embodied and carried out by men, shape men's experiences of disaster (Dominelli 2020; Enarson and Pease 2016; Pacholok 2009; Rushton et al. 2021a, 2021b; Tyler and Fairbrother 2013). For instance, attributes associated with masculine gender performances, self-belief as well as public and private expectations are recognized contributors to risk-taking in disaster contexts (Enarson 2016). A review of the literature points to the importance of analyzing masculinities in disasters to provide a nuanced and critical understanding of men's responses to social life post-disaster.

Research on North American and Australian wildfires examine the embedding of hegemonic masculinity in bushfire management, which is shaped by a traditional, systemic, male-dominated culture of responding to bushfires (Eriksen, Gill, and Head 2010; Pacholok 2009). Similar notions are recognized in ideas about being a "kiwi bloke" which is about "get[ting] your gumboots (wellington boots) on and get[ting] out there" (Longhurst 1994: 16). It is understood that men draw on practical skillsets and tools to respond to disaster, often attending to the physical needs, such as fixing damaged infrastructure or protecting properties in the wider community (Rushton et al. 2021a; Tyler and Fairbrother 2013).

Patterns of hegemony, associated with qualities pertaining to strength, stamina, cool-headedness and risk-taking, dominate bushfire response discourses (Eriksen 2014; Parkinson 2022a, 2022b; Zara et al. 2016). Eriksen (2014) argues that these precarious views provide men with fictitious and unattainable ideals of masculinity which ill-equip men with the skills to manage and cope with the adverse social and physical effects of bushfires. A concern also lies in the inevitability of the growing frequency and intensity of bushfires due to climate change, and how these increases in fire incidences will manifest into hyper-masculine behaviors. Men who struggled to deal with the aftermath of the 2009 Black Saturday fires in Australia, for example, reported elevated alcohol and drug abuse, which was regarded as a socially acceptable method of coping for men (Parkinson 2022b; Zara et al. 2016). Substance abuse was also identified as a coping strategy drawn on by men in research conducted in Sri Lanka following the 2004 Indian Ocean Tsunami and New Zealand after the Kaikōura earthquake. Research findings highlighted that men's misuse of alcohol and drugs related to feelings of failure, loss, fear, and trauma (de Alwis 2016; Dominelli 2020; Rushton et al. 2021b).

A gender analysis of Japan's devastating earthquake, tsunami, and subsequent Fukushima Nuclear Power Plant disaster in 2011 has provided insight into the differences in response, coping, and recovery between women and men. Long-term effects of the disaster have resulted in radiation polluting the surrounding environment (Takebayashi et al. 2017). For women, the dangers of radiation lay within health impacts, while men saw radiation risk being a threat to the economy and employment (Morioka 2016). Men's responses were

intrinsically tied to sets of understandings about Japanese masculinity and their traditional roles as providers which in turn governed men's decisions to remain within contaminated locales (Morioka 2016). Additional studies indicate underlying vulnerabilities in men such as social isolation (Klinenberg 2002), high incidents of mortality (FitzGerald et al. 2010; Salvati et al. 2018), and high-risk work (Pacholok 2013) stem from constructions of masculinity which can place men at elevated risk in disaster. Furthermore, it is noted that the lack of appropriate support for men post-disaster marginalizes men (Dominelli 2020), thereby perpetuating their suffering and sense of powerlessness, which has been linked to maladaptive behaviors, including increases in gender-based violence (Parkinson 2022a, 2022b).

The brief overview of the literature on men, masculinity and disaster presented in this article, foregrounds patterns of masculinity in the construction of men's accounts of disaster. The consensus amongst gender and disaster scholars is that further research on men and masculinities, as well as the role of contextually specific social constructions of gender in disaster response and recovery, is essential.

### *Situating Seismic and Climate Hazards in Aotearoa New Zealand*

This section provides a brief overview of seismic and climate-related risks within Aotearoa New Zealand and includes a summary of the Kaikōura earthquake. Located in a southern region of the southern hemisphere, New Zealand is prone to a composite of climate hazards including but not limited to cyclones, tropical winds (locally known as "northerlies"), Antarctic winds (locally known as 'southerlies'), storm surges, floods, bush-fires, droughts and snow. New Zealand is witnessing an increase in weather-induced disaster events, exacerbated by changes in the climate (Salinger et al. 2019; Wakelin et al. 2018). Exemplars include ex-tropical cyclone Debbie in 2017 resulting in significant flooding in Edgecumbe, a rain and flood event on the West Coast in 2019, damaging infrastructure and causing a fatality (NZ Herald 2019a) and more recently flash flooding across the northern regions in January 2023, resulting in fatalities and mass evacuations (Frost 2023; Graham-McLay 2023).

Between January 2002, and January 2024, 103 States of Emergency have been declared, comprising extreme weather, flooding, tornados, earthquakes, landslides, fire and the recent COVID-19 pandemic (NEMA 2024). Both the North and South Islands have suffered from increasing periods of drought, with severe events in 2013 and 2020, which further increase likelihood of wildfires and water restrictions (NASA Earth Observatory 2013; NIWA 2020). In 2022, a revision of the National Seismic Hazard Model forecast an average 50% increase in the likelihood of severe ground shaking throughout the country compared to previous modeling with Wellington and the Wairarapa being particularly vulnerable (GNS Science 2022). Consequently, New Zealand will continue to experience social, physical, and economic impacts, resulting from multiple hazard risks including extreme weather and earthquakes.

This article focuses on the Kaikōura earthquake, which occurred on November 14, 2016, and resulted in twenty-five complex fault ruptures that collectively manifested into a profoundly devastating disaster event in Aotearoa New Zealand (GNS Science 2018). The more damaging consequences of the earthquake were seen across Marlborough and North Canterbury in the South Island. While the earthquake was officially named after the coastal town of Kaikōura, surrounding rural towns, the Marlborough region and greater Wellington were also significantly affected (Stevenson et al. 2017). Communities including Kaikōura

became isolated due to landslips and infrastructure damage, requiring supplies to be delivered by sea and air (Feek and Young 2016; Phibbs et al. 2018). A series of aftershocks occurred in the subsequent months following the initial earthquake event, some of which were above Mw 6 (Bradley, Razafindrakoto, and Ahsan Nazer 2017; NEMA 2016). A local tsunami was generated, with the highest recording of 6.9 m run-up along the coastal village of Goose Bay (NEMA 2016). There were two fatalities, and 580 people reported earthquake related injuries (ACC 2017). In addition, the earthquake had caused the seabed along the Kaikōura coast to lift by 1 m, generating significant disruption to the fishing industry and marine tourism as boats were unable to exit the harbor. The coastal town of Kaikōura which is primarily a tourist destination, experienced a decline in visitors, translating into economic hardship, business closures, and job losses.

A significant wind and rain event occurred within 48 h of the earthquake, ensuing further challenges for residents and emergency response teams (Marlborough District Council 2016a, 2016b, 2016c; RNZ 2016). Flood warnings were issued and due to concerns about a large landslip blocking the flow of the Clarence and Ure rivers (Geonet 2016; Mitchell and Small 2016), an evacuation along both rivers was ordered (Marlborough District Council 2016d; NZ Herald 2016). The severe weather intensified the challenges presented by the earthquake by diverting resources in some places toward the immediate needs of communities impacted by the sudden onset weather event (Marlborough District Council 2016d). The research informing this paper draws on personal accounts of the Kaikōura earthquake, severe weather events, and climate concerns to present an insight into how men understand risk and manage the impacts of natural hazards in New Zealand.

### Materials and Methods

Men who had experienced the Kaikōura earthquake were invited to partake in this research, to speak about how the earthquake had affected them, their families and communities. The research interviews also sought to understand men's strengths in dealing with a significant disruption and traumatic event. The geographic location for data gathering was within the southern regions of Marlborough and North Canterbury. Recruitment was through advertising in local newspapers, libraries, social media pages and professional networks. Nineteen men volunteered to share their stories and views in interviews, which were conducted during November 2018–July 2019. All had experienced the shaking of the earthquake and had been affected in some way. The men ranged in age from 30 to 75 years old and were employed in a variety of occupations including: civil servants, construction workers, self-employed professionals, retirees, vineyard workers, emergency service personnel, emergency managers and military personnel. One participant was a British migrant, one was Māori, and 17 were Pākehā (European decent). Further to participants' consent, interviews were digitally recorded. The interview guide was developed based on gaps identified in the literature and included questions related to the earthquake event, the aftermath, strengths and challenges, health and financial issues, and coping strategies. The interviews were semi-structured which enables flexibility for the interviewer and participant to explore and discuss themes and questions beyond the interview guide. Interviews were transcribed verbatim and sent to participants for member checking.

Manual thematic analysis was employed to identify reoccurring themes within and across the data set (Braun and Clarke 2020). Analysis was completed by one researcher and checked by the whole research team. The topic of extreme weather and previous experience

of disaster, which did not form part of the initial research, was brought into the analysis due to the content of the interview material. While the interview questions focused on a specific earthquake event, due to the semi-structured nature of the interviews, transcripts included multiple references to climate and weather concerns. This demonstrates the men's awareness of, and concerns for, climate-related hazards. The narratives that captured apprehension and preparedness for increasing severe weather occurrences are drawn on to illustrate men's understandings of risk in rural Aotearoa New Zealand. This research received approval from the Massey University Human Ethics Committee (approval number: 18/13). Pseudonyms are used for each participant other than Gary who wished for his name to be used in the research.

## Results and Discussion

### *Men's Narratives of Individual Psychosocial Impacts of Disaster*

This section presents the embodied, mental, and economic impacts of the Kaikōura earthquake on individuals. Analyzing disasters at the individual as well as at the community level captures the subsequent and ongoing consequences of an initial event that profoundly alters and places stresses on the everyday lives of those affected.

In interviews, men reported multiple ongoing consequences of the Kaikōura earthquake, for example, as Lewis describes below, his son is now distressed by wind:

My son doesn't like wind now. And that's because when we get a good southerly and you hear that roar and noise and I think the earthquake and the noise of the earthquake he remembers that, and he associates that with wind. And he's 11 and if we say, 'oh there's a southerly coming' I've got to be careful, 'oh is there wind?' and I have to say 'oh no there's not too much wind'. So, he has been affected to a degree that he frets more about wind. (Lewis, 45–54, Pākehā)

Lewis' son's association between earthquakes and wind places emphasis on the individual effects of earthquakes. In his role as a parent, and engaging with methods underpinned by care and empathy, commonly recognized in literature concerning mothers, Lewis attempts to reduce his son's fear of wind by downplaying the intensity of the southerly. The entanglement of multiple hazards is apparent in Lewis' son's fear. Given Kaikōura's exposure to large winds, compounded by increased frequency and strength of winds (NZ Herald 2019b; Reisinger et al. 2014), it is concerning that some people may associate wind with earthquakes. Hyperawareness to noises and movement is echoed in research conducted by Adams-Hutcheson (2017) and Rushton et al. (2021b) who noted correlations between movement, noise, and earthquake trauma. Like Lewis' son, Adams-Hutcheson's participants experienced connections between noises and movement that triggered fears pertaining to the 2011 Christchurch earthquake. For instance, one respondent talked about how the noise and rumble of trucks reminded her of the initial start of the earthquake's ground motion, thus causing similar bodily reactions (Adams-Hutcheson 2017).

The embodiment of disaster is also recognized in George and James's interviews as they describe the impacts of the earthquake on sleep:

I couldn't sleep inside, I slept in my van...I couldn't go back to my place longer than a few minutes, I didn't want to look at it...The closer to the place I got, there was an uncomfortableness to it. (George, 45–54, Pākehā)

I had to sleep on the lounge floor with my youngest daughter because she didn't want to go into the bedrooms or anything like that. She didn't want to go anywhere that was in a closed space. (James, 45–54, Pākehā)

Like Lewis, James also talks to his role as a parent and protector and trying to ease his daughter's fear following the earthquake. In his interview, James also disclosed that he was struggling with sleep as the fear of another earthquake kept him awake (Rushton et al. 2021b), yet he prioritized his role as a father by sleeping on the floor with his daughter. In this instance, the lines between individual impacts of disaster blur with the impacts on others. Both narratives presented above offer insight into how valued masculine practices and actions, such as control become disrupted in disaster (Rushton et al. 2021b). The physical and mental impacts of disaster are shown here along with the ways understandings about place can be unsettled, in the cases of both participants, the shift of the home from being a safe place to being a place of fear, leading to challenges with sleep. While embodied impacts of disaster support understanding barriers to recovery, disruption to income was a prevailing theme across the interviews.

The town of Kaikōura is dependent on tourism with international tourists contributing significantly to the district's GDP (Reisinger et al. 2014), and 25% of the population working within the tourist sector (McDonald et al. 2017). The earthquake created an estimated loss of NZ\$21 million in tourist revenue in the Kaikōura district (McDonald et al. 2017). The significant impacts to tourism can be characterized as a socioeconomic disaster. Patrick, who works in the tourism industry talks about how the earthquake effected his income:

I still had a business to run. . .The government was a huge help and financed us basically, we did lose a lot of money, we lost a lot of work. . .I hadn't been in the overdraft since before this earthquake and then all of a sudden, we were. Never really got out of that. (Patrick, 35–44, *Pākehā*)

Due to Patrick's reduced income resulting from the loss in demand for tourism services, he became reliant on government financial support. Although the government subsidies relieved some financial pressure, Patrick still experienced economic hardship which continued 2–3 years post-earthquake. Lewis, also a business owner, spoke about the ongoing challenges following the earthquake: "...the business did take a strong hit. . .Although we had insurance, the profit margin, we were running at a loss. We've got to pick that up and strengthen our business foundation again." Lewis was fortunate to have insurance that covered employee salaries, enabling him to keep the business operating. Nevertheless, both Patrick's and Lewis' extracts draw attention to the intersections of individual and collective social and financial impacts of the 2016 earthquake. Although the narratives discussed focus specifically on a seismic event, participants' personal accounts of the earthquake provide insights into ongoing socioeconomic impacts on individuals, their families and livelihoods.

### ***Men's Accounts of the Broader Psychosocial Impacts of Disasters***

This section foregrounds the importance of reviewing wide-reaching effects on the communities and environment in disaster in conjunction with individual impacts. A theme across the interviews pertaining to impacts was the disruption to infrastructure and the physical changes to the environment. Significant landslips caused by the Kaikōura earthquake cut off and damaged main access roads in and out of Kaikōura and surrounding townships. To efficiently repair these roads, a partnership was formed between the New Zealand Transport Agency and Kiwi Rail, creating the North Canterbury Transport Infrastructure Recovery Alliance (NCTIR). This alliance brought several hundred labourers, engineers, traffic management personnel among other skilled workers temporarily to Kaikōura and the surrounding locales (New Zealand Transport Agency 2020). Patrick works in the hotel sector and has

considerable knowledge about property management. He had witnessed how the influx of NCTIR workers had changed Kaikōura's rental property market and the local economy:

Financially for the town it's been awesome. It's a town that during wintertime there is no money in town. No one pays their bills on time but there's been a steady flow of money, however these people [NCTIR workers] need to live somewhere and there's a chronic shortage of housing that's forced I believe, forced [local] people out of town...hard working families that struggle to find a place...We were very lucky we only bought this place one year before the earthquake. If we were still renting, we probably wouldn't be in town... It's very tough times for renters... A friend of ours just moved to town...They've been living in holiday homes for months, they've just got a long-term rental just recently after, that's been the whole school year since February at [NZ]\$350 a night. (Patrick, 35–44, Pakeha)

Patrick talks to the fluctuating seasonal incomes, whereby during the winter off-season, which sees a 50% decrease in tourist spending (Stats 2017), residents experience financial hardship, highlighting Kaikōura's reliance on tourism. Although tourism in Kaikōura was significantly disrupted, in one instance, there has been an economic benefit to the earthquake through NCTIR workers moving to Kaikōura and surrounding areas for the rebuild. As Patrick further stated: "you couldn't get a motel room in this town until about two months ago (June 2019)." While tourism was hampered, accommodation in the coastal town was at full capacity which further contributed to surrounding businesses such as cafes and pubs benefiting from an alternative income stream. This highlights 'winners' and 'losers' of the earthquake. A socioeconomic issue occurred, whereby residents were marginalized and, in some cases, residents became unhoused because of the lack of rental housing availability, and increased financial hardship and wellbeing. George's experience supports Patrick's observation by sharing his challenge to find a rental property after the earthquake as he stated "there was nothing [available rentals], we put in for three or four houses and there was nothing". This example showcases the relevance of hazardscapes, which signifies the relationship between physical hazards and socio-temporal contexts, and how attention needs to be given to the multiple and complex risks on the local population in (post-)disaster spaces (Khan 2012). As Cutter (2018) argues, the unexpected should be prepared for and planning should extend to include likely *and* unlikely (but possible) impacts identified across a range of disaster settings. In the case of the town Kaikōura, forward planning and better management of the integration of workers may have prevented an increase in homelessness among the local population.

Changes to the physical environment also impacted the local communities following the earthquake. Significant coastal uplift, for example, created losses in marine habitats, pāua, and crayfish that resulted in considerable disruption to fishing (McCowan and Neubauer 2018). The disruption has been exacerbated by a reduction in fishing stock resulting in the implementation of a fishing moratorium. This rigorous policy provides time for marine life to recover (Cradock-Henry, Fountain, and Buelow 2018; Fisheries New Zealand 2020) while in the interim, impacting and restricting local fishing, a heavily masculine industry. Concerns for the marine life along the 40 km stretch of coast is illustrated by Tohorā as indicated below:

At the moment we have a closedown totally on our coastline, cray fishing, rod fishing, possibly for five years, maybe longer, but when it does open, because of the loss of habitat, we certainly won't be entitled to take our full amount, it'll be greatly reduced until it properly recovers, that could be a full generation. (Tohorā, 65–74, Māori)

Tohorā, an indigenous New Zealander, speaks of the devastating long-term outcomes of the earthquake which has impacted the way of life for Māori (Cormack 1997) who rely on coastal fisheries for sustenance as well as provisioning for ceremonial feasts. In the following narrative, Tohorā continues speaking about aquatic life but deflects his discussion to his broader concerns for New Zealand waters, specifically relating to climate change. While the Kaikōura earthquake caused considerable damage, Tohorā situates the impacts within the broader context of the extensive risks of climate change. In the following interview extract, Tohorā narrates his concerns:

One of the biggest things for me is climate change because our seas are getting warmer, and as the seas heat, current flow change, fish migration change, fishing grounds change. So we possibly could be heading into a whole new area of rediscovering the fishing grounds because they will move. We are getting anecdotal evidence now of catching snapper [a warm water fish] off Greymouth in the middle of winter, which has never been seen before. I've heard from fishermen saying they've caught kingfish off Foveaux strait. Never been caught before. That's rising temperatures. So that whole thing will change. I think climate change is going to be bad, but it's like our ancestors in my opinion that went through ice ages, there will be a huge period of adaption, until we come back into balance with how we work with the new climate. So it's not going to be easy... And I personally think as our weather patterns dramatically change, as they are, mankind will finally come to the conclusion that we have got no choice, we have to act or she will slap us. And that could lead to an extinction. We have not left a very good planet for our children. That's a reality. (Tohorā, 65–74, Māori)

While the earthquake generated a series of devastating outcomes, Tohorā infers that the damage is temporary. Climate change however, as a slow-onset disaster will provoke long-lasting transformations that will lead to negative consequences for future generations. The changes will be particularly detrimental to indigenous communities who have a strong connection to the natural environment (Jones et al. 2014; Lynn et al. 2013; Reisinger et al. 2014; Vinyeta, Whyte, and Lynn 2016). In New Zealand, 50% of Māori assets are situated within environment-related industries such as fisheries and primary industries (King, Penny, and Severne 2010) and Māori have considerable investments in the fishing industry, including 40% ownership of regional fishing quotas. The substantial position of Māori within New Zealand's seafood industry exposes them to the unpredictability of changing ocean temperatures as well as increasing severe weather events (King et al. 2010). As Tohorā explains, there is now anecdotal evidence of changing fish migration arising from New Zealand's warming sea waters.

A changing climate threatens indigenous communities' traditional ecological knowledge and access to traditional food sources (Jones et al. 2014; Vinyeta et al. 2016). An example that highlights the impacts of climate change on indigenous populations is presented by Lynn et al. (2013) who explain how Karuk communities in California have experienced a complete elimination of salmonids and acorns which are a traditional diet staple. The elimination of traditional food sources for the Karuk tribe has led to increases in heart disease and diabetes (Lynn et al. 2013). This example illustrates one way in which the effects of climate change may profoundly impact indigenous ways of life (Jones et al. 2014; King et al. 2010; Lynn et al. 2013). Moreover, systemic social inequalities stemming from colonization and prejudice fundamentally underpin climate impacts on indigenous populations. These inequalities contribute to disproportionately exposing indigenous people to the adverse effects of climate change, creating barriers to social and economic support while also overlooking indigenous environmental knowledge (Jones et al. 2014; Phibbs and Kenney 2022; Yumagulova et al. 2019).

Men's identity and self-esteem are intrinsically embedded in their traditional roles such as providing for their families (Bryant and Garnham 2015; Kukarenko 2011). For indigenous men, roles are profoundly shaped by family, community, livelihoods, the environment, and indigenous knowledge (Cormack 1997; Vinyeta et al. 2016). Therefore, warming sea temperatures have the potential to lead to broader shifts in both Māori and Pākehā masculine identities that compromise men's health and well-being. The literature on masculinity draws attention to negative outcomes, particularly mental health issues, resulting from men being unable to undertake traditional practices for leisure and employment purposes such as fishing (Norgaard, Reed, and Bacon 2018; Rasmussen 2009; Vinyeta et al. 2016). Disruptions to traditional masculine roles has been linked with higher suicide rates, psycho-social disorders, and alcohol abuse (Kukarenko 2011). While the literature discussed refers to indigenous communities in North America, it provides an insight into possible climate impacts on men in Aotearoa New Zealand and elsewhere.

### *Masculinity and Preparedness*

Tyler and Fairbrother (2013) infer that there is a relationship between disaster preparedness, mitigation strategies, and sets of understandings of hegemonic masculinity. Specifically, men are associated with disaster preparedness, protection, and response within public spaces (Enarson 2016; Miceli, Sotgiu, and Settanni 2008; Parkinson and Zara 2016). That is not to say it is only men who prepare for natural hazard events, but rather the argument lies in the different gendered pathways in *how* and *why* people prepare. The gendered differences, and the association between men, hegemonic masculinity and preparedness can be seen in Australia's *prepare, stay and defend* bushfire policy, which encouraged residents to forego evacuating in order to protect properties. The response to this policy was explicitly masculine, as it was predominately men who stayed to mitigate structural losses (Parkinson and Zara 2016; Tyler and Fairbrother 2013; Whittaker, Eriksen, and Haynes 2016). Evacuation is inherently influenced by differing gendered perceptions of risk (Whittaker et al. 2016) in the case of the many Australian men staying to "fight the fires," public notions of hegemonic masculinity and prestige in Australia dominated the men's decisions against evacuating (Eriksen et al. 2010).

Preparedness was a recurring theme within the men's interview data on the Kaikōura earthquake. A diversity of literature has argued that men are less likely to prepare than women (Cuesta et al. 2022; Fothergill 1996), that women are less likely to prepare than men (Cvetković et al. 2018; Ekenga and Ziyu 2019; FEMA 2018) or that there are no differences in preparedness between the binary genders (Nikkanen, Malinen, and Laurikainen 2023). A conclusion can be drawn that the literature on disaster preparedness is broad, and factors such as past experiences, geographical awareness, culture, gender, and labour need to be taken into consideration. Participants in this research talked about awareness of and the need to prepare for multiple hazards, paying attention to extreme weather. As described below, Dale, Carl, and Brad did not specifically prepare for an earthquake, but had resources available by virtue of equipping their rural homes with supplies in the event of severe weather or other natural hazards:

Urm, didn't really expect it. I think naturally we're quite prepared anyway, just because we get big winds so we're organised for power cuts and stuff and having our own water source and septic tank, so all that sanitary stuff side of things is all fine. (Dale, 35–44, Pākehā)

We've got our own power generator. . . I've got a 22 with my gun licence so I can, we can always shoot hares or rabbits so we can always survive and you're never short of water out here. (Carl, 45–54, Pākehā)

Because of how we're set up in a rural we've got a water supply like 30000 litres. So practically all good. Even living within a rural community, my mindset is and I remind my wife, you might as well keep the car as full as you can with gas. (Brad, 45–54, Pākehā)

Dale, Carl and Brad's extracts speak to multiple risks that rural New Zealand communities face. Dale specifically states that preparing for extreme weather events is *natural*, inferring an established process of natural hazard adaptation and mitigation strategies at the individual level. The interviews support that the men indicate their competence in managing the harsh South Island terrain, affirming cultural expectations that New Zealand men should be autonomous and self-reliant (Rushton et al. 2021a) and as Carl suggests, they can always rely on resources, such as water and game, within the natural environment. James also living on a rural property talks of his disaster plans: "so the tractor is jacked up to get us across the river and all sorts of carry on if something bad did happen."

Self-reliance is frequently examined in the masculinity literature (Keppel 2014) and can offer a way to understand men's decisions for preparing. Certain practices, including actively lessening dependence on others and asking for help, are associated with sets of understandings about the 'kiwi bloke', represented through images of control, strength and independence (Keppel 2014). Independence was also identified in Adam's interview extract, reproduced below:

They should be prepared in their mind. They shouldn't be panicking about it, they should know if the worst happens what are we going to do as a family and if they have elderly parents or sick people or stuff like that they need to have a pre-determined plan of how they will work together and how they will support each other. . . it's not just earthquakes, it's the rain events that we're having, rising sea levels, tsunamis, wind events all that sort of stuff people need a plan because that's the reality of what is going on. (Adam, 65–74, Pākehā)

Adam's comments about disaster preparedness in New Zealand down-plays urgency through emphasizing the need to be self-reliant. He stresses the importance of household planning but suggests doing so in a calm and collected manner. Panicking is not a valued virtue in understandings of hegemonic masculinity, but being in control is. Thus, in this instance, it can be argued that Adam is directly proposing a way to prepare that aligns with accepted qualities associated with hegemonic masculinity.

Preparedness measures that fail can transcend into secondary impacts. Through living on a rural property, Edward like Dale had access to water and septic tanks, alluding to the notion that they were prepared and self-sufficient. Unfortunately, Edward's water and septic tanks failed during the earthquake, leaving sewage seeping into the groundwater, contaminating the water supply. This resulted in Edward needing to collect water from Christchurch, over a two-hour drive away. At the time of interviewing, 2 years post-earthquake Edward was still transporting water from Christchurch to his home. Further examples of individual impacts were discussed by Patrick, as he experienced raw sewage flooding into the backyard of his home that he shares with his three young children, posing serious health risks. The accounts of utility failures showcase the limitations of individual preparedness efforts while also emphasizing the interplay of hazards and risks within a hazardscape (Khan 2012) that may hinder individual and community recovery.

### *Hierarchies of Risk*

While some participants, like Tohorā spoke directly about the climate and possible implications of climate change, others voluntarily shared stories inadvertently relating to the impact of extreme weather. For example, Gary explains his frightening experience with an unexpected dump of snow:

We had snow there about six years ago...two metres of snow! My garages and my carport wasn't designed for that sort of thing...I put all this timber underneath to hold the bloody roof up. And shoveling all this snow off the bloody roof at night to take some of the weight off...and it was like 4 metres high so had to try and get that off...And I had two boxer dogs. I got into [the] shed and I looked back and the snow had fallen in on one of the dogs. And I forgot my gloves and it was so bloody cold and I was trying to get the snow off the dogs well I left the digger to warm up, I moved about bloody about 6 metres outside the garage, 'woooh' down it come. Smashed my digger, smashed all the roof. It would have killed me and nobody would have found me...The timbers and the rafters would have all came down on where I would have been sitting...So that was that drama. And I thought God how lucky am I close to death. And then the earthquake thing. I think I'm a wee bit hardened. (Gary, 65–74, Pākehā)

Several participants, like Gary, voluntarily drew on previous experiences of disaster which offered further context to how they understand hazards and perceive risk. Gary's actions in clearing the snow and strengthening the roof speaks to common discourses on men's roles and efforts in disasters in particular, using practical skills, possession of tools, such as tractors or diggers, and undertaking physical work that facilitates response efforts (Eriksen 2014; Rushton et al. 2021a; Tyler and Fairbrother 2013). Gary's talk about managing an unanticipated snow event also speaks to the importance of adaptation. As he states, his property was not built to handle large quantities of snow, resulting in the collapse of the roof. Gary goes on to comment on how he has become 'hardened' by his experiences, suggesting he is now desensitized to hazards which can be inferred that he is not concerned about both climate and seismic risk.

Climate research shows unfamiliar and unpredictable severe weather is likely to increase risk (Reisinger et al. 2014) which also places emphasis on the importance of conducting full assessments of the hazardscape (Khan 2012) and preparing for the unforeseen (Cutter, Mitchell, and Scott 2012). Men's talk of concerns for the changing climate within an interview focusing on a singular earthquake event exemplifies a hierarchy of perceived risk. Their discussions of extreme weather allude to how the climate plays on their minds more frequently than the probability of earthquakes. Participants anticipate extreme weather and sea level rise associated with climate change, acknowledging the impacts on their communities evidenced in William's narrative reproduced below:

The thing is Kaikōura has risen, it hasn't dropped and before the earthquake, along the esplanade every high tide it was starting to go over the road. But now it's lifted we haven't got that problem anymore. The sea level rise isn't going to affect us as much [laughs]. (William, 55–64, Pākehā)

The use of 'we' and 'us' in William's narrative suggests concern for the rising sea levels in the tourist town of Kaikōura is commonly shared. Situated along Kaikōura's esplanade are homes, businesses, tourist attractions, the local library and the Kaikōura council. Increases in the sea level and coastal weather events would inevitably devastate Kaikōura physically, socially and economically. William laughs, inferring the seabed up-lift was an unexpected advantage of the earthquake that now provides a natural barrier to the rising sea. Nevertheless, he implies that Kaikōura will inevitably be affected by sea level rise, although

the impact has now been reduced or deferred. Rising sea levels and increases in storm surges are challenges faced by many coastal communities in Aotearoa New Zealand. More notably, Westport on the South Island's west coast is experiencing significant coastal erosion, exacerbated by extreme weather (Carroll 2019; Ministry for the Environment 2022; NIWA 2017; Redmond 2018). The National Institute of Water and Atmospheric Research (NIWA) estimates an annual erosion rate of 6 m per year along Carters Beach (NIWA 2017). Between 2003 and 2017, Carters Beach situated along the west coast witnessed an 80-m loss to its coastline, concerning the local community (NIWA 2017). It has been suggested by some that an earthquake could be beneficial for communities like Carters Beach, evidenced in Adam's comments:

Even the Mayor of Westport the other day said something about rising sea levels and then said "oh we don't need to worry about it because if we have an 8 [magnitude earthquake] the land will rise by 4-5 metres." [Laughs] Geez, that's helpful! (Adam, 65–74, Pākehā)

Working within emergency management, it is apparent that Adam acknowledges that both earthquakes and sea level rise can lead to devastating consequences and hoping for an earthquake to offset the consequences of rising sea levels is not helpful. He further infers that he does not view sea level rise, erosion and earthquakes within a hierarchical system of risk perception through his use of satire in response to the Mayor's remark. By questioning the Mayor's comments, it can be suggested that Adam understands the risks earthquakes pose, alluding to the idea that he would not wish to experience an earthquake if that meant the land would rise above sea level. The Mayor of Westport on the other hand, through his reported comment, elevates the long-term risks of coastal erosion above that of an immediate earthquake. One reading of his remark is that climate change and sea level rise pose more of a threat to his community than earthquakes. The low likelihood of seismic occurrences is also evidenced by Carl:

But if you look at these homesteads along this road which have stood there maybe some will be over 100 years old and they've stood up with snows, winds but with this quake but because they've had 2-3 chimneys with open fires and during the quake they shook and ripped the building because of their wobbling and they ended up falling over and just trashing the house. (Carl, 45–54, Pākehā)

Carl talks about the different natural hazard threats associated with living in New Zealand's South Island. He refers to multiple weather events that have occurred, implying coping with extreme weather. Carl situates the earthquake within a temporal period of 100 years, where within that time, there have been multiple extreme weather events but only one significant earthquake. His extract therefore speaks to how earthquakes are regarded as rare, once-in-a-lifetime events, whereas climate-related events reoccur. This observation is supported by the previous narratives that highlight how participants are prepared for disaster because of the frequent risk of extreme weather, not seismic hazards. They therefore position severe weather and earthquake events within a hierarchy of risk perception. Two participants, including Carl referred to earthquakes taking place on 300-year cycles, emphasizing the unlikelihood of another happening in their lifetime. The stories represent awareness of the high probability and dangers of disasters resulting from the possible impacts of climate change, which in most cases are positioned higher than earthquakes in participants' respective hierarchies of risk.

## Conclusions

New Zealand has experienced multiple large disaster events and continues to face extreme weather events. It is estimated that rising sea levels and increases in sea and atmospheric temperatures will lead to more weather-induced disasters. It is therefore important to consider hazardscapes, including the psychosocial impacts on New Zealanders' lives and livelihoods and how people discern risk. This research contributes to the developing field of men and disaster through presenting men's stories of the psychosocial impacts of Kaikōura earthquake, insights into disaster preparedness, and their overall perception of natural hazard risk. It was identified that participants acknowledge multiple risks relating to natural hazards, highlighting how they make sense of disasters through a hierarchy of risk. Discussions of the Kaikōura earthquake were supported by previous experiences of disaster and concerns for future events as many participants did not view the earthquake in isolation, rather they situated the seismic event within their broader experiences of disaster. Consideration was given to the higher probability of extreme weather, and the negative effects of climate change, such as increases in sea levels, than to seismic hazards. Relevant to understandings about individual disaster preparedness, is how some participants were prepared for the earthquake precisely because they expected and had prepared for extreme weather. For many, they lived on rural properties and, through previous experiences, knew of the possibility of disruptions to lifelines such as electricity, roads, and water.

Overall, the discussions of disasters presented in this article highlight the various hazards impacting rural New Zealand communities, and how they often have not fully recovered before the next disaster occurs. Individuals and communities shift continuously from states of recovery to those of response without the ability to fully recover before dealing with the next crisis, while under the conditions of a changing climate. The research offers insights for the field of emergency management in New Zealand and internationally on people's awareness of natural hazard risk and how they rank them in relation to their level of concern based on previous experience of natural hazard events. The article also contributes to understandings about preparedness, offering a gender and rural perspective to highlight the ways in which rural men make decisions, prepare for, respond to and cope with adversity. Further research examining how women, people with diverse genders, and urban residents perceive natural hazard risk in Aotearoa New Zealand would extend the study outcomes presented here and contribute to improved knowledge of preparedness for the New Zealand emergency management sector.

## Conflicts of Interest

We have no conflicts of interest to declare.

## Acknowledgment

Open access publishing facilitated by Massey University, as part of the Wiley - Massey University agreement via the Council of Australian University Librarians.

## Data Availability Statement

Due to privacy restrictions and confidentiality, research data cannot be shared.

## ENDNOTES

Please direct correspondence to Ashleigh Rushton, The University of the Fraser Valley, Faculty of Health Sciences, 45190 Caen Ave., Chilliwack, British Columbia, V2R 0N3, Canada; e-mail: [ashleigh.rushton@outlook.com](mailto:ashleigh.rushton@outlook.com)

<sup>1</sup>The authors would like to acknowledge and thank all participants who gave their time and stories for this research. Further thanks goes to Massey University and the Commonwealth Scholarship Commission for their financial contributions.

## REFERENCES

- Accident Compensation Corporation (ACC). 2017. "14 November 2016 Earthquake Claims." Internal Memo: Operation Services, Analytics Reporting. Ref: 41510.
- Adams-Hutcheson, Gail. 2017. "Embodied Vibrations: Disastrous Mobilities in Relocation from the Christchurch Earthquakes, Aotearoa New Zealand." *Transfers* 7(3): 23–37.
- Alston, Margaret and Jenny Kent. 2008. "The Big Dry: The Link Between Rural Masculinities and Poor Health Outcomes for Farming Men." *Journal of Sociology* 44(2): 133–47.
- de Alwis, Malathi. 2016. "The Tsunami's Wake: Mourning and Masculinity in Eastern Sri Lanka." Pp. 92–102 in *Men, Masculinities and Disaster*, edited by E. Enarson and B. Pease. Abingdon, UK: Routledge.
- Bradley, Brendan, Hoby Razafindrakoto, and M. Ahsan Nazer. 2017. "Strong Ground Motion Observations of Engineering Interest from the 14 November 2016 Mw7.8 Kaikōura, New Zealand Earthquake." *Bulletin of the New Zealand Society for Earthquake Engineering* 50(2): 85–93.
- Braun, Virginia and Victoria Clarke. 2020. "One Size Fits All? What Counts as Quality Practice in (Reflexive) Thematic Analysis?" *Qualitative Research in Psychology* 18: 328–52.
- Bryant, Lia and Bridget Garnham. 2015. "The Fallen Hero: Masculinity, Shame and Farmer Suicide in Australia." *Gender, Place and Culture* 22(1): 67–82.
- Carroll, Joanne. 2019. "Satellite Pictures Show Rapid Erosion of West Coast Beach." *Stuff NZ*, November 16. Retrieved October 20, 2020. <<https://www.stuff.co.nz/national/117261741/satellite-pictures-show-rapid-erosion-of-west-coast-beach>>.
- Cormack, Syd. 1997. *Four Generations from Maoridom. The Memoirs of a South Island Kaumatua and Fisherman*. Dunedin, New Zealand: University Otago Press.
- Cradock-Henry, Nicholas, Joanna Fountain, and Franca Buelow. 2018. "Transformations for Resilient Rural Futures: The Case of Kaikōura, Aotearoa-New Zealand." *Sustainability* 10(6): 1952.
- Cuesta, Arturo, Daniel Alvear, Antonio Carnevale, and Francine Amon. 2022. "Gender and Public Perception of Disasters: A Multiple Hazards Exploratory Study of EU Citizens." *Safety* 8(3): 59.
- Cutter, Susan. 2018. "Compound, Cascading or Complex Disasters: What's in the Name?" *Environment: Science and Policy for Sustainable Development* 60(6): 16–25.
- Cutter, Susan, Jerry T. Mitchell, and Michael S. Scott. 2012. "Revealing the Vulnerability of People and Places: A Case Study of Georgetown County, South Carolina." Pp. 83–114 in *Hazards Vulnerability and Environmental Justice*, edited by S. Cutter. Oxon, UK: Routledge.
- Cvetković, Vladimir, Giulia Roder, Ajem Öcal, Paola Tarolli, and Slavoljub Dragičević. 2018. "The Role of Gender in Preparedness and Response Behaviors Towards Flood Risk in Serbia." *International Journal of Environmental Research and Public Health* 15(12): 2761.
- Dominelli, Lena. 2020. "Rethinking Masculinity in Disaster Situations: Men's Reflections of the 2004 Tsunami in Southern Sri Lanka." *International Journal of Disaster Risk Reduction* 48: 101594.
- Ekena, Christine and Lan Ziyu. 2019. "Gender and Public Health Emergency Preparedness Among United States Adults." *Journal of Community Health* 44(4): 656–60.
- Enarson, Elaine. 2016. "Men, Masculinities and Disaster: An Action Research Agenda." Pp. 219–33 in *Men, Masculinities and Disaster*, edited by E. Elaine and B. Pease. Abingdon, UK: Routledge.
- Enarson, Elaine and Bob Pease. 2016. "The Gendered Terrain of Disaster: Thinking About Men and Masculinities." Pp. 3–20 in *Men, Masculinities and Disaster*, edited by E. Elaine and B. Pease. Abingdon, UK: Routledge.
- Eriksen, Christine. 2014. *Gender and Wildfire: Landscapes of Uncertainty*. New York: Routledge.

- Eriksen, Christine, Nicholas Gill, and Lesley Head. 2010. "The Gendered Dimensions of Bushfire in Changing Rural Landscapes in Australia." *Journal of Rural Studies* 26(4): 332–42.
- Federal Emergency Management Agency [FEMA]. 2018. "2017 National Household Survey Results: Preparedness in America." Retrieved October 20, 2020. <[https://community.fema.gov/story/fema-releases-2017-national-household-survey-findings-on-individual-and-community-preparedness?lang=en\\_US](https://community.fema.gov/story/fema-releases-2017-national-household-survey-findings-on-individual-and-community-preparedness?lang=en_US)>.
- Feeke, Belinda and Audrey Young. 2016. "Airlift Brings Relief as Kaikoura Drinking Water Supplies Drop Below Needs for Next 24 Hours." *The New Zealand Herald*, November 15. Retrieved October 20, 2020. <<https://www.nzherald.co.nz/nz/airlift-brings-relief-as-kaikoura-drinking-water-supplies-drop-below-needs-for-next-24-hours/K3BNO4O3CDDTRI6RJNNQ4Y67MU/>>.
- Fisheries New Zealand. 2020. "Kaikōura Area Fishing Rules." Retrieved October 8, 2020. <<https://www.fisheries.govt.nz/travel-recreation/fishing/fishing-rules/kaikoura-area-fishing-rules/>>.
- FitzGerald, Gerry, Du Weiwei, Aziz Jamal, Michele Clark, and Xiang-Yu Hou. 2010. "Flood Fatalities in Contemporary Australia (1997–2008)." *Emergency Medicine Australasia* 22(2): 180–6.
- Fothergill, Alice. 1996. "Gender, Risk, and Disaster." *International Journal of Mass Emergencies and Disasters* 14 (1): 33–56.
- Frost, Natasha. 2023. "Rain Batters New Zealand's Largest City, Causing Major Flooding." *The New York Times*, January 27.
- Geonet. 2016. "Landslides and Landslide Dams Caused by the Kaikoura Earthquake." Retrieved October 8, 2020. <<https://www.geonet.org.nz/landslide/dam>>.
- GNS Science. 2018. "Kaikōura Two Years on: The Changed Landscape." *Media Release*. Retrieved January 29, 2024. <<https://www.geonet.org.nz/news/2Wn37bnkNWWWssc2CoG4yQ>>.
- GNS Science. 2022. "Aotearoa New Zealand's Resilience Boosted by Release of New Hazard Model." *Media Release*. Retrieved October 10, 2022. <<https://www.gns.cri.nz/news/aotearoa-new-zealands-earthquake-resilience-boosted-by-release-of-new-hazard-model/>>.
- Graham-McLay, Charlotte. 2023. "Auckland Floods: City Begins Clean-Up After 'Biggest Climate Event' in New Zealand's History." *The Guardian*, February 1.
- Jones, Rhys, Hayley Bennett, Gay Keating, and Alison Blaiklock. 2014. "Climate Change and the Right to Health for Māori in Aotearoa/New Zealand." *Health and Human Rights Journal* 16(1): 54–68.
- Keppel, Jessica Jean. 2014. "Masculinities and Mental Health: Geographies of Hope 'Down Under'." Pp. 367–83 in *Masculinities and Place*. Oxon, UK: Routledge.
- Khan, Shabana. 2012. "Disasters: Contributions of Hazardscape and Gaps in Response Practices." *Natural Hazards and Earth System Sciences* 12(12): 3775–87.
- King, Darren N., Guy Penny, and Charlotte Severne. 2010. "The Climate Change Matrix Facing Maori Society." Pp. 100–11 in *Climate Change Adaptation in New Zealand: Future Scenarios and Some Sectoral Perspectives*. Wellington, New Zealand: New Zealand Climate Change Centre.
- Klinenberg, Eric. 2002. *Heat Wave: A Social Autopsy of Disaster in Chicago*. Chicago: University of Chicago Press.
- Kukarenko, Natalia. 2011. "Climate Change Effects on Human Health in a Gender Perspective: Some Trends in Arctic Research." *Global Health Action* 4(1): 7913.
- Longhurst, Robyn. 1994. "Reflections on and a Vision for Feminist Geography." *New Zealand Geographer* 50(1): 14–9.
- Lynn, Kathy, John Daigle, Jennie Hoffman, Frank Lake, Natalie Michelle, Darren Ranco, Carson Viles, Garrit Voggeser, and Paul Williams. 2013. "The Impacts of Climate Change on Tribal Traditional Foods." Pp. 37–48 in *Climate Change and Indigenous Peoples in the United States*, vol. 120, edited by J. Koppel Maldonado, B. Colombi, and R. Pandya. New York: Springer International.
- Marlborough District Council. 2016a. "Civil Defense Update 3.10 pm 14 November 2016." Retrieved September 30, 2020. <<https://www.marlborough.govt.nz/your-council/latest-news-notices-and-media-releases/media-releases?item=id:1xa8nogiflxcbyft0mkc>>.
- Marlborough District Council. 2016b. "Civil Defense Update 11.40 am 15 November 2016." Retrieved September 30, 2020. <<https://www.marlborough.govt.nz/your-council/latest-news-notices-and-media-releases/media-releases?item=id:1xa8t55rflxcbyq52yan>>.
- Marlborough District Council. 2016c. "Civil Defence Update 4.40 pm 15 November 2016." Retrieved September 30, 2020. <<https://www.marlborough.govt.nz/your-council/latest-news-notices-and-media-releases/media-releases?item=id:1xa8vf0ob1xcbyywbdgv>>.

- Marlborough District Council. 2016d. "Civil Defence Update 4.30 pm 17 November 2016." Retrieved October 8, 2020. <<https://www.marlborough.govt.nz/your-council/latest-news-notice-and-media-releases/media-releases?item=id:1xa9opxsv1cxb9hhlbm>>.
- McCowan, Tom and Philipp Neubauer. 2018. "Paua Biomass Estimates and Population Monitoring in Areas Affected by the November 2016 Kaikoura Earthquake." *New Zealand Fisheries Assessment Report* 54: 24.
- McDonald, Gary, Nicola McDonald, Morag Ayers, J.-H. Kim, and Emily Harvey. 2017. *Economic Impact of the 2016 Kaikoura Earthquake: A Report Prepared for the Ministry of Transport*. Ministry of Transport: Wellington, New Zealand.
- Miceli, Renato, Igor Sotgiu, and Michele Settanni. 2008. "Disaster Preparedness and Perception of Flood Risk: A Study in an Alpine Valley in Italy." *Journal of Environmental Psychology* 28(2): 164–73.
- Ministry for the Environment. 2022. "Adapting to Flood Risk in Westport." Retrieved December 11, 2023. <<https://environment.govt.nz/what-you-can-do/stories/adapting-to-flood-risk-in-westport/>>.
- Mitchell, Charlie and Jamie Small. 2016. "Clarence River Not as Bad as Feared, but People Warned to Stay Away." *Stuff NZ*, November 14. Retrieved October 8, 2020. <<https://www.stuff.co.nz/national/86436608/warning-as-large-clarence-river-dammed-by-landslide>>.
- Morioka, Rika. 2016. "Japanese Families Decoupling Following the Fukushima Nuclear Plant Disaster: Men's Choice Between Economic Stability and Radiation Exposure." Pp. 103–14 in *Men, Masculinities and Disaster*, edited by E. Elaine and B. Pease. Abingdon, UK: Routledge.
- NASA Earth Observatory. 2013. "Drought in New Zealand." Retrieved 5 November, 2020. <<https://earthobservatory.nasa.gov/images/80990/drought-in-new-zealand>>.
- National Emergency Management Agency (NEMA). 2016. "Kaikōura Earthquake and Tsunami: 14 November 2016. Post Event Report." Retrieved September 30, 2020. <<https://www.civildefence.govt.nz/assets/Uploads/publications/Kaikoura-earthquake-and-tsunami-post-nov-2016-post-event-report.pdf>>.
- National Emergency Management Agency (NEMA). 2024. "Declared States of Emergency." Retrieved May 12, 2023. <<https://www.civildefence.govt.nz/resources/previous-emergencies/declared-states-of-emergency/>>.
- National Institute of Water and Atmospheric Research (NIWA). 2017. "Managing and Adapting to Coastal Erosion at Carters Beach 2017 Review and Update." Retrieved October 10, 2020. <<https://www.wrcr.govt.nz/repository/libraries/id:2459ikxj617q9ser65rr/hierarchy/Documents/Publications/Natural%20Hazard%20Reports/Buller%20District/Westport/Managing%20and%20adapting%20to%20coastal%20erosion%20at%20Carters%20Beach%20-%20Niwa%20Report%202017.pdf>>.
- National Institute of Water and Atmospheric Research (NIWA). 2020. "Drought Hits Hard, Far and Wide." Retrieved November 5, 2020. <<https://niwa.co.nz/news/drought-hits-hard-far-and-wide>>.
- New Zealand Transport Agency. 2020. "Kaikōura Earthquake Response." Retrieved October 8, 2020. <<https://www.nzta.govt.nz/projects/kaikoura-earthquake-response/>>.
- Nikkanen, Maija, Sanna Malinen, and Heikki Laurikainen. 2023. "What Drives Feelings of Responsibility for Disaster Preparedness? A Case of Power Failures in Finland and New Zealand." *Risk, Hazards & Crisis in Public Policy* 14: 188–208.
- Norgaard, Kari Marie, Ron Reed, and J. M. Bacon. 2018. "How Environmental Decline Restructures Indigenous Gender Practices: What Happens to Karuk Masculinity when there are No Fish?" *Sociology of Race and Ethnicity* 4(1): 98–113.
- NZ Herald. 2016. "Clarence River: Slip Causes Breach After Earthquake Damage." *NZ Herald*, November 14. Retrieved October 8, 2020. <[https://www.nzherald.co.nz/nz/news/article.cfm?c\\_id=1&objectid=11747820](https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11747820)>.
- NZ Herald. 2019a. "Elderly Women Dies in Flood Waters on West Coast." *NZ Herald*, March 27. Retrieved October 22, 2020. <<https://www.nzherald.co.nz/nz/elderly-woman-dies-in-flood-waters-on-west-coast/3DM2IEDN7EYE6SRRGOHKCHXJUA/>>.
- NZ Herald. 2019b. "Wild Weather with 170km/h Winds Cuts Power in Christchurch and Kaikōura, Whips Up Waves on Wakatipu." *NZ Herald*, January 24. Retrieved October 11, 2020. <<https://www.nzherald.co.nz/nz/wild-weather-with-170kmh-winds-cuts-power-in-christchurch-and-kaikoura-whips-up-waves-on-wakatipu/D34ZBSYXBSDY2QTFNS5ENAHHEM/>>.
- Pacholik, Shelley. 2009. "Gendered Strategies of Self: Navigating Hierarchy and Contesting Masculinities." *Gender, Work and Organization* 16(4): 471–500.
- Pacholik, Shelley. 2013. *Into the Fire: Disaster and the Remaking of Gender*. Toronto, ON: University of Toronto Press.
- Parkinson, Debra. 2022a. "Gender-Based Violence and Disaster." in *Oxford Research Encyclopedia of Natural Hazard Science*.

- Parkinson, Debra. 2022b. "‘I Thought you were more of a Man than that’: Men and Disasters." *The Australian Journal of Emergency Management* 37(4): 20–5.
- Parkinson, Debra and Claire Zara. 2016. "Emotional and Personal Costs for Men of the Black Saturday Bushfires in Victoria, Australia." Pp. 81–91 in *Men, Masculinities and Disaster*, edited by E. Enarson and B. Pease. Abingdon, UK: Routledge.
- Phibbs, Suzanne and Christine Kenney. 2022. "Indigenous Responses to Natural Hazard Events." Pp. 273–86 in *Handbook of Environmental Hazards and Society*, edited by T. McGee and E. C. Penning-Rowsell. London and New York: Routledge.
- Phibbs, Suzanne, Christine Kenney, Graciela Rivera-Munoz, Thomas Huggins, Christina Severinsen, and Bruce Curtis. 2018. "The Inverse Response Law: Theory and Relevance to the Aftermath of Disasters." *International Journal of Environmental Research and Public Health* 15(5): 916. <https://doi.org/10.3390/ijerph15050916>.
- Rasmussen, Rasmus Ole. 2009. "Gender and Generation: Perspectives on Ongoing Social and Environmental Changes in the Arctic." *Signs: Journal of Women in Culture and Society* 34(3): 524–32.
- Redmond, Adele. 2018. "Storm Accelerates Coastal Erosion at Carters Beach." *Stuff NZ*, February 3. Retrieved October 20, 2020. <<https://www.stuff.co.nz/the-press/news/west-coast/101149344/storm-accelerates-coastal-erosion-at-carters-beach>>.
- Reisinger, Andy, Roger L. Kitching, Francis Chiew, Lesley Hughes, Paul C. D. Newton, Sandra S. Schuster, Andrew Tait, and Penny Whetton. 2014. "Australasia." Pp. 1371–438 in *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK: Cambridge University Press.
- RNZ. 2016. "Wild Weather to Hit Quake-Hit Areas Again." RNZ, Nov 17. Retrieved October 11, 2020. <<https://www.rnz.co.nz/news/national/318279/wild-weather-to-hit-quake-hit-areas-again>>.
- Rushton, Ashleigh, Suzanne Phibbs, Christine Kenney, and Cheryl Anderson. 2020. "The Gendered Body Politic in Disaster Policy and Practice." *Journal for International Disaster Risk Reduction* 101648: 101648.
- Rushton, Ashleigh, Suzanne Phibbs, Christine Kenney, and Cheryl Anderson. 2021a. "‘I wouldn’t Trade this Country of Ours for Anything’: Place, Identity and Men’s Stories of the 2016 M7. 8 Kaikōura/Waiu Earthquake." *Social & Cultural Geography* 23(8): 1155–1173.
- Rushton, Ashleigh, Suzanne Phibbs, Christine Kenney, and Cheryl Anderson. 2021b. "‘She’ll be Right’: The Place of Gendered Emotions in Disasters." *Gender, Place and Culture* 29(6): 793–815.
- Salinger, M. J., J. Renwick, E. Behrens, A. B. Mullan, H. J. Diamond, P. Sirguey, R. O. Smith, M. C. Trought, L. Alexander, N. J. Cullen, B. B. Fitzharris, Christopher Hepburn, Amber Parker, and Phil Sutton. 2019. "The Unprecedented Coupled Ocean-Atmosphere Summer Heatwave in the New Zealand Region 2017/18: Drivers, Mechanisms and Impacts." *Environmental Research Letters* 14(4): 044023.
- Salvati, Paola, Olga Petrucci, Mauro Rossi, Cinzia Bianchi, Aurora A. Pasqua, and Fausto Guzzetti. 2018. "Gender, Age and Circumstances Analysis of Flood and Landslide Fatalities in Italy." *Science of the Total Environment* 610: 867–79.
- Stats, N. Z. 2017. "Kaikōura recovery by the numbers." Retrieved September 20, 2020. <<https://www.stats.govt.nz/reports/kaikoura-recovery-by-the-numbers>>.
- Stevenson, Joanne, Julia Becker, Nicholas Cradock-Henry, Sarb Johal, David Johnston, Caroline Orchiston, and Erica Seville. 2017. "Economic and Social Reconnaissance." *Bulletin of the New Zealand Society for Earthquake Engineering* 50(2): 343–51.
- Takebayashi, Yoshitake, Yuliya Lyamzina, Yuriko Suzuki, and Michio Murakami. 2017. "Risk Perception and Anxiety Regarding Radiation After the 2011 Fukushima Nuclear Power Plant Accident: A Systematic Qualitative Review." *International Journal of Environmental Research and Public Health* 14(11): 1306.
- Tyler, Meagan and Peter Fairbrother. 2013. "Bushfires are ‘Men’s Business’: The Importance of Gender and Rural Hegemonic Masculinity." *Journal of Rural Studies* 30: 110–9.
- Vinyeta, Kirsten, Kyle Powys Whyte, and Kathy Lynn. 2016. "Indigenous Masculinities in a Changing Climate: Vulnerability and Resilience in the United States." Pp. 140–51 in *Men, Masculinities and Disaster*, edited by E. Elaine and B. Pease. Abingdon: Routledge.
- Wakelin, Steven, Mireia Gomez-Gallego, Eirian Jones, Simeon Smaill, Gavin Lear, and Suzanne Lambie. 2018. "Climate Change Induced Drought Impacts on Plant Diseases in New Zealand." *Australasian Plant Pathology* 47(1): 101–14.
- Whittaker, Joshua, Christine Eriksen, and Katharine Haynes. 2016. "Gendered Responses to the 2009 Black Saturday Bushfires in Victoria, Australia." *Geographical Research* 54(2): 203–15.

- Yumagulova, Lilia, Suzanne Phibbs, Christine M. Kenney, Darlene Yellow Old Woman-Munro, Amy Cardinal Christianson, Tara K. McGee, and Rosalita Whitehair. 2019. "The Role of Disaster Volunteering in Indigenous Communities." *Environmental Hazards* 20: 1–18.
- Zara, Claire, Debra Parkinson, Alyssa Duncan, and Kiri Joyce. 2016. "Men and Disaster: Men's Experiences of the Black Saturday Bushfires and the Aftermath." *Australian Journal of Emergency Management* 31(3): 40.