HazNet

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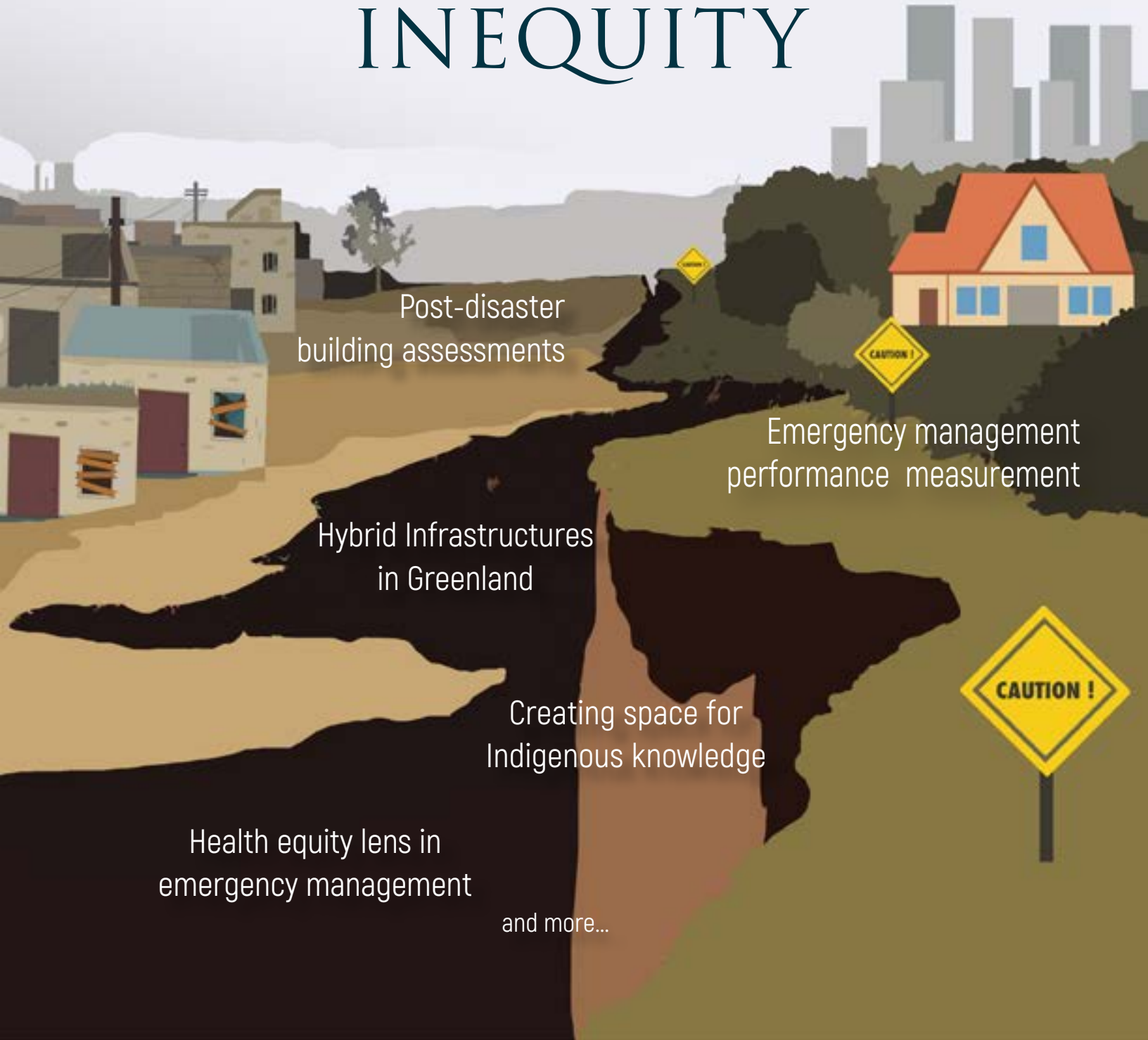
INEQUITY



Post-disaster building assessments

Emergency management performance measurement

Hybrid Infrastructures in Greenland

Creating space for Indigenous knowledge

Health equity lens in emergency management

and more...

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Editor's Note

As a child, I grew up in a low-lying, poor part of my hometown Ufa, Russia. It was an area subject to toxic urban runoff, seasonal flooding, and a myriad of social issues. I often wondered why life was so much easier for people living in the upper part of town. There, it didn't flood. Power outages were rare. Most people had indoor plumbing and did not have to deal with floating outhouses in the event of seasonal flooding. For families in our neighbourhood, moving to the upper part of town was largely out of reach. Back then, I didn't know the words to describe the structural inequity due to race, class, and gender. I didn't fully understand the limited upward mobility or the vicious cycles of poverty and vulnerability that locked my neighbours out of a brighter, alternative future. I was lucky. I studied very hard. Amazing scholarships set me on a path to learn about the growing profession of emergency management. I moved to Canada. My parents, however, still live where I grew up, faced with the same issues that have only become more acute with the growing inequity gap.

In this carefully curated issue, we bring you some food for thought to challenge your understanding of inequity in your work. Building on the foundations of emergency management, we bring in lenses from public health, architecture and design, health care systems, decolonization and Indigenous ways of knowing. Through this variety of perspectives, we aim to answer the question, why does inequity matter?

Inequity has high costs for society. In Canada, the 2017 Canadian At Home/Chez Soi study found that the average annual cost of helping those struggling with homelessness and mental illness in Vancouver, Winnipeg, Toronto, Montréal, and Moncton (excluding medications) was $53,144 per person. Yet, the range of these costs varied from just over $15,000 to a staggering $340,000 per person. Investing in the housing-first model and addressing the underlying health and socio-economic circumstances of those transitioning from homelessness can significantly reduce these costs. Savings can be from $22,257 for high-need users to $14,177 per year for those with more moderate needs. With at least 235,000 Canadians experiencing homelessness in a given year, prevention could save a lot of money. More importantly, it could save lives.

Inequity kills. In the United Kingdom, for example, a recent study of nearly 2.5M premature deaths showed 35.6% of these deaths were attributable to socioeconomic inequality with the most unequal causes of death being due to tuberculosis, opioid use, HIV, psychoactive drugs use, viral hepatitis, and obesity. There's more. Inequity is also a design issue. In a hotter and more volatile world, even shade becomes an index of inequality, a requirement for public health, and a mandate for urban planners and designers.

Inequity undermines governance. A recent academic study showed that economic inequality enhances the perception that society is breaking down. This, in turn, creates cravings for a strong leader who will restore order (even if that happens at the expense of democratic values). In recent years, we have witnessed how changes in prices of basic necessities like food, fuel, and transport sparked upheavals that led Chile and Ecuador to declare states of emergency. A year ago in France, the so-called yellow-vest movement began and led to a 10-billion-euro aid package for the poorest, changed laws and police tactics, cost the French economy billions, and forced the president to layout a series of reforms to tackle social inequity. In Canada, an Ipsos survey conducted for the insolvency firm MNP Ltd. shows 46% of the surveyed Canadians are $200 or less away from financial insolvency at month-end. An emergency preparedness kit becomes a bit of luxury when the margin of safety is so small.

Inequity is an intergenerational social justice issue. As of December 2019, 1,261 jurisdictions around the world, home to 798 million citizens in 25 countries, have declared a climate emergency. Climate change, in turn, will deepen inequity between those who can adapt and others that carry a heavier burden of poverty, hunger, and disease. Across Canada, First Nations communities are declaring states of emergency over suicide epidemics, unsafe drinking water, and drug crises. Colonialism and inequity lie at the heart of all of these issues.

Inequity creates fault lines in society. It is a tinder-dry social-conflict context waiting for a spark. Given that these metaphors are becoming more familiar for emergency managers, our profession is being increasingly forced to ask how we can rise as a profession to address this challenge? We hope this issue will deepen your understanding of the multiple dimensions of inequity and their far-reaching consequences for our field of practice. By focusing on solutions, we aim to leave you inspired to address inequity in your work.

In our Feature section, read about how adopting a health equity lens is essential for creating a more sustainable approach to disaster management, in Canada and beyond. Through this piece, practical tools are introduced to ensure well-intended policies are equitably informed through the four phases of emergency management.

In our Research section, learn about a decision-making framework that can help balance difficult trade-offs when formulating disaster risk reduction policies. Read about a hybrid-design framework that integrates infrastructure, landscape, and social practices for Green-land's future in the face of accelerated climate change.

In our Practice section, read about an innovative methodology, a Canadian first, in post-disaster building assessments. In this issue, we also highlight a methodology for measuring emergency management performance using an accessible step-by-step process for initiating strategic change with measurable outcomes. Read an article on re-defining emergency management core competencies and learn the types of leadership best equipped to navigate the evolving landscape of emergency management.

We also turn to the past to find ways to inform our future. Learn about ways for creating space for Indigenous knowledge in the Rangitāiki Plains of Aotearoa New Zealand based on a historical analysis from the 1890s until 2017. Read a letter from Lake Manitoba written during the widespread power outages that reminds us about the importance of Indigenous Knowledge for fostering values of self-sufficiency, survival, and sustainability.

As the Editor for HazNet, I have the great privilege of working with thought leaders around the world to report on global best-practices and on the most recent research to bring timely and timeless content to our readers. In addition to our contributors, I want to thank our stellar HazNet team for their dedicated behind-the-scenes work: Nicole Spence, Carime Quezada, Ivan Chow, and Shaun Koopman and many other volunteers who make HazNet possible.

For the past 10 years, HazNet has been telling Canada's story of disaster resilience. Thank you for being a part of it. We look forward to shaping this evolving story with you.

Lily Yumagulova,
Editor, HazNet
www.haznet.ca

President's message

For ten years HazNet has showcased new ideas and research in disaster risk reduction, shared the heartbreak of those who have been impacted by disasters, and advocated for a disaster resilient Canada. I began reading HazNet long before I become the President of the Canadian Risk and Hazards Network (CRHNet) because HazNet served as a bridge to a community that was just as passionate about disaster risk reduction as I was. The fields and types of jobs involved in disaster risk reduction are incredibly diverse and it is easy for people to stay in silos. Publications such as HazNet serve as more than just reading material; they also help to bring people together in working towards a common goal. Disaster risk reduction is not accomplished in silos; it was borne out of a complex problem and so requires expertise from a diverse group of professions. I would like to take a moment to recognize and thank the HazNet team for their ongoing contributions, including reaching out to different people and professions to promote disaster risk reduction. It is through their hard work and passion that we have seen HazNet develop into the high-quality publication you see before you.

This an interesting time for disaster risk reduction in Canada. New initiatives are being implemented in different provinces and jurisdictions. The increasing risk of disasters due to factors such as climate change, and social factors that influence vulnerability, have underscored the need for progress. While in the past we have seen that action on risk reduction all too often would occur only after a major emergency, there has been more of a push for organizations, governments, and households to become more proactive. CRHNet is committed to exploring opportunities to showcase these initiatives and make this information more accessible to groups across Canada.

The new Board, which was voted in following the 2019 Symposium, is looking forward to building on the work accomplished by past Boards. Some of the legacy projects that we are looking towards implementing in the near future include hosting a new iteration of the Disaster Risk Reduction Roundtable through an exciting collaboration with Public Safety Canada. I would like to take a moment to thank Michel Doré for his work in making this opportunity become a reality for CRHNet.

The joint Disaster Risk Reduction Roundtable and the CRHNet Symposium will be held in Ottawa in October 2020. CRHNet is looking forward to partnering with Public Safety Canada for this innovative event. We hope you can join us!

I look forward to working with all of you to continue to strengthen CRHNet in its mission to support collaboration between the many partners involved in disaster risk reduction.

Patricia Martel, Ph.D, CEM

President, CRHNet

Welcome to

The Honourable Bill Blair

The Canadian Risk and Hazards Network welcomes The Honourable Bill Blair on his appointment as Minister of Public Safety and Emergency Preparedness.

Raised in Scarborough and the son of a police officer, Minister Blair learned at an early age that to "serve" comes before "protect" for a reason. He served 39 years with the Toronto Police Service, the last decade as its Chief of Police.

Minister Blair has demonstrated his ability to unite and engage others through his numerous roles in provincial, national, and international policing forums. He served as President of both the Ontario and Canadian Associations of Chiefs of Police, receiving the distinction of Commander of the Order of Merit of the Police Forces.

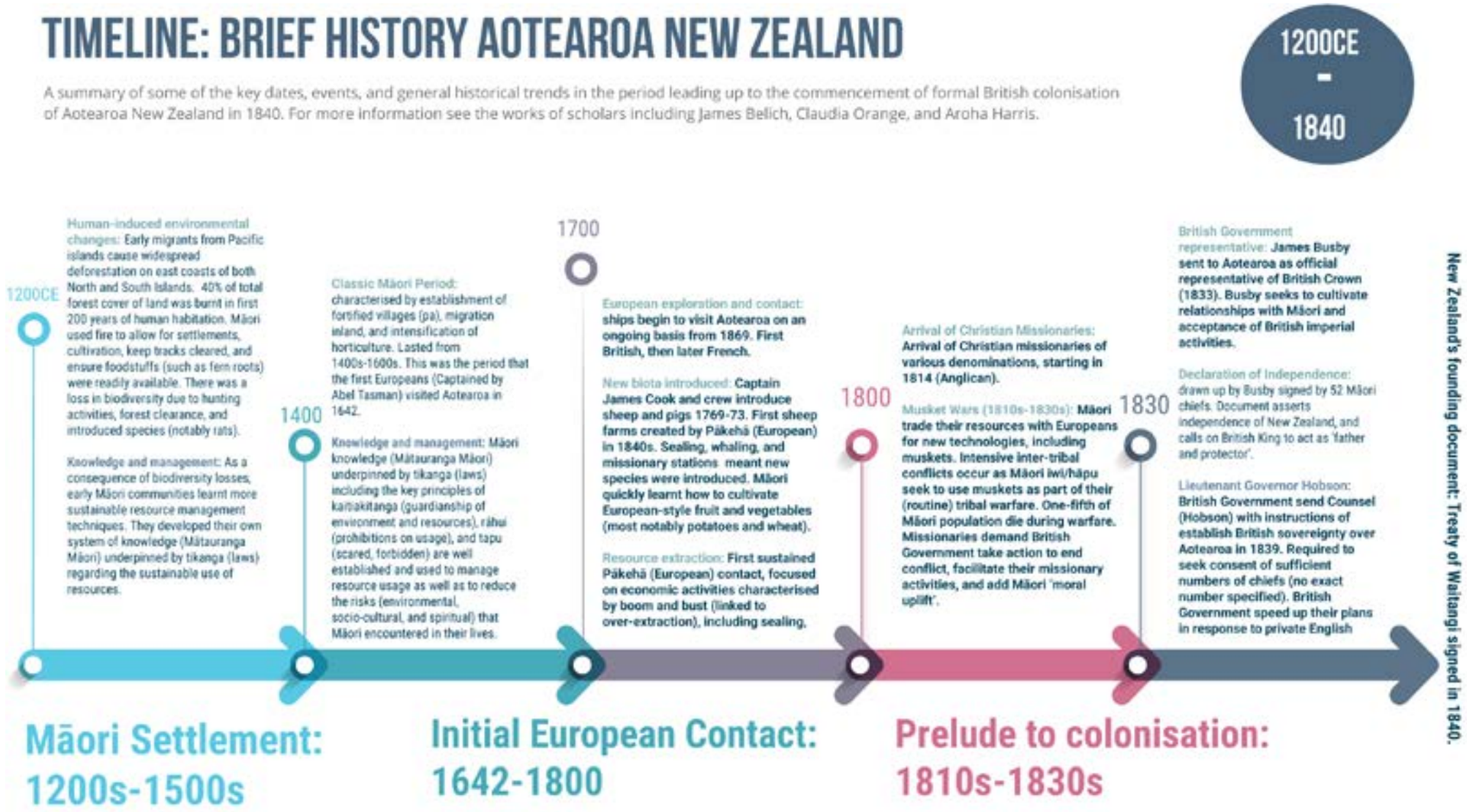
CRHNet looks forward to continuing to work with Minister Blair and Public Safety Canada on public safety, and disaster risk reduction, and emergency management.

Tracing and unsettling path dependency: Creating space for Indigenous knowledge in river management

By Meg Parsons, Johanna Nalau, Roa Petra Crease,

Karen Fisher, and Cilla Brown

The impacts of climate change and intensified development on floodplains increase the risks posed by flood and emphasize the importance of understanding both the causes of, and mechanisms for, breaking path dependency. Despite incremental changes, decision-makers remain largely "locked-in" to past policies and actions that favor engineered approaches to flood risk (Lawrence et al., 2015, 2013). Our research is an archival study of the history of flood management and path dependency within Aotearoa New Zealand (hereafter referred to as Aotearoa NZ). Such in-depth empirical historical studies offer significant insights into decision-making pathways, which can assist in identifying the factors that contribute to, and help overcome path dependency.



Methodology

We employ a historical geography approach to investigate the creation, maintenance, and attempts to break path dependency within the Rangitāiki Plains, Aotearoa NZ, from the 1890s until 2017 (Parsons and Nalau, 2016). We draw on primary sources held in archives, libraries, museums, and private collections to show how successive government policies and actions created a profoundly path-dependent system of flood management, the foundation of which resides in processes of indigenous dispossession and the marginalization of local Māori iwi (tribes) knowledge and values from environmental governance and policy.

The term "path dependency" refers to the tendency of institutions and decision-makers to continue to employ past policies and practices in any given situation (such as the government's response to a flood) even if better alternatives are available because of their structures, values, beliefs, financial implications, and knowledge systems. Put simply, a path-dependent institution is one that is resistant to change, employs a narrow set of decisions and/or approaches (based on past experiences) and seeks to maintain the status quo even if past circumstances and decisions may no longer be applicable or the most appropriate.

SIwi (tribal groups) affiliated with the Rangitāiki Plains include Ngāti Awa, Ngāti Makino, Ngāti Pikiao, Tūhoe, and Ngāti Tūwharetoa.

Timeline: Aotearoa New Zealand 1840s-1890s.

Notes on some socio-economic, political, and environmental changes that set the scene for our case study

Treaty of Waitangi/Te Tiriti o Waitangi 1840

Treaty of Waitangi (Te Tiriti o Waitangi) first signed by a representative for the British Government (Lieutenant-Governor William Hobson), 40 Māori rangatira (high ranked Māori), and various English residents on 6 February 1840. By September 1840 a further 500 rangatira had signed one of nine copies of the Treaty and Britain had declared sovereignty over the whole of Aotearoa New Zealand.

Not all iwi in Aotearoa signed the Treaty and those who did sign, signed the Māori language versions rather than the English version that differed substantively from the Māori version.

The Māori signatories of the Treaty/Te Tiriti did so on the understanding that it would guarantee their sovereignty rights (encapsulated in the Māori terms of **tino rangatiratanga** and **mana**), but afford them protection from unscrupulous Pākehā settlers.

Article 1 of the English language version stated that Māori ceded their sovereignty to Britain, whereas the Māori version spoke of British governorship (alike to protectorate) over the country. Similarly, **Article 2** of the Māori version of the Treaty guaranteed Māori their retention of their tino rangatiratanga (the direct translation of which is chiefly authority) over their taonga (treasures), which included their lands, forests, and other resources, while the English version maintained their property rights (in accordance to British legal traditions).

Britain proclaimed sovereignty over the whole of Aotearoa in May 1840, while still seeking Māori signatures for the Treaty.

The divergent understandings of the Treaty/Te Tiriti between Māori and the Crown (and the wider settler population) resulted in ongoing disagreements and conflict in the nineteenth and twentieth centuries.

Migration and settlement 1840s-1880s

Large-scale settler migration: Prior to 1840 there was 2000 non-Māori living in NZ, by 1870 there was 250 000 non-Māori. Most immigrants were from Britain and Ireland, also smaller numbers from other nations (including Croatia and Denmark and China). Migration numbers peaked in the 1860s when gold was discovered in the South Island sparking a gold rush.

Planned and unplanned settlements: developed throughout the country. First in coastal locations in proximity to local Māori, who supplied goods to growing European populations. Majority of settler population lived in urban areas, whereas Māori population were predominately rural in the nineteenth century.

Settler colonial democracy: First parliamentary election occurred in 1853, and first sitting of parliament took place in Auckland in 1854.

Forest clearance and grasslands transformation: settlers quickly started clearing the land of indigenous vegetation (forest and tussock grasslands) to be replaced by exotic grasslands (for use for pastoral farming), horticultural gardening growing introduced crops, and urban settlements. Between 1840 and 1930 50 per cent of endemic forest was cleared (mainly through fire rather than felling). Initially farming focused on sheep farming for wool, but following the advent of refrigerated shipping in 1882 sheep and cattle farming expanded (with meat and dairy products shipped to Britain).

Armed conflict: Sporadic conflict between Māori and British armed forces breaks out throughout the country, known collectively as the New Zealand Wars. First in the Nelson in 1843, and then in Northland in 1845-46, and from 1860-1872 a large portion of the North Island were affected by wars between Māori groups and British military forces (including Māori allies).

1840s-1870s Conflict/ resistance

Pan-tribal movements: In the 1850s Māori protests against British colonial rule and the Crown's refusal to honour to articles of the Treaty/Te Tiriti grew stronger and pan-tribal movements emerged. These movements championed Māori sovereignty, values, and rights over lands and waters, and sought to ensure that Māori retained their lands. The British government viewed these movements as acts of rebellion and any iwi or hāpu seen to be linked to those movements were rebels who were to be punished.

Invasion: In 1865 armed forced invaded and occupied the Eastern Bay of Plenty, including the Rangitāiki Plains, after the colonial government branded all Māori in the region rebels despite most tribal leaders actively seeking to avoid conflict and refusing to participate in war against the British.

Confiscation (Raupatu): The NZ colonial government introduced legislation (New Zealand Settlements Act) in 1863 to confiscate the land of Māori who are deemed to be in rebellion against the Crown. This include Māori land in the Waikato, Taranaki and the Eastern Bay of Plenty regions. The majority of the lands in the Rangitāiki Plains was confiscated under this Act. Eastern Bay of Plenty iwi including Ngāti Awa, Whakatohea, Ngāti Makino, Ngāti Pūkiao, Tūhoe, and Ngāti Tūwharetoa were affected.

Legacy: Following military actions, Māori were further dispossessed of their lands, waters and resources through activities of the Native Land Court, a suite of other legislation, and economic processes. Māori communities were unable to practice traditional subsistence activities or engage in the market economy on equal terms with settlers (Pākehā) (as had occurred prior to the wars). Māori poverty grew throughout the colony as Māori were marginalised within settler colonial society.

1890s Rangitāiki Wetlands

Survey: In 1890 central government surveyed the Rangitāiki area, and made available land for European farming settlement. During 1890s initial attempts to drain the wetlands failed and most Pākehā farmers give up their leases in the region. Wetlands were deemed an impediment to European progress, cuvilisation and a threat to people's health.

Māori dispossesion but continued presence: Few Pākehā living in Eastern Bay of Plenty (except for fledgling coastal towns of Whakatāne and Ōpōtiki) despite the land being confiscated from local iwi in 1866. Māori dispossessed but still able to access their traditional mahinga kai (food gathering sites) in forests, rivers, wetlands, and marine areas. However, from 1910s this changed with the commencement of government drainage operations. Pākehā migrated to the newly created grasslands of the Rangitāiki Plains.

Power relations and values in decision making

Our research demonstrates how social values and shared narratives led generations of Pākehā (New Zealanders of European background) residents and decision-makers - first at the level of the central government and then devolved to local government - to perceive the Rangitāiki wetlands as requiring radical transformation, and the close linkages between this transformation, the creation of path dependent institutions, and the marginalization of local Māori communities' knowledge and values. In contrast to Western understandings that position people as separate from (and in command of) the natural environment, Māori worldviews situate people as part of the environment and as connected with all beings through kinship relationships (Hall, 2012; Harmsworth et al., 2016; Salmond et al., 2014; Te Aho, 2011).

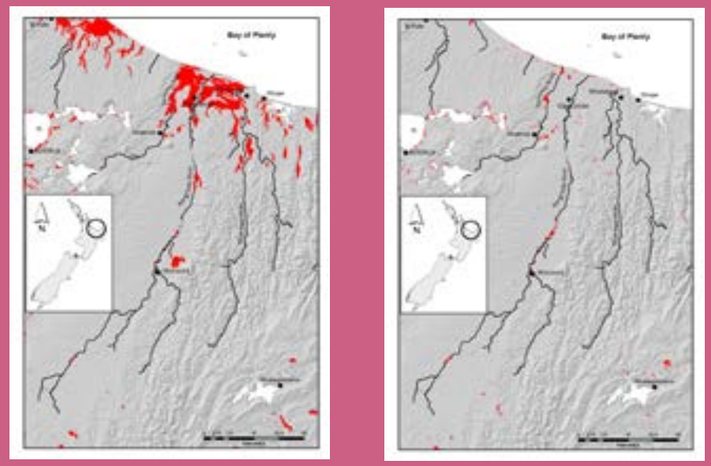


Figure 2a: Map showing extent of wetlands within the Rangitāiki Plains prior to European colonisation and drainage works. Figure 2b: Map showing current extent of wetlands within the Rangitāiki Plains as of 2019. Source: Used with permission from the author.

Formation of the path: 1910s-1930s drainage and river "improvement"

Decisions to drain the Rangitāiki wetlands and re-align the Rangitāiki River were based on Pākehā subjectivities that perceived floodplains as unpredictable, unproductive and potentially hazardous. The transformation from wetlands to grasslands began in the decades following the 1865 military invasion and confiscation of Māori land, which breached the articles of the Treaty of Waitangi/Te Tiriti o Waitangi (and the underlying principle of partnership on which the legal agreement was based) signed between representatives of various Māori iwi and the British Crown in 1840 (See Figure 2). New technologies enabled radical transformations from indigenous forests and "previously useless swamp" into "the most valuable" land for agriculture (see Figures 2a, 2b, and b) (AJHR, 1911, 1913; Law, 1962; New Zealand Parliament, 1910).

Drainage and flood control efforts profoundly affected Māori, with hard adaptations contributing to the acceleration of Māori land loss. Local Māori did not perceive drainage and flood controls as "improvements," and regularly petitioned members of parliament and government officials about their loss of lands, resources and degradation associated with drainage and flood controls (Bamford and Brown, 1909; Department of Maori Affairs, 1915; Te Anga, 1914). In these petitions, local Māori challenged scientific technologies and Pākehā values, and sought to reassert Māori knowledge, values, and ways of living (AJHR, 1927, 1923; Waitangi Tribunal, 2009, 1999).

Figure 3: Pākehā men constructing drainage canals by hand in the Rangitāiki Plains circa 1910. The central government also imported dredging machines from Britain and the United States of America to assist in efforts to drain the wetlands. Source: Auckland Libraries Heritage Collection.

BRINGING A RICH AREA ON THE EAST COAST OF THE NORTH ISLAND OF NEW ZEALAND INTO PROFIT: ONE OF THE DRAINS ON THE RANGITAIKI SWAMP. T. Pavish, Photo.

Path Continuation: 1940-2010s flooding and the role of local government

By the 1940s, more than 90 per cent of the Rangitāiki wetlands were drained. The loss of wetlands, the removal of native vegetation cover, decline in endemic biodiversity, introduction of exotic grasses and fauna, and development of urban areas contributed to altering river flow and behavior, and increasing flood vulnerability. The first major flood occurred in 1925, the next in 1944, and so on throughout the twentieth and twenty-first century, including in 2017 when one of the levees protecting the township of Edgecumbe broke after a period of heavy rainfall - the town was rapidly engulfed in floodwaters. Each flood event sparked political and public discussions about how to solve the flood hazard. Local governments remained firmly fixed on hard adaptations (most recently with the rebuilding on the Edgecumbe levee following the 2017 flood) as the principal approach to address flood risk, which ultimately reinforced existing institutional arrangements.

Whereas since 1975 onwards the central government was actively engaged in reconciliation efforts with Māori, which included legal agreements with iwi (for example, with 'Treaty Settlements'); new legislation that acknowledged the Treaty principle of partnership (between Māori iwi and the Crown); and Māori concepts such as kaitiatanga (guardianship over the environment). Local governments were not legally defined as Treaty partners which meant that they could and did overlook new legislation (the Conservation Act 1987 and the Resource Management Act 1991) that explicitly mentioned Māori values and the need to take into account Māori priorities into government decisions about environmental management.

Accordingly, local governments in the Rangitāiki Plains (like elsewhere in Aotearoa) were able to disregard the protests of local iwi (including Ngāti Awa about the use of rock walls, the removal of vegetation, and destruction of waterways.

Figure 4: Rebuilt levee in Edgecumbe township, July 2017. Source: Used with the author's permission.

Disrupting path dependency

River and flood risk management in the Rangitāiki Plains continues to prioritize Western understandings of human-environmental relationships and to privilege Pākehā values. However, recent efforts in the late 2010s by local Māori in the Rangitāiki Plains (and elsewhere) to reassert their rights, values and interests, facilitated by legal mechanisms and new institutional arrangements - including co-governance arrangements, new legislation, and local management plans - hold the potential to produce new priorities and approaches to managing rivers and flood risk, and most notably, the desires to restore wetlands and their preference for ecosystem-based adaptations rather than hard adaptations (levees, drainage canals, and pumping stations). The inclusion of different types of knowledge and values is, thus, critical to breaking path dependencies within environmental governance and management regimes (Crow et al., 2018; Jeffers, 2014).

Conclusion and emerging research gaps

In our research, we traced the history of path dependency within a single flood risk management system and highlighted how the management of flooding is a layering process wherein individual decisions and actions accumulate over time. Successive generations of Pākehā actors mobilized to establish and then maintain the dominant approach to flood management based on particular values and beliefs about the environment and what constitutes appropriate use of environmental resources. To this day, institutions remain committed to the use of hard adaptations (see Figure 4 showing rebuilt levee in Edgecumbe), despite substantive critiques by Māori communities for generations, and by non-Māori ecologists and scholars (Clarkson et al., 2013; Makey and Awatere, 2018). However, as our research demonstrates, there is a need for new decolonizing approaches that recognize Māori knowledge and values (most notably kaitiatanga/guardianship), and the Treaty principle of partnership on which Aotearoa as a nation was first founded.

Megan Parsons

Megan's research adopts a transdisciplinary and decolonizing approach to explore how Indigenous peoples' in Oceania conceptualize and respond to intersecting processes of social and global environmental changes. The authors for this paper includes a mixture of Indigenous and non-Indigenous researchers: Karen Fisher, Roa Crease, and Megan Parsons are all of mixed Māori/Pākehā/other ancestry; Johanna Nalau is Finnish; and Cilla Brown is Samoan.

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Understanding trade-offs in post-disaster reconstruction

By Heidi Tuhkanen

Development and disaster risk reduction policies and actions are essential for global goals such as sustainable development and reducing societal risks. However, they are often seen as being at odds with each other, rather than mutually supportive. While economic growth has contributed to the overall global poverty reduction over the last 25 years, development driven by economic growth also creates risk. For example, rapid and unplanned urbanization without regard for the environment can leave areas with high concentrations of people and assets without natural defenses that functioning ecosystems, like wetlands or coral reefs, provide. On the flip side, regulation aimed at reducing disaster risk is often seen as being in opposition to or limiting economic development initiatives.

The Stockholm Environment Institute (SEI) has studied the misaligned relationship between development and disaster risk in order to develop ways to transform this relationship. One of SEI's approaches to support equitable and disaster resilient development is based on the identification and anticipation of "trade-offs" made within post-disaster decision-making processes. Though our empirical work has taken place in the post-typhoon Yolanda reconstruction phase of Tacloban, Philippines, five years after the disaster, the broader literature base for our work indicates transferability to other regions and contexts of the world (Tuhkanen et al., 2018).

Trade-offs and equity, a complex relationship

Trade-offs are defined as a decision between two desired outcomes where a gain in one requires a loss in another. The losses, or how these decisions negatively impact society, are sometimes not at the forefront of decision-making. Trade-offs are common in complex policy situations where multiple objectives, stakeholders, scales, and time-horizons collide. These are decisions that determine which objectives, stakeholders, and areas are prioritized, and more importantly not prioritized, in the decision-making processes and the outcomes. At times, they are not even explicitly considered and are based on assumptions which can be questioned. To understand why we continue to make decisions which result in negative consequences and create risks, it can be useful to look at the trade-offs involved in the decision-making process (Tuhkanen et al., 2018), as illustrated in Table 1.

Equity is a common, yet critical, dimension of trade-offs made in DRR and development decision-making processes. These decisions and the resulting policies, interventions or practices are likely to affect people differently. The consequences can depend on where you live or work, your cultural or socio-economic background, your physical abilities, and your capacities to change your circumstances. The impacts of decisions might also differ across time and create consequences for future generations to deal with. This means that it is important to recognize the trade-offs: what was traded for what. We need to keep in mind who

Trade-off dimension and definition	Examples of trade-offs	Examples of key questions to explore each dimension
Aggregation: The aggregation of development and DRR gains and losses	Competing needs: when other needs or goals compete with DRR for funding/ resources Conflicting goals: when DRR is and other objectives, such as economic development, are perceived to conflict	• What are the goals, expected benefits and potential negative consequences of the plan? • Is the plan complementary to, or in conflict with, other plans, including ones at different governance levels or other sectors?
Risk: The prioritisation of risks when seeking to reduce multiple risks	Prioritizing between risks, especially in uncertain situations: impacts of single risk reduction on other interrelated risks (hazard and non-hazard) or general system resilience Shifting of risks: impacts of one actor's risk reduction for other actors, locations	• Does the plan clearly identify and plan for potential risks, both natural hazard-related risks as well as other risks, e.g. social, economic, environmental, technological, as well as their interactions? What about the cascading effects of risks from or into other sectors? • Which risks are prioritized in the plan and why? What are the consequences, e.g. for those affected by the risks or for overall system resilience?
Equity: The equity of decision-making processes and outcomes	Allocation of benefits/assistance: differing definitions and criteria used for determining distribution of benefits, including local and external definitions of equity; balancing needs-based assistance post-disaster with the incentivizing of pre-disaster risk mitigation and prevention activities. Structural influence on risk: the impact of different development pathways, e.g. market led economic development, and its influence on the ability of different actors to deal with risks and impacts	• What is the distribution of the expected gains and anticipated losses across society in terms of different groups of people (geographically and socially) in the plan? Is it equitable? • Which individuals and social groups are most vulnerable to disaster risks? What are the underlying causes of their vulnerability? • Are there mechanisms in the plan to equitably share the impacts, risks, and potential costs of these planning decisions across society? If not, what are the obstacles to implementing such mechanisms?

Time: The balancing of near and long-term goals, costs and benefits	Pursuing short-term vs. long-term goals: compatibility of the impacts of goals across time Risks related to immediate disaster interventions: the pressures, benefits and risks related to acting quickly versus acting later based on further assessment	• Does the plan focus more on short-term or long-term needs? How does it address conflicts between the two, if any? • Are there potential unforeseen negative impacts that could happen beyond the agreed timeframe? • Is there pressure e.g. related to political, planning or business cycles of actors involved in the project to show short-term results (benefits)?
Participation: The distribution of participation and power	Role of structures: the extent to which processes and structures incentivize cooperation vs. competition Resource limitations: how to design effective participation with limited resources (skills, time, finances, etc.) Decision-making power: whether participation enables the ability to influence decisions and challenge the status quo	• Are there some elements or practices in the planning process that promote competition, for example between sectors, departments, or organisations, rather than collaboration? • What are the obstacles or limitations for increased inclusion in the process, especially among vulnerable or marginalized groups? • What is the process for engaging stakeholders during the planning process? How participatory is the process? How are people who will be impacted by the plan engaged? Is decision making power shared?

Table 1. A typology framework of development and DRR trade-offs, adapted from Tuhkanen et al. 2018, p. 7-8 and Tuhkanen and Han, 2018 p 2.

ultimately bears the losses and the risks, as well as the capacity of those groups to either cope or alternatively reduce those risks. Otherwise, we continue to maintain the misalignment between development and disaster risk, which is an obstacle for equitably and resilient development.

This begs the question, how can we work towards more aligned and equitable decision-making?

Recognize and correct for the power asymmetry in decision making processes

A more equitable outcome requires a shift in the distribution of gains, losses and risks across society. The challenge is that a shift in the distribution of gains and losses across society and changing the status quo meets with resistance from some stakeholders, particularly those who stand to lose power or privilege in this reconfiguration. Participatory tools and mechanisms which neutralize power imbalances can be utilized to develop a shared goal or to guide planning and investment. Based on their work in Sweden, Brink and Wamsler (2018) find that nature-based approaches offer local authorities opportunities for engagement of citizens or other stakeholders to develop a shared baseline or future scenarios. In areas that have experienced disasters, participatory mapping of risks with residents can also be used to validate technical hazard risk maps and can be used as an opportunity to increase residents' awareness of future risks as well as collaborative planning of mitigation or response actions (Hordijk et al., 2016).

Utilize regulatory measures to support the sharing of risk and costs across society

Risk is unequally distributed across society due to differentiated vulnerability and exposure. Different groups in society have different capacities to reduce their risks, which may result in dramatically different outcomes after a hazard event. Laws and regulations can be used to support risk mitigation and prevention, as well as risk-sharing. For example, mandatory or incentivised insurance connected with discounted premiums for risk mitigation actions, can help to mitigate risk across society, increase the number of people insured (Mills, 2007). Higher coverage can help lower the cost of insurance and spread the costs of disaster losses across society. Public-private partnerships can help make the insurance affordable (McAneney et al., 2016).

Invest in disadvantaged communities to promote resilience

Decisions on where to allocate limited financial resources for risk mitigation or prevention versus post-disaster recovery and reconstruction are often based on financial calculations of post-disaster asset losses. However, while minimizing the overall value of asset losses, this favours investments into "high value" wealthy areas and fails to account for peoples' different capacities to reduce risk, cope and recover. Thus, low income or otherwise vulnerable groups may be highly exposed to risk and disproportionately impacted by disasters. An investment strategy based on interventions in such areas can mitigate poverty and wellbeing losses and promote disaster resilience. Such interventions could include social programs and needs-based post-disaster support to affected households (Walsh and Hallegatte, 2019).

Exploring trade-offs related to equity highlights the importance of the processes that shape our decisions, as well as their outcomes across society. In short, to ensure decisions result in more equitable, resilient and sustainable development, attention needs to be paid to the participation of and outcomes for vulnerable and marginalized groups.

For more information on SEI'swork on trade-offs and transformation, please visit weTRANSFORM.dev. Read more of Heidi Tukanen's work on the SEI website https://www.sei.org/people/heidi-tuhkanen/.

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Hybrid Infrastructures: A Greenlandic case study

By Elaina Keppler and Charlotte Lin Pedersen

How could a hybrid design framework that integrates infrastructure, landscape and social practices together offer an alternative response to planning for Greenland's uncertain future in the face of accelerated climate change in the Arctic?

INFRASTRUCTURE IN GREENLAND

- With an **area of 2,146,000 km²**, Greenland is the largest island in the world.
- Yet with a **population of 56,705** (2019), it is the least densely populated territory in the world.
- Roughly **80% of Greenland is covered** by the Greenlandic ice sheet.
- There are **75 settlements** in Greenland, **varying from 20 to 17,000 inhabitants** in the capital Nuuk.
- There are only **150 km of roads** in the whole country; **60 km of these roads are paved**.
- There is currently only **one international airport**, with plans underway to build **two more by 2023**.
- There are a total of **13 registered domestic airports** and **47 helipads** in Greenland.
- There are **7 sea ports**, and several other smaller harbours along the coast.
- Sea passenger transport is served by **several coastal ferries**.
- Transport of goods is handled **exclusively by shipping.**
- At 70%, Greenland has **one of the highest shares of renewable energy** in the world.
- However electricity has traditionally been generated by **oil or diesel power plants**, despite a large surplus of potential hydropower, due to the **difficulties in establishing a national energy grid**.

Infrastructure in Greenland is a complex and multi-scalar topic, inherently linked to issues of ecology, economy and inequality. The Greenlandic cultural and natural landscape is changing rapidly due to the acceleration of climate change in the Arctic, which in turn is affecting global geopolitics. Despite the massive challenges that climate change brings, the melting sea ice is also opening up access to new opportunities in the tourism, mining, energy, and shipping sectors - attracting the interest of foreign nations. Suddenly, Greenland is finding itself in a prominent position on an emergent new world map, defined by the dynamic effects of climate change.

Climate as cultural infrastructure

One could argue that Greenland is geographically remote; located seemingly on the edge of the world. Yet in many ways, Greenland is in the centre of it, coupled to a greater global machinery through shipping routes, resource chains and geopolitical relationships. The island is a vastly expansive yet sparsely populated area. Due to the formidable landscape, geography, and climate, Greenland has few road-based transport infrastructures - the majority of transportation between the different settlements are by plane, helicopter, boat, or dog sled. The small towns are separated by hundreds of kilometers of uninterrupted terrain in what could be called a scattered urbanism. Historically, the ocean has provided the Greenlandic people with the most vital forms of both infrastructure and sustenance. This fluid infrastructure deeply affects the daily way of life in Greenland, simultaneously creating connections and divisions that determine how the island is inhabited. The current fragmentation combined with the coming climate challenges arguably call for a strengthening of infrastructural connections.

Orthographic projection of Greenland

Ecological grief

In the Greenlandic context, climate change is not an abstract future scenario but a phenomena experienced daily by the Greenlandic people. As countries struggle to limit future risks and overall warming to 1.5C, many Greenlandic residents are experiencing climates that have already warmed by more than this in their lifetime. The first national survey examining the human impact of climate change in Greenland (Greenlandic Perspectives, 2019), demonstrates that more than 90% of islanders acknowledge that the climate crisis is happening and the majority of local residents believe it will harm its people, sled dogs, flora and fauna. In Ilulissat in Western Greenland, the authors spoke to fisherman Lars Noahsen, who had been hunting since the time he was twelve and borrowed his father's boat without his permission, returning triumphantly with his initial seal catch. He has now given up hunting and his sled dogs, focusing instead on the booming tourism industry in the town by offering his services as a boat tour guide to the increasing numbers of "last chance" tourists coming to see the melting glaciers. This type of flexibility, while representative of the Greenlandic capacity for adaptability and resilience, also indicates a change in lifestyle that threatens the long standing traditions and cultural identity that is embedded in the thawing sea ice.

Environmental justice

Despite being one of the areas of the world hardest hit by climate change, Greenland could not afford to submit to the 2015 Paris Agreement to cut emissions. Emissions restrictions on Greenland would be next to impossible for them to honour, given Greenland's precarious and vulnerable economic situation. Unfortunately, Greenland could be on the path to dramatically increase its contribution to global warming, if they choose to exploit their oil, gas and mineral reserves in a bid for economic independence from Denmark - a topic high on the political agenda. In their 2017 report, the International Monetary Fund (IMF) substantiates that the world's poorest countries have contributed the least to climate change and also possess the fewest resources for resilient infrastructure and adaptation. The example of Greenland's predicament with the Paris Agreement gives a clear signal to more prosperous nations that it is imperative to help less resourceful countries bear their inequitable burden if we are to reach our collective climate goals. Policies that mandate cooperatively funded climate adaptation could play a critical role in forming a framework for sustainable infrastructural development in Greenland and other Arctic regions.

Material practices as design toolkit

In order to ensure Greenland's sustainability, equity has to be a main focus. In consideration of this, the authors developed a design toolkit that focuses on local material practices, or everyday actions. As another local Ilulissat fisherman told the authors, "We end up doing things our own way anyway, because help from Denmark takes so long and they often don't get it right." Taking inspiration from S.J. Carruth's doctoral dissertation, 'Infrastructural Urbanism That Learns From Place,' this research offers a methodological approach for integrating socio-cultural traditions into infrastructural design by linking human-scale practices with larger processes and systems. As a starting point, actions observed and experienced firsthand in Greenland were synthesized into three practices that could form a foundation for an informed spatial response.

1.0 PRACTICE OF ADJUSTABILITY

MODULARITY

SEASONALITY

BRICOLAGE

The first practice, adjustability, connotes a response to emergent, unexpected, and temporal conditions as a measure of resilience. As observed in Greenland, people use what is at hand, giving degrees of flexibility over longer or shorter periods of time. Adjustable, modular components can be used to react to changing conditions as well as encourage individual agency and awareness. Materials that naturally patinate over time instead of requiring extensive maintenance can also be used to an advantage.

2.0 PRACTICE OF POLYSYNTHETICITY

VISIBLE INFRASTRUCTURES

MULTIPLICITY OF FLOWS

SYSTEM AS ACCESSIBLE SPATIAL ELEMENT

The second practice, *polysyntheticity, relates to how infrastructure in Greenland is often bundled together and visible. Exposed infrastructure lends a greater degree of transparency of function, increasing knowledge of energy and ecology systems as a whole. There is also a multiplicity of usage in the Greenlandic experience. In a place traditionally scarce in resources, everything must fulfill more than one function working in a networked system rather than as individual elements. This can be interpreted as hybrid usage and multiple modes of circulation.

3.0 PRACTICE OF COMMONING

COMMUNAL SALE OF FISH AND HUNT

'GREETING OF THE SUN' TOWN RITUAL

FISHERMEN GATHERING TO DISCUSS THE DAY

* Polysyntheticity is a linguistic term describing languages which consist of long words created by stringing together many shorter words. The Greenlandic language is polysynthetic, as are many indigenous languages, and exemplifies how putting multiple parts together can create a new meaning.

The third practice, commoning, is the social act of establishing and maintaining common resources, which refers back to a long-standing practice of collectivity in Greenland. Could making the landscape more accessible to the community allow for a strengthening of commoning practices? This practice could be reflected in larger regional policies such as pan-Arctic collaborations, Indigenous-led land management and conservation strategies or, as more locally-based initiatives which foster necessary social resilience, such as shared community cold storage freezers.

Despite the inherent complexities, planning and building infrastructure in the Arctic is an urgent issue. Given the low population base in the region, it has been historically difficult to justify significant infrastructure development despite an increasing need. Adaptations in the landscape due to climatic changes, such as the rising water levels and thawing of permafrost, renders infrastructure development and implementation extremely challenging and yet even more pertinent. Taking these diverse issues into account, a holistic, hybrid approach that integrates infrastructure, landscape and social practices together could offer an alternative response to planning for Greenland's uncertain future.

Illustration and photos by authors

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A Canadian first in post-disaster building assessments

By Steven Bibby

BC Housing has released its latest damage assessment tool to support tenants, owners, occupants, and communities impacted by damaging events such as floods, fires, wind storms, and earthquakes.

A rapid assessment of the safety of structures evacuated because of a disaster reduces the disaster's social impact, allowing communities to recover quicker and reduce the impact on emergency and social service resources.

Damage assessment creates actionable intelligence

Rapid Damage Assessment is a process used by first and second responders to quickly assess buildings to determine whether they have become unsafe for occupancy. Using protocols which have been developed by the Applied Technology Council (ATC) in the USA, and adopted by several countries worldwide, the process allows people to categorize a building as being either unsafe, restricted use, or having no restrictions following a quick 30-minute assessment.

Assessors with some degree of engineering, architectural, technical, or construction knowledge are typically trained over a seven-hour period how to safely identify and record seven criteria (ATC 20 & ATC 45 criteria) which impact the safety or habitability of a building following a flood, earthquake, windstorm, or similar event. For example, they will observe the exterior of the building to identify whether any story is out of plumb or has the risk of falling objects. Inside of the building, they would also look for non-structural risks such as submerged gas and electrical fixtures, or the release of dangerous contaminants or environmental hazards. Once completed, they placard the building to advise occupants and visitors of the results of their assessment and to warn of any restrictions or unsafe conditions.

The research and the players

BC Housing has provided communities and individuals with Rapid Damage Assessment training for several decades. As the provincial agency that develops, manages, and administers a wide range of subsidized housing options across the province, it began training their own building management staff around 1990 to ensure that they could assess their own buildings quickly. In 2016, the agency embarked on a research project to identify best practices from around the world. Partnering with the Justice Institute of BC, Engineers and Geoscientists BC, and the Architectural Institute of BC, this team developed a Post Disaster Building Assessment (PDBA) Framework and Recommendations that communities across the country can use in advance of natural hazards or emergency situations.

The Framework can help communities determine which teams will be responding in an emergency and equip the teams to ensure that they have the tools necessary to perform Post-Disaster Building Assessments. This supports communities in their ability to get people back in their homes as quickly and safely as possible. The Framework includes the shared expertise of 49 organizations from around the globe that are involved in related building assessment fields such as engineering, search and rescue, and emergency management. The research project was funded by the Canadian Safety and Security Program, a federal program led by Defence Research and Development Canada's Centre for Security Science (DRDC CSS) in partnership with Public Safety Canada.

Tools in practice

The framework and the tools are experiential and capture learning from the 2011 earthquake and tsunami in Japan, several earthquakes in New Zealand, and local events in British Columbia and Alberta. When flooding impacted the community of Grand Forks in May 2018, BC Housing aided with training and coordinating personnel to use the PDBA process for their homes and businesses. This process was a key contributing factor in people being able to return to their homes or businesses quicker, and for identifying those which had restrictions or that was unsafe for occupancy. BC Housing's PDBA process allowed emergency personnel to quickly identify the status of businesses and residences.

BC Housing also shared the Geographic Information System (GIS) based tools with Alberta in 2016, which they used to assist evacuees following their devastating fires in Fort McMurray. BC Housing's damage assessment training had been provided to emergency personnel in Alberta only a few years prior, following the 2013 floods in Calgary and High River. The GIS tools were developed jointly by BC Housing, North Shore Emergency Management, and the Faculty of Applied Science at the University of British Columbia, and are now managed by GeoBC.

Facing unique challenges

Some of the unique challenges and findings reported within the framework address issues such as the team assignments. While considerable research is available on building engineering practice, the framework revealed information on subjects with little or no previously documented process, such as the best practices and adapting standards for building typology, assessor and coordinator curriculum, placard wording, team assignments, and the coordination structure. The complexity and crossover points of the overall assessment process were identified as a "system of systems," tying together emergency management, search and rescue, safety assessments, situational awareness, information management, and other related components.

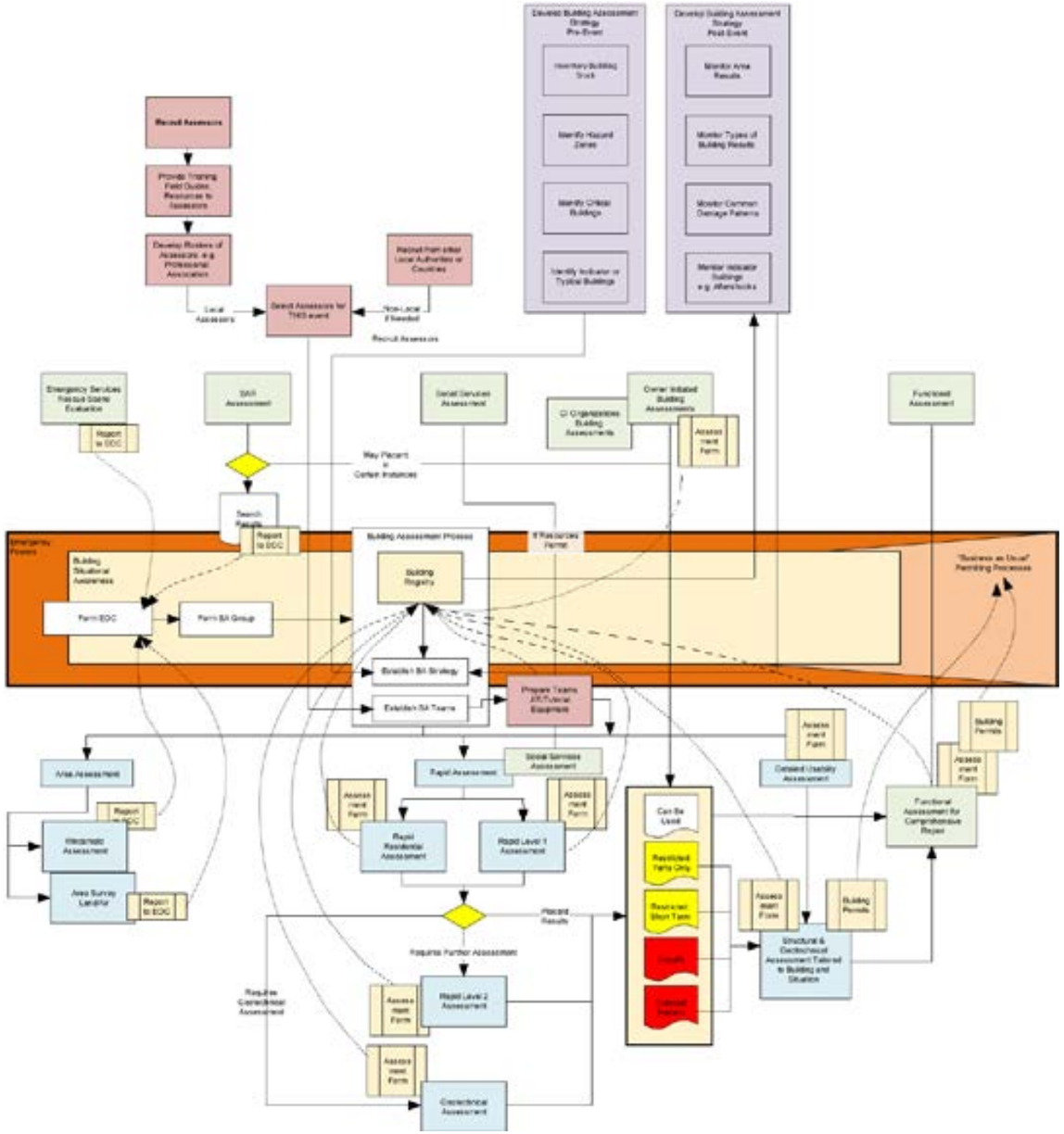
For example, the Framework identified and recommended a unique approach for BC by including the Emergency Support Services (ESS) personnel in the team allocation. It also recommends the assessment of non-complex buildings by personnel with backgrounds in other areas of expertise that are appropriate for emergency situations, such as construction and emergency managers. This approach helps to overcome a well-known issue of engineer availability in disasters, by helping to assess buildings within the skill set of other available personnel while developing a triage process based on both building importance and typology. It is also one of the most challenging recommendations, as it requires agreement and definition on the building typology as it relates to the skills and credentials of those tasked to assess them.

Additional tools and resources

In addition to the BC PDBA Framework, BC Housing has created internationally-recognized tools, including the newly released Building Assessor Registry. The first of its kind in Canada, the Registry permits BC Housing to rapidly link assessors with communities requiring their services. It also allows individuals to self-identify their training, qualifications, contact information, and their willingness to assist communities following a damaging event. Any community impacted by such an event and requiring building assessors can contact BC Housing through EMBC to request their help. BC

Housing will then contact the assessors and connect them with the impacted community for deployment.

In order to develop provincially recognized credentials, qualifications, forms, and training, a provincial PDBA Advisory Committee was formed in 2018 to represent the primary stakeholders who would be involved in the process. The advisory committee includes representation from small, large and Indigenous communities, along with provincial ministries and agencies, and many professional organizations representing architects, engineers, building officials, technologists, facilities managers, and others. This Advisory Committee meets cyclically to ensure that the tools, processes, and governance will continue to meet the needs of the communities and the province. Through the PDBA Research Project, they have also developed a network of international experts in building assessment who can be called upon to assist when needed.



BC Housing continues to meet with representatives from other provinces, territories, and countries to encourage the development of a unified national and international PDBA program. In support of this endeavor, resources such as the research, recommendations, tools, placards and further information gathered are available for free on the BC Housing website or by contacting the author and BC Housing's Security and Emergency Services staff at ses@bchousing.org.

Several ongoing challenges still exist within BC, for example, civil liability protection and ownership of the overall assessment process. Providing civil liability protection to assessors depends on several factors, such as a universally accepted definition of building typology along with a minimum standard of the curriculum which can lead to certification. Ownership of an overall assessment process is also challenging, and the Framework describes it as a system of systems (see Figure 1). For example, a robust assessment system would incorporate and correlate the post-disaster results related to community facilities, critical buildings, housing, bridges, energy supply systems, and other critical infrastructure. Each of these is typically managed and reviewed by different organizations, each with its own system of assessment, training, and reporting. There is no single branch of government or single non-government organization responsible for the entire system, and an unwillingness to take on the entire process given the scarce availability of resources.

BC Housing regularly provides two levels of training for individuals, communities, and organizations in support of the PDBA program. BC Housing's Rapid Damage Assessment training teaches people how to quickly assess buildings to determine whether they are unsafe to occupy using internationally adopted protocols developed by the Applied Technology Council (ATC). For communities and organizations who need to develop or manage their own PDBA program, they offer the Coordination of Damage Assessment training. Engineers and Geoscientists BC have begun providing technical training for engineers and others who use monitoring devices for their prioritized post-earthquake response and assessments. The Architectural Institute of BC also provides the ATC training to their membership and guests based on a model from California's Safety Assessment Program.

Steven Bibby is the Director of Security and Emergency Services at BC Housing, leading the emergency management, business continuity and security programs for the provincial agency since 2005. He is the Co-Chair of the BC Post-Disaster Building Assessment Advisory Committee, and his emergency response experience has been developed working as a practitioner at emergencies throughout Canada since 1997, along with research in Japan since 2008 and in New Zealand, Italy and Greece.

For good measure:

A methodology for emergency management performance measurement

By Bethany Moore, MPA, CEM

In today's era of accountability, it has never been more important for emergency managers to demonstrate their progress towards achieving program goals and desired outcomes. Performance measurement systems are designed to do just that – to allow an entity to establish a baseline (where are we now?), to track and measure progress (how far have we come?) and to provide evidence of outcomes achieved (what have we accomplished?). Establishing that the work we do is making a difference is important both from an organizational perspective and for the field of emergency management overall. From an organizational perspective, the ability to provide evidence of achievements could mean the difference between securing or losing program funding. Performance measurement also benefits the field of emergency management by providing evidence to support further investment in initiatives that have achieved measurable results for organizations and communities. The field of emergency management is several years away from standardized, industry-wide performance measures, but many organizations are facing pressure to establish performance measures in the short term. In this article, I describe a methodology for designing a performance measurement system in emergency management.

My research and experience in the area of performance measure is from the health care emergency management perspective. The health care perspective is useful in this context because there are many lessons that emergency managers can draw from the health care field in relation to performance measurement. In health care, performance measurement is highly structured and the standards for data and reporting are some of the highest of any field of practice. As an entity operating within the Canadian health care system, Alberta Health Services (AHS) tracks and measures its performance in cooperation with two external entities that set out specific goals, outcomes and standards for measurement and data: the Canadian Institute for Health Information and the Health Quality Council of Alberta (Alberta Health Services, 2017). Unfortunately, the kind of nationally recognized, evidence-based and outcome-focused performance measures that have become the norm for health care organizations do not yet exist for emergency management. So, when we set out to design a robust performance measurement framework for emergency management within AHS, the challenge was steep. Our performance reporting would sit next to that of clinical areas where tracking and measurement of performance is designed to meet the highest levels of scrutiny, leaving us to wonder, how would we measure up?

Tying performance to improved outcomes

One of the key challenges to performance measurement in the field of emergency management is a lack of performance data that directly ties our performance to improved outcomes in actual emergency and disaster events. In health care, randomized controlled trials and cohort studies allow us to objectively assess the impact of operational changes that improve or worsen patient outcomes. The nature of disaster events makes it challenging to do the same from an emergency management perspective in assessing the impact of emergency preparedness initiatives.

The realization of our emergency preparedness efforts occurs only in the aftermath of infrequent emergency and disaster events that unfold in complex, unpredictable ways. The outcome of any given disaster results from a combination of factors that include both performance-related elements, such as preparedness initiatives and response effectiveness, and non-performance related elements, such as the timing and severity of the event itself. Even the most robust post-incident analysis is rarely able to directly link outcomes such as the number of deaths resulting from a particular disaster to specific performance-related factors. No two disasters are the same, and even when an organization or jurisdiction faces similar events multiple times, or similar events occur across multiple jurisdictions, assessments of how well an organization performed can vary widely depending on the perspective. Collecting valuable performance-related evidence during and post-disaster is possible but requires robust performance measurement processes that can establish direct links between your performance and observed outcomes.

Forward-thinking emergency managers today have an opportunity to be at the forefront of performance measurement in emergency management by designing, implementing and refining performance measurement systems that will help to build a foundation for an industry-wide, evidence-based and outcome-focused performance measures framework. To do this, I propose a five-step methodology for practitioners to establish an emergency management performance measurement system for their organization.

Step 1:
Establish a Framework

A framework is essential as the basis for how you will assess performance. The purpose of a framework is to set out the broader organizational goals that will form the basis for the performance measures that you will put into place.

Performance measurement frameworks can take many forms, and are often built around a pre-established, organization-specific vision and mission. For example, a community jurisdiction may establish a broad vision to be the greenest city in Canada. Since achieving this vision requires the participation of all city departments and services, organizational direction may require the emergency management program to focus its performance measurement on this vision and any associated strategies set out by the organization. This forms the framework for development of program-specific performance measures.

For emergency management programs that have more freedom in establishing a framework for performance measurement, there are numerous approaches that can and have been successfully adapted to emergency management. However, a review of the literature in this area reveals that there is no single approach that is widely accepted across the industry. As performance measurement in emergency management matures, tried and tested and commonly-accepted frameworks will emerge. For now, though, most organizations will need to tailor existing approaches to meet organizational needs.

Here, I focus on only two common approaches to performance measurement that can be adapted to any emergency management program: an industry standards approach, and a Balanced Scorecard (BSC) approach.

Industry Standards Approach

In some organizations, particularly those that operate in heavily regulated environments, compliance with industry standards is viewed as paramount to performance. This approach has also been endorsed in the literature as an effective framework that also has the benefit of allowing for benchmarking to compare across organizations (Office of the Auditor General…, 2010). If your organizational culture places a high value on industry standards, this approach may be the best fit to gain buy-in for your performance measures.

The challenge with using industry standards as a performance measurement framework, is that standards are designed to assess a current state or snapshot in time rather than provide a basis for measuring progress. Further, most industry standards focus on structure (such as establishing an emergency management program or dedicated position), process (such as conducting a planning meeting) and outputs (such as completing a response plan) rather than the outcomes these activities are seeking to achieve. The focus on structure, process and output in terms of whether or not the organization meets the criteria set out in standards typically leaves little room for assessment of quality and effectiveness.

The Canadian Standards Association's Z1600 standard for Emergency Management and Business Continuity Programs is one of the most widely used standards in emergency management in Canada and has been adapted for performance measurement purposes in Alberta Health Services. While the standard offers a holistic view of emergency management that is applicable across organizations of all types and sizes, its generalizability also presents challenges in using it to assess performance in a specific organization or jurisdiction. Without establishing an organization-specific interpretation, it can be difficult to establish consensus on what exactly full compliance with each clause in the standard entails. Further, many elements of the standard offer little in the way of guidance for organizations to assess the actual impact of their efforts. As a result, if you plan to use an industry standard as the framework for performance measurement, be aware that standards cannot just be taken at face value for performance measurement purposes. For organizations that are willing to put in the work to interpret and adapt industry standards, they can be a useful framework as the basis for performance measurement in emergency management.

Balanced Scorecard (BSC) Approach

In contrast to an industry standard approach, the BSC approach provides maximum flexibility to an organization in establishing a framework for performance measurement. The BSC is one of the most commonly used and widely researched frameworks for performance measurement in both the public and private sectors (Mackay, 2004; Micheli & Kennerley, 2005). A traditional BSC, developed for the private sector, sets out four perspectives of performance: financial, customer, internal business process and learning and innovation. Each of the perspectives is linked to a common strategic goal. The perspectives that are used in a BSC are often adapted to organization-specific priorities and may include fewer or more than four perspectives. In the emergency management context, this may take the form of quadrants representing the four phases of emergency management, or organization-specific program objectives (see Figure 1). A BSC approach also allows organizations to easily integrate new and innovative perspectives into their performance measurement, such as inequity reduction or equity making in how the organization prepares for and responds to disaster.

In a BSC, all of the perspectives are linked together with causal relationships that set out what must be achieved in one perspective to enable achievement in another perspective. A BSC provides a framework for establishing multiple, linked perspectives of performance, but does not dictate the specific measures of performance. As a result, organizations using a BSC have a great deal of flexibility to not only decide where they are focusing the spotlight in looking at performance (the perspectives), but also what specific measures they will use to assess that performance.

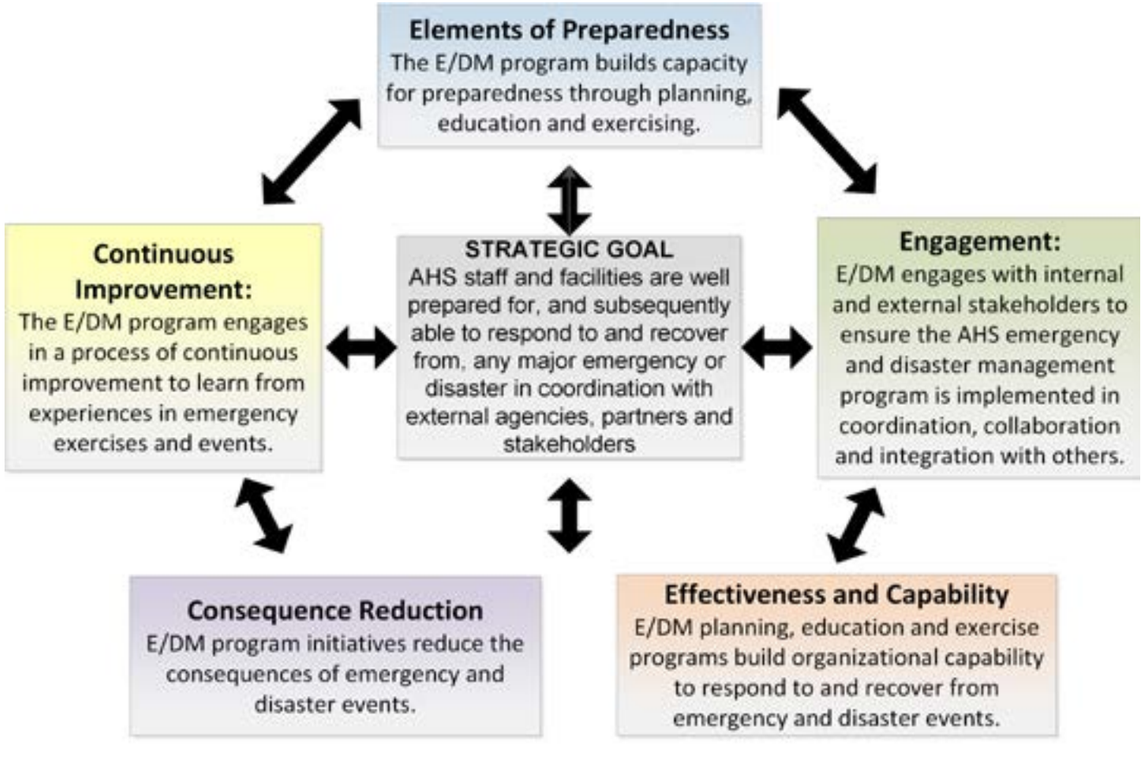


Figure 1: Example adaptation of a Balanced Scorecard to emergency management

Step 2: Develop Performance Measures

Once you have established a framework for performance measurement, the next step is to determine how you will measure performance within that framework. Performance measures are often a combination of two things: Indicators, which quantify a specific element of performance, such as number of staff trained, percentage of plans completed, or score on a stakeholder evaluation survey; and Metrics: which are a combination of indicators that, taken together, indicate progress towards a particular objective.

Whether you choose an industry standard approach or a BSC approach, you will need to develop indicators for each clause of the standard, or each BSC perspective, that set out measurable aspects of performance. For example, a BSC perspective focusing on stakeholder engagement may include a handful of metrics such as, internal stakeholder engagement, external stakeholder engagement, and public engagement. Each of these metrics should have one or more indicators associated with it. For external stakeholder engagement, this may include metrics looking at frequency of stakeholder meetings, stakeholder participation in emergency exercises, and the results of an annual stakeholder engagement survey.

Using proxy measures to measure inequity

Because of the difficulties in directly linking emergency management performance to disaster outcomes, we often rely on proxy measures as the next best thing. A proxy measure is "an indirect measure of the desired outcome which is itself strongly correlated to that outcome" (GovEx, 2019). In emergency management, proxy measures are necessary to capture performance in achieving some of the most important emergency management outcomes, such as reducing the amount of suffering or destruction that results from an event. In these cases where direct measurement is not possible, we instead establish indicators that have strong evidence of being linked to actual desired outcomes.

Reducing inequity in disaster is one example of an outcome that may require proxy measures to assess from a performance perspective. Knowing that the most vulnerable individuals are disproportionately impacted by disaster, a jurisdiction may establish a performance goal to reduce inequity in disaster for its population. To measure this, they would need to look first at structure, process and outputs, and then at outcome, or proxy outcome, measures. Examples of indicators may be: a structural indicator assessing evidence that a working group to tackle the issue has been established; process indicators counting frequency of meetings or stakeholder and vulnerable population attendance at those meetings; and an output indicator for the development and approval of a jurisdictional plan for how inequity will be addressed in disaster.

Measuring what is most important

True outcome measures in this example would require data collection across multiple disasters where impacts are widespread across both vulnerable and non-vulnerable segments of the population. Even then, it would be difficult to establish that improvements in equity were a direct result of reducing inequity initiatives. Since true outcome measures are not possible, the jurisdiction would need to establish proxy measures for the goal of reducing inequity. For example, knowing that individuals of lower socioeconomic status have lower levels of individual personal preparedness (Ablah, Konda & Kelley, 2009), the jurisdiction could establish a proxy measure based on a survey of household preparedness, comparing low income and high income areas. The jurisdiction could also collect valuable performance data during disaster showing trends in how both vulnerable and non-vulnerable populations access services in disaster.

Quality over quantity is key when it comes to developing performance measures. An outcome-based approach means measuring aspects of performance that are more resource-intensive in terms of data collection, so it is essential to focus your efforts on indicators that provide the most valuable information. An effective performance measurement system does not measure everything, it measures what is most important. Figuring out what is most important to your organization based on strategic goals for the program is an crucial step in identifying the performance measures you will use.

Step 3:
Collect Data

All performance measurement requires collection of data. In some cases, this may be data you are already collecting that you can analyze for performance measurement purposes. In other cases, new data collection and analysis processes may need to be established. For example, organizational performance in emergency exercises is a common measure that organizations seek to use in emergency management. Exercises, after all, are the closest thing to a real event that we can replicate in a scheduled, structured way. However, the subjective nature of most post-exercise reports makes them difficult to use in performance reporting if you want to establish quantifiable trends over time. To do so, you would need to implement consistent evaluation processes across every exercise to ensure you are collecting the same information in the same way.

Some of the most valuable data that you can collect will require complex data collection processes. For example, community jurisdictions often establish goals of a more resilient population. Assessing the population impacts of program performance significantly increases the complexity of the performance measurement design. It means that you must collect data not only internally within your program, but also from external stakeholders and others whose behavior you are seeking to change. While this is more resource-intensive than a program-based approach, the benefit is that you are gathering performance data that is meaningful not just within your program or organization, but to the wider community or group that you serve.

Assessing progress towards actual population outcomes also requires routinely collecting data from the public in the form of surveys or other resource-intensive initiatives. This kind of data collection involving the public often also requires a privacy impact assessment and other ethical considerations. In these cases, it is important to consider the feasibility of data collection at the outset when you are establishing performance measures. Consider cost and other resource constraints that may limit your ability to collect complex data. Meaningful, outcome focused data can be gathered as part of your routine work, but it requires some effort at the outset to implement the operational practices needed to ensure you are collecting accurate data that will provide you with meaningful performance information.

Step 4:
Establish Reporting

With a framework in place and performance measures and data collection procedures established, you must then determine how best to report performance. In cases where your performance measurement framework has been pre-established by the organization, reporting may also be required to follow a particular format. In other cases, you will need to determine how best to present the data so that it achieves the goals set out for the performance measurement. An industry standard approach is often suited to reporting by compliance percentages, while a BSC approach provides more flexibility in how you report on performance.

Consider the audience for the performance reporting – do they want performance data that can easily be summed up in a short presentation with highly visual graphs? Or do they want to be able to explore the performance data in detail to help inform strategic planning? Understanding the needs of your audience will help to guide the type and frequency of reporting.

Regardless of how you decide to report on performance, it is important to be fully transparent about the basis for the performance information that you are reporting. In many cases, particularly with an industry standards approach, you may need to establish weighting across the performance measures. If you have established 100 performance indicators based on an industry standard, reporting only the compliance percentage does not tell the whole story. The clauses in industry standards can range in impact from highly insignificant, to an essential component of organizational performance. Knowing that not all 100 indicators contribute equally to achieving desired outcomes, you will either need to apply weighting to ensure that you are providing an accurate representation of performance in your reporting; or choose a handful of key performance indicators from the standard to focus on and provide in-depth reporting on those.

Step 5:
Monitor and Maintain

Performance measurement is not a 'set it and forget it' system. Organizational priorities often change, which may require you to adjust to a new framework or shift direction towards new strategic goals. Despite these shifts, much of the work involved in identifying outcomes and developing indicators can be easily adapted to a new framework or approach as needed.

Indicators should be reviewed and refined frequently, particularly when organizational processes change. Issues with data collection may also arise, requiring you to rethink your approach or adjust indicators. Finally, any weighting that you have applied for reporting purposes should also be continually re-assessed to ensure that performance reporting is accurate.

Conclusion

Performance measurement is one of many tools that emergency managers can use to demonstrate value, to aid in strategic decision making and to meet stakeholder expectations. Performance measures alone do not necessarily improve performance, but as Rozner (2013) points out, "they do provide 'signposts' that signal progress toward goals and objectives as well as opportunities for improvement." The value that you get out of performance measurement will largely depend on the work that you put in finding meaningful measures and collecting robust data.

The kind of performance measurement that we see in the health care field did not happen overnight. It is the product of decades of refinement, use and implementation by hundreds of organizations. It's built into the everyday practice of front line health care providers, and supported by organizational commitment to collecting defensible data. The field of emergency management has a long way to go towards industry-wide performance measures, but there are numerous approaches that you can take today to build useful and defensible performance measures for your emergency management program. Further, efforts today will create a body of practice that will one day help to form the building blocks of benchmark standards across the industry.

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Beyond traditional leadership: Re-defining Emergency Management Core Competencies

By Sarah Thompson

Emergency managers have always operated in a paradigm of complexity that crosses jurisdictional boundaries. The underlying need for critical decision-making in situations with high risk and pressing uncertainty remains central and consistent (Vitoriano, Montero, & Ruan, 2013).

There are undeniably distinct chapters in the history of Canadian emergency management, over a century of shifting government programs, environmental policies, construction practices and other variables that revise the framework of our profession (McEntire, 2004; Blaikie, Cannon, Ian, & Wisner, 2004; Mietti, 1999). Throughout this history, the traditional and hierarchical command and control model of government has been at the centre of this system, including the 1950s mindset of Civil Defence to the War Measures Act and beyond (Lindsay, 2009).

This historical emphasis on direction, rather than collaboration, and control over coordination, underpins emergency management as a profession, as well as the workplace culture more generally. We often see this represented in 'siloed' government programs as well as in our command and control models of response (for example, the Incident Management System). In the modern age of the discipline, we thus retain a legacy of professional competencies and leadership styles that are strongly linked to these systems of management. While functional flexibility and scalability are inherent within these systems, such structures are ultimately built around the more limited concept of direction by a designated individual, over assigned resources. To survive the modern reality of public safety, emergency management will need to develop core competencies beyond concepts of traditional leadership.

Building on foundations of emergency management

The foundations of emergency management has enabled adaptation to some modern challenges. Technological changes, such as increased digital connectivity and availability of information, have had a substantial effect on workplace culture and ways of doing business. We also see a trend towards more female and culturally diverse workplace environments (Jackson, Alberti, & Snipes, 2014) as well as a more genuine and concerted effort towards inclusivity and meaningful dialogue.

In addition, the once-radical 'whole-of-community' approach to emergency management, now endorsed nationally by the recently published Emergency Management Strategy for Canada: Toward a Resilient 2030 (Public Safety Canada, 2019). This report was designed in part to fulfill the Government of Canada's commitment to the Sendai Framework, but such approaches are rooted in far older examples (Young, 1997; FEMA, 2011). While such concepts are far from new, their inclusion in the national strategy also reflects a change in our professional culture in Canada.

More representative organizations will help ensure greater visibility of the needs of currently unrepresented and vulnerable groups, highlight and reduce inequities in the provision of emergency support and invite more inclusive and balanced dialogue (Enarson, 2007; Krüger et al., 2015). However, many studies show the continued presence of barriers to leadership positions for women, visible minorities and members of the LGBTQ2S community in particular (Shreave, 2017; Hewitt, 1995). Therefore, building upon the foundations of our discipline should undoubtedly include specific and deliberate efforts to foster more representative teams, particularly in leadership roles. It should also include professional development that is responsive to our modern paradigm of leadership.

A changing culture of leadership

Across time, as well as social, cultural and political change, the need has remained for decision-makers who can adapt and manage well in times of crisis. But along the way, something else has happened: the workplace context and culture of leadership and decision-making has changed.

Decision-making is now more collaborative, data-driven and integrated than it has ever been. This cultivation of modern approaches to emergency management has been led by a generation of professionals that has managed events from Y2K and 9/11 to Hurricane Katrina and severe acute respiratory syndrome (SARS). Such professionals understand the need for coordination rather than control, which inherently includes the need for a greater range of perspectives in decision-making.

But even now, emergency managers find themselves trapped between the need for modern approaches, and the strengths of traditional hierarchical formats. We continue to see challenges created by our legacy of command and control management styles, the same challenge outlined 20 years ago when David Neal and Brenda Phillips made the argument that "Four decades of systematic research shows that a rigid, bureaucratic command and control approach to emergency management generally leads to an ineffective emergency response" (Neal & Phillips, 1995, p. 1). To develop truly scalable and flexible programs, the profession will need to do more than adapt existing approaches; it will need to evolve beyond them. But how does such evolution occur?

A Cultivating leadership

The trends outlined will further increase the growing importance for professionals in emergency management to be coordinators, bridge-builders, negotiators, and mediators. Such change necessitates the deliberate and ongoing development of core leadership qualities and so-called 'soft' skills. In this case, soft should not be confused with 'weak' or 'unnecessary' (Morden, 2016). A prominent modern example of this is the 'transformation' leadership model, which posits that effective leadership empowers team members to think independently, critically and creatively and aims to raise their level of autonomy and self-confidence (Gill, 2011; Pedler, Burgoyne, & Boydell, 2004). The importance of investing time and energy in the development of these skills must not be overlooked.

Rather, their importance is equivalent to the foundational principles of emergency management that we all rely on. Regardless of the management structure in question, it is relatively easy to see that such qualities are key to the effectiveness in all pillars of emergency management. It is also becoming clearer that in the modern paradigm of emergency management that leadership qualities cannot be the exclusive purview of the Incident Commander and leadership skills can no longer be viewed as belonging only to traditional decision-makers (Higgs & Dulewicz, 2016). While levels of authority and decision-making power necessarily differ, the operational structure for response would greatly benefit from such skills across all roles at the Emergency Operations Centre and at an incident site.

Without disregarding the lessons of our past, and the many (still current) benefits of the command and control principles, we must cultivate leadership skills and qualities at every level of the organization. To effectively stimulate a more consistent effort toward the development of appropriate skills across the discipline, we must begin with updating the core competencies of the discipline.

Therefore, it is suggested that development of core competencies to fit the modern paradigm of emergency management should begin with management competencies which are vital to all roles and functions:

- Stress management (self and team)
- Strategic and critical thinking (anticipation of future challenges, problem-solving, coping with changing situations and environments)
- Team development (enhance social relations and define roles within teams, as a lead or team member)
- Interpersonal skills (building morale, maintaining relationships, etc.)
- Listening (listening to hear, not listening to respond)
- Decision-making techniques (consensus, democratic, etc.)
- Empathy (ability to put yourself in another person's shoes)

While such skills can be taught in the classroom, it is important to recognize that they develop and mature in the workplace. Equally important is to recognize that the modern paradigm of emergency management is more female and culturally diverse than ever. Therefore, the development of skills tailored to the realities of modern Emergency Management will depend at least in part on the ability to create inclusive and diverse workplaces (Young & Pyke, 2018).

While emergency managers strive towards the goals of the Sendai Framework in day-to-day work, such efforts must be emulated in the workforce composition and culture. This brings back concepts such as whole-of-society approaches to emergency management. Implemented in the context of a workplace, this should include efforts to build a workforce with diversity of culture, age, and perspectives – one that is representative of the public.

Such diversity has clear benefits beyond the development of leadership skills. In addition to reinforcing concepts of creativity and self-confidence, diverse workplaces also help increase cultural competence and broaden approaches to problem-solving.

In conclusion, emergency management professionals should not feel limited by the proud legacy of traditional command and control structures, and the leadership qualities they have fostered. To evolve beyond the current paradigm of emergency management, to meet modern and future demands of the discipline, focus should be centered on enhancing and updating core leadership competencies. The continued evolution should foster opportunities for women, people of colour, Indigenous youth and other under-represented groups to become part of the way forward. All these components together will contribute to the development core competencies beyond concepts of traditional leadership.

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Lake Manitoba power outage reflections: Off-grid lessons revived

Good Day All,

I hope everyone is having a good day.

This power outage in Lake Manitoba has surely been intense at times. We've been so busy maintaining everything with the upkeep: keeping us warm and wearing layers of warm clothing and having water and wood in the house at all times.

About thirty years ago, I listened to Elder's and Knowledge holders speak about a time of a change coming. I shared what I heard to many: I don't think they believed me or maybe they thought I was crazy. The Elders said, get ready and prepare for what is coming. The winds and the fires are going to increase. There is going to be flooding. I experienced a flood in our community in 2011. I hear of all the catastrophic events happening around the world and around us. I guess it was a matter of time again before something else hits in our area.

Most recently I heard an Elder share that a dream came to his fellow Elder, which was shared to him, that he believed a time was near where something was going to happen. I'm now experiencing a power outage that forced me off the grid (well somewhat) and off some of the dependencies and conveniences of my comforts. However, my thought is that it may be just a taste and a test of what else could come and will come our way to be better prepared for next time, if that's even possible. I might sound selfish to others but I'm thankful that I've been given this time of endurance and perseverance.

I also heard my late dad as he shared with me that he was told by his grandmother that the future was going to be difficult and he had to be cautious, that it was going to be very difficult to raise children completely into their maturity of adulthood. Angomisin (be cautious) is what she said to him. My dad shared this with me three months before he passed away. I have to say, it's been nice to be at home and to be by the fire by my wood cookstove and cook from it and have my candles lit every evening until bedtime. Yes, it's a lot of work, but it's also a feeling of gratefulness. I grew up in a home with no running water and a wood cookstove. My parents always had an indoor stove. To this day, my mother still maintains a wood stove and she is 75 years old. My late Kokoom had a wood stove inside her small home and one for outdoors.

She woke up with the sun every morning and she was outside at the break of dawn saying her prayers and greeting the new day. She utilized her stove for cooking, bathing, washing, and laundry. I also watched my grandmother wash her laundry in a washtub with a washboard and hang her laundry outdoors on her clothesline.

My Kokoom was not rich but she was rich with her kindness and warmth and lots of love in her home. This power outage has reminded me of the beautiful and treasured memories that I grew up in as a child when I stayed with her. As well with my parents.

I've been reminded and shown that the colonial system can at any time come to a halt and stop us in an instant. The ferocious and the power of the winds and the heavy snow rip the hydro lines down and laid the wire and poles. The power of nature has the power to force us into total submission. As well as to determine the continuance of life.

Humanity has become so comfortable and so dependent on the system of greed, power, jealousy, hate, addiction, drugs and selfishness. But let us be reminded that the things I've mentioned are not what's going to help us to survive and to a life of good health and well-being. I have sat in many events, gathering, language camps and meetings with Knowledge holders, Elders and grandmother's from across the country at the Turtle Lodge in Sagkeeng, Manitoba on the topic of climate change and survival skills. The outcome from these events has always led us to teach our children about the sacredness of life and to respect the earth and all of its life. The animals, medicines, plants, fire, and water. If we respect and acknowledge their sacredness then the Earth Mother would continue to take care of us.

At the end of each day, I'm exhausted from the physical labour of maintaining our home. My husband and I prepare the day before for the next day. Bring our water in, keep it on the stove to warm and for use. He makes sure that our wood is chopped for the next morning for washing up and cooking and of course to have a fresh cup of coffee. The house is rather cool in the mornings as it's not as warm when we get up, although we stoke our fire during the night and put a few logs in to keep it going. But usually, it's a solid sleep as we're so tired from the day.

Our people of long ago were healthy, free of diabetes, cancer and heart disease because they worked hard. They worked from dawn to dusk. They knew how to survive. They ate the natural foods that were known to their area. Our youth are so disconnected from their natural environment; it is sad, because they are not being taught about a way of life on the values of survival and sustainability. My ancestors were very self-sufficient people. They led a good life of good health and happiness. They were strong and vibrant people.

These are things that I have thought about these last several days while without electricity and all the luxuries that come with it that I get to enjoy daily. This power outage is humbling. The only sad part about it is that not everyone has experienced what I have for people to understand. Life is so fragile. Don't ever take things for granted.

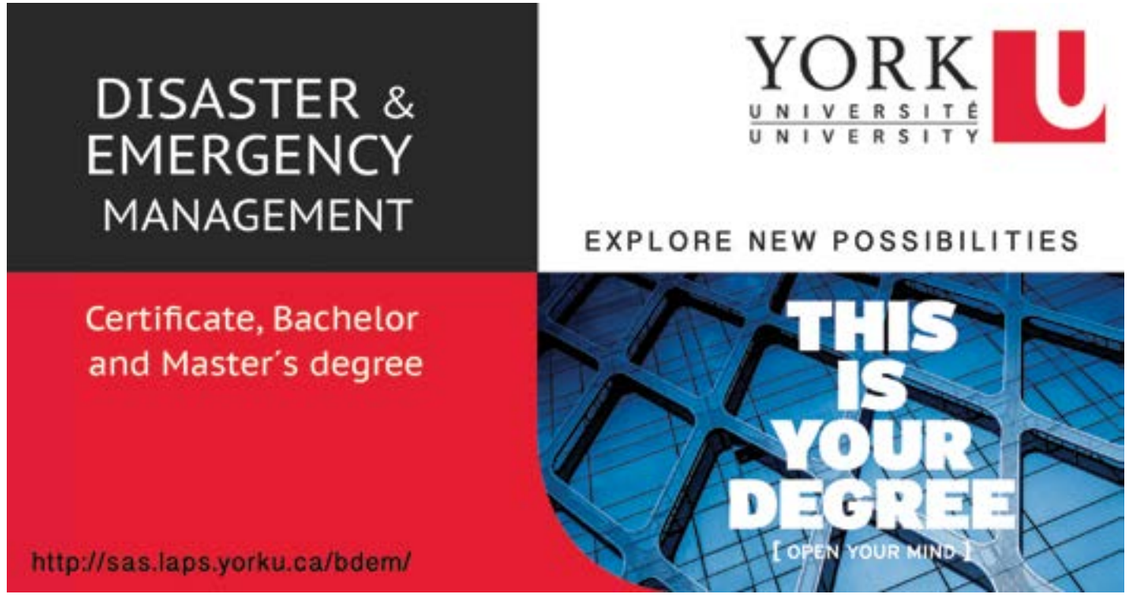
Kinanakomin

Zoongi Gabawa Ozawa Kinew Ikwe, Strong Standing Golden Eagle Woman,

Mary Maytwayashing, Anishinaabe Nation, Crane Clan

Mary Maytwayashing, (Zoongi Gabawi Ozawa Kinew Ikwe, Strong Standing Golden Eagle Woman) is from the Lake Manitoba First Nation aka, Animozibeeng, Dog Creek. Mary is an Anishinaabe Grandmother who leads Traditional Ceremonies. Mary's Western educational background is Social Work. Mary's professional career has been in the areas of Addictions/ Substance Abuse, Corrections, Child Welfare and Education. Mary's greatest learning has come from the Traditional Knowledge and Wisdom Holders with whom, she has the privilege of working with. Mary has had the fortune of working with people from all walks of life. Mary's passion continues to be in assisting and educating people about the Original and Ancient ways of the First People to these lands. Mary has facilitated along side Grandmothers and Elders teaching young girls and women on the Grandmothers Teachings "Coming of Age" Rites of Passage teachings. Mary's inspiration comes from experiencing and seeing the smiles on people's faces when they learn the Teachings of their people.

Mary believes that we are all born and gifted with a purpose. As humans we need to find what our purpose is. This can be done through our ceremonies and teachings. Mary continues to live her purpose by honoring and facilitating the teachings and sharing with the people.



FEATURE

Adopting a health equity lens in emergency management

By
Nicole Spence, Tasha-Aliya Kara, Katrina Plamondon,
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Adopting and applying a health equity lens onto policies is essential to reducing disproportionate impacts on populations and creating a more sustainable and equitable approach to disaster management.

Canada's citizens are some of the healthiest in the world, but the benefits of good health are not enjoyed equally by all. As the frequency and severity of extreme events increase in direct relation to climate change, globalization, and industrialization, vulnerable populations are disproportionately impacted. While these inequitable health burdens have been well explored, equity considerations in disaster management are not particularly well examined.

Some provinces have frameworks for health equity in disaster and emergency management; however, there is no national equity-based emergency management framework. And although equity and fairness are guiding principles in Canada's National Disaster Mitigation Strategy, there is a divide between policy and practice, imploring the question: How can we ensure well-intended policies are equitably informed?

Equity considerations are essential to reducing disproportionate impacts on populations and creating a more sustainable and equitable approach to disaster management. Otherwise, the increase in extreme events threatens to widen the existing health gap, in Canada and beyond.

Health inequities and disasters: A global perspective

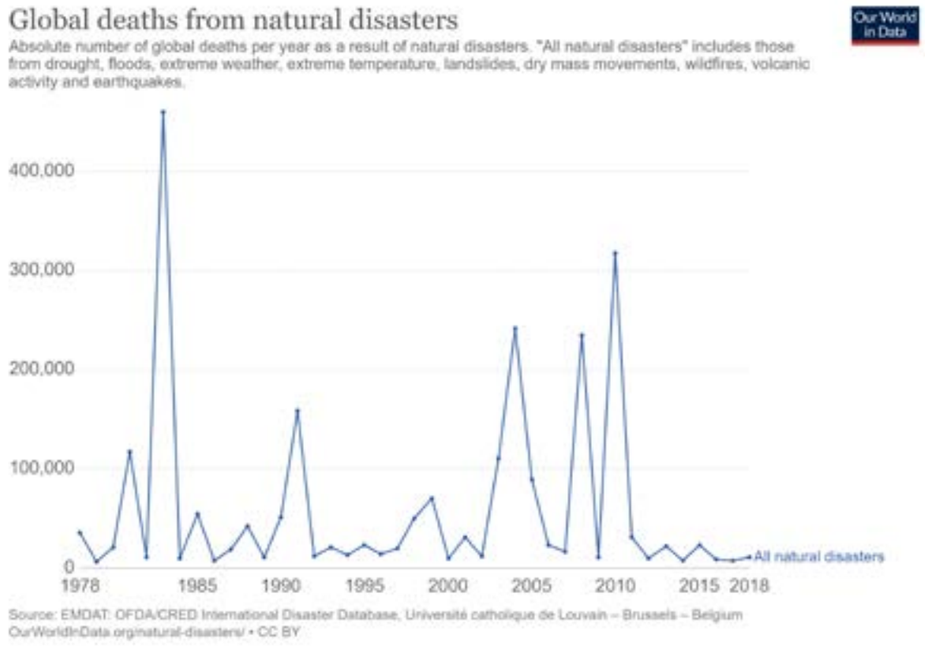
Disasters come in many forms, however, what is not often understood is the inequity of the health of those affected. In the past couple of decades, some scholars have begun to acknowledge that the assessment of those affected by post-disasters should address the inequities for the needs of socially vulnerable populations (Emrich, Tate, Larson & Zhou, 2019). What is clear however, is that **the roots of vulnerability during disasters such as the social, economic and health disparities endure**.

It is commonly understood that action taken outside the health sector can have health effects much greater than actions taken within it. To better address the health of a population, the inclusion of the social determinants of health - the economic and social conditions in which people live, learn, work, and play - is required. These factors are inequitable when they disproportionately advantage some groups over others, and can be avoided through policy or collective action (Stronks, Toebes, Hendriks, Ikram, & Venkatapuram, 2016; CCGHR, 2015).

More importantly, a social justice and human rights framework identifies the need to go beyond the immediate conditions of health burdens and focus on the causes of the causes: the fundamental structures of social hierarchy and social conditions. Through this lens, there are five drivers of health inequity: structural discrimination, income inequality and poverty, disparities in opportunity, disparities in political power, and governance that limits meaningful participation (ChangeLab Solutions, 2019, p. 9). By framing these structures and conditions as political determinants of health, it recognizes that **the social determinants of health include historical and ongoing political injustices**, and that health is ultimately determined by political decisions.

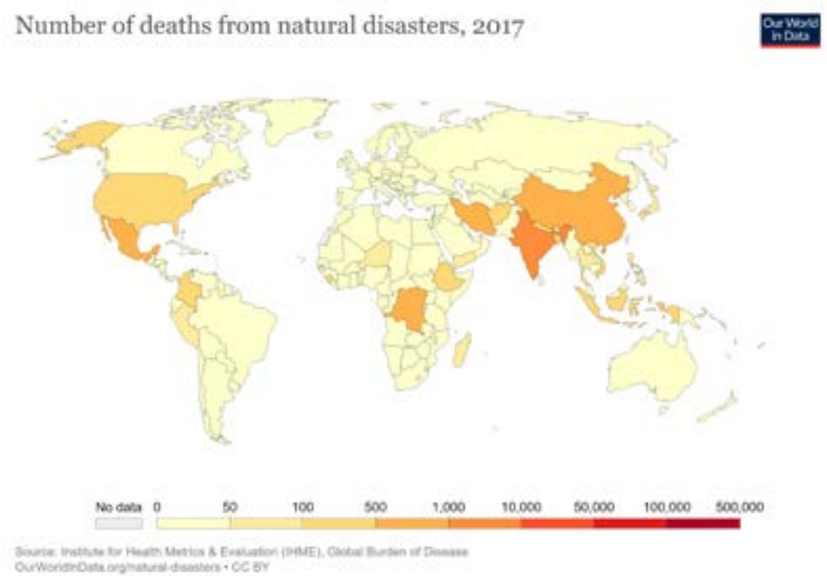
The inverse relationship between disasters and deaths

Examining the inverse relationship between extreme events and deaths exemplifies that the roots of inequities endure in a disaster. While extreme events have increased, disaster-related deaths from natural hazards have fallen significantly in the past century (see Figure 1). The observed decrease in deaths is a direct result of preparedness; however, it is not observed equally across all populations (see Figure 2). While higher-income countries experienced the majority of recorded disasters (56%) since 2000, lower-income countries suffered 68% of the disaster death toll (CRED, 2015). Of course, these differences are not only observed between countries, but exist where there is high variability within countries, regions, and municipalities - including Canada.



Total number of deaths as a result of disasters from natural hazards

Source: EMDAT (2019), CC BY 4.0



Distribution of deaths from natural hazards, 2017 Source: EMDAT (2019), CC BY 4.0

Climate change and inequities

Climate change has recently been declared as a health emergency by national and international governing bodies, panels, and committees. Climate-related disasters alone have increased by 44% from the 1994-2000 average and more than doubled the level in 1980-1989 (CRED, 2015), apparent in its domination of headlines in the media.

However, it is also ebbing away at communities' capacity and resilience. Critical infrastructure such as schools, health facilities, and roads, are increasingly damaged by seemingly small-scale weather events. This results in economic losses that undermine the ability of communities to invest in poverty reduction, health and education (UNDRR, 2019).

The sun sets on the west side of Vancouver during the 2017 wildfire season. Photo used with permission from Nicole Spence

As environmental changes challenge the health and economy of many nations, an increasing global trend is emerging: **rural and underserved communities are the most vulnerable to these risks and exacerbating present non-climatic inequities.** The injustice of this issue is underlined by the fact the regions experiencing the greatest increase in climate-related diseases and events are the communities that are the least responsible for the increase in greenhouse gas emissions. Worse, these communities often have the least amount of resources to adapt, become prepared, withstand, and recover from extreme events (Levy & Patz, 2015; Patz et al., 2007).

The implication of this is that development has helped increase preparedness for some, but that very development creates disaster risk and threatens development for others. It follows that efforts to protect vulnerable population groups not only serve ethical purposes but also facilitate economic growth and development, thereby decreasing regional inequities (Levy & Patz, 2015; Patz et al., 2007). Therefore, **climate change is a critical component of any equity discussion and vice versa.**

Equity challenges and opportunities in Canada

Canada has often aspired to be a socially progressive force at home and abroad, and its history of nation building has been translated into an approach to global health that is focused on equity and global citizenship (Nixon et al., 2018). Yet there are certain populations and geographic areas in Canada with similar conditions and health burdens to developing nations.

These conditions are particularly observed amongst those with lower socioeconomic status as well as First Nations, Inuit and Métis peoples. **The inequities are rooted in colonial history and perpetuated by income inequality, gender identity, and racism**, amongst other factors. For example, in pre-contact times (i.e. before settlers arrived), First Nations benefited from a strong health care system with ceremonial, spiritual, and physical elements, including a connection to nature and maintaining a healthy balance with the ecosystem. When the churches and government exerted control during colonization, traditional health systems were eradicated or repressed. Western medicine that was availed was sporadic or segregated and was highly associated with residential school experimentation on children. Furthermore, it only contained one of the three historical elements of First Nations health systems, often leaving people feeling neglected or emotionally distraught, and with low trust in the system (FNHA, 2019). These issues persist today, resulting in lower life expectancy and household food insecurity, and higher infant mortality and unintentional injury mortality. In some cases, these existing inequities are worsening (PHAC, 2018).

Exacerbating this, many parts of Canada are warming much faster than the rest of the world, particularly in areas with geographical barriers. **Between 1900 and 2013, the average temperature in British Columbia increased faster than the global average** (Abbott & Chapman, 2018), with an observed increase in duration and severity of wildfires. Aligned with the global trend, remote and Indigenous communities are often the first and foremost affected (PHAC, 2018; Abbott & Chapman, 2018; Krishnaswamy, Simmons, & Joseph, 2012). For those living in coastal and remote settings, rapid evacuation may not be possible due to a lack of road access, limited ability to land large planes, or lack of access to safe waterways (Public Safety of Canada, 2019a, para. 1; Maguet, 2018).

Fire retardant is used to suppress an interface fire in the interior of BC during the 2017 wildfires

Photo by Flickr user Province of British Columbia via CC BY-NC-ND 2.0

Extensive flooding in the Southern Interior Region in 2017 caused washouts, mudslides and prompted multiple evacuation alerts across the region.

Photo by Flickr user BC Ministry of Transportation via CC BY-NC-ND 2.0

Wildfires in BC

The increasing threat of extreme events became evident when a provincial state of emergency was declared in British Columbia for two consecutive years. Evacuations prompted by wildfires set record levels, with the total number of people displaced estimated at 65,000, with nearly 48,000 people evacuated on July 15, including 12,400 people from Williams Lake and surrounding area (Maguet, 2018). The following summer, evacuation orders and alerts and poor air quality throughout the summer impacted a significant number of people, as illustrated in Table 1.

During these events, First Nations communities were disproportionately impacted. The Tsilhqot'in communities in Williams Lake alone consisted of nearly two thirds of the total area affected by wildfires in British Columbia (Verhaeghe, Feltes, Stacey, 2017, p. 7). Following these events, an interview with the Tsilhqot'in Nation highlighted how the unnecessarily complicated bureaucratic system and lack of funding disadvantaged the community and many other First Nations communities.

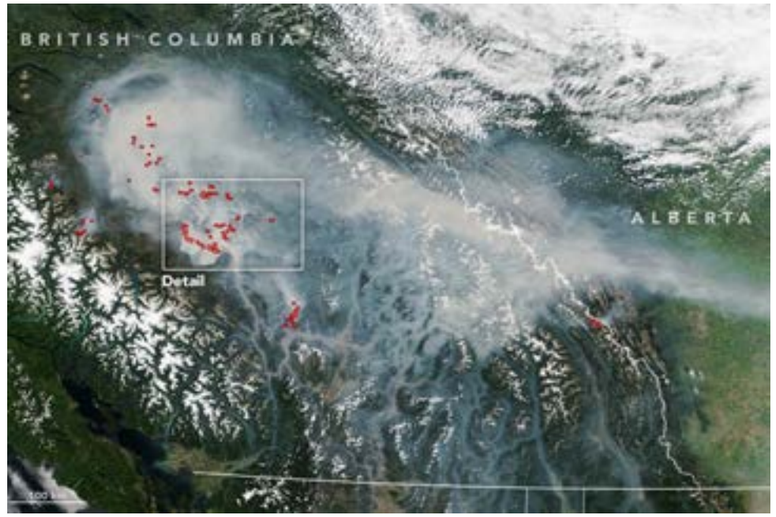
Table 1 - Wildfire Season Summary (2017 and 2018)

Source: Wildfire Season Summary, Province of British Columbia (2019)

	2017	2018
FIRES	1,347	2,117
Hectares Burned	1.2+ million	1.3+ million
Fire Suppression Costs	$649 million	$615 million
Persons Displaced	65,000	6,000
Structures Impacted	502	158
Evacuation Orders	120	66
Evacuation Alerts	166	124
Total Days On Provincial State Of Emergency	71 (July 7 to Sept 15)	24 (Aug 15 to Sept 7)

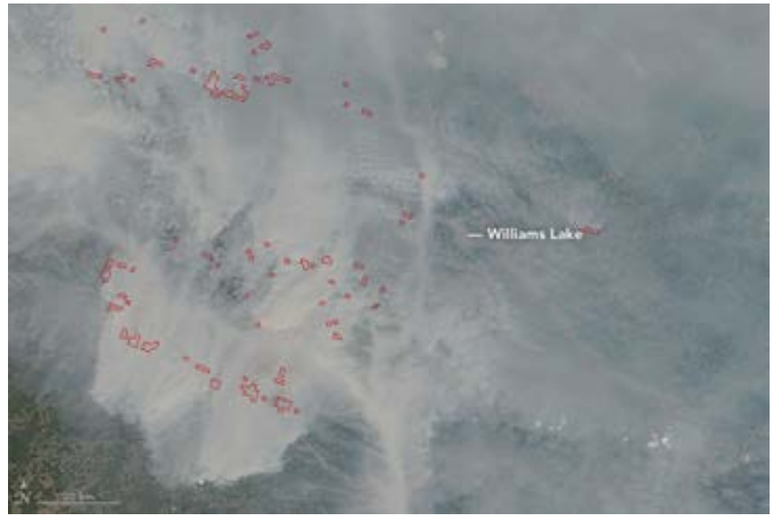
The aftermath of these events extended far beyond immediate displacement. During the 2017 wildfires, the rurality and distinctiveness of the Tsilhqot'in nation meant that the physical and mental health needs of the community were not adequately addressed through conventional services (Verhaeghe, Feltes, Stacey, 2017, p. 14). Personal health impacts such as poor air quality were compounded by the closure of multiple health facilities, canceled or rescheduled appointments and procedures, and a lack of health staff and physician availability due to evacuations. To make matters worse, public health issues such as water quality and food security posed significant challenges for re-entry once the immediate threat had resolved. Given these factors, the mental health impacts were far reaching, from evacuees to first responders (Verhaeghe, Feltes, Stacey, 2017, p. 33).

The situation faced by Tsilhqot'in communities in Williams Lake was not unique; in fact, it has been the case for the past thirty years. Those living on a First Nations reserve face a 33 times greater chance of being evacuated due to wildfires, as opposed to those living off-reserve (HazNet, 2018, p. 10). Many experts agree that the effects of climate change can be linked to these extreme weather events of 2017.



Severe wildfire smoke covers BC during the world wildfire season in history. First Nations communities are mapped by red polygons.

Source: Emergency Management BC



Severe wildfire smoke covers Interior BC, causing evacuations of nearly 48,000 people on one day. First Nations communities are mapped by the red polygons.

Source: Emergency Management BC

Equity-informed frameworks

Indeed, **there is no lack of evidence about the causes of inequities; but rather a lack of responsive research** (Raphael et al., 2011), practice, and governance mechanisms (Lee, 2010) to support equity-informed solutions. This brings forward a critical question: how do we practically and meaningfully integrate equity considerations into disaster management in Canada?

Where we came from, and where we're going

From a macro perspective, emergency management in Canada has been led by the Emergency Framework in collaboration with the Federal, Provincial and Territorial locations. Introduced in 2007 and updated in 2017, it now addresses how emergencies are managed through four interdependent components: prevention and mitigation; preparedness; response; and recovery, which are the shared responsibility by all sectors, when dealing with various emergencies (Emergency Management Policy and Outreach Directorate Public Safety Canada).

In 2009, Appleyard, described a framework for health equity in Ontario's Emergency Management programs in Ontario's health system, with those most vulnerable needed to be recognized, and supported through more research and policy. Public sector leaders are considered essential to ensure that a "health equity objective and analysis must be part of emergency management programs" (Appleyard, 2009, p. 10).

Canada has also been a signatory to all three international frameworks on disaster risk reduction, including the Sendai Framework which supported the development of a national platform on disaster risk reduction in 2009. It highlights that reducing risk has been proven more economical than the cost of response and rebuilding, and that a whole-of-society approach will increase the overall resilience of communities (Public Safety Canada, 2018). Despite the policy recognition and the preliminary groundwork, a **health equity lens still has yet to be systematically applied to emergency management programs.**

The red glow of the sun below a BC air ambulance landing at Vancouver General Hospital during the 2017 wildfire season.

Photo used with permission from Nicole Spence

Frameworks are necessary, but not the entire solution

While the Emergency Disaster Framework provides a logical approach, it does not delve deeply into social inequities for those in the Canadian population who are structurally vulnerable, and how they would be best served (Labonté & Rukert, 2019). More importantly, **what is missing from these types of framework is how to actively reduce the inequities experienced** by many in the Canadian population who are as most risk when immersed in a disaster situation.

An example of a more responsive framework is the well-known independent review examining the 2017 flood and wildfire seasons conducted by George Abbott and Chief Maureen Chapman that calls for emergency services to be available and provided to First Nations in a way that is comparable to other communities of similar size and location, stating that "equity must be the norm, not the exception" (p. 82). This guiding document provides recommendations on four themes (partnerships and participation, knowledge and tools, communication and awareness, and investment) that prioritize First Nations. Given that most projections expect an increase in extreme events, **determining the unique needs and circumstances of specific populations is critical to managing emergencies in Canada.**

This highlights a clear opportunity to transform its commitments to equity and global citizenship into stronger leadership on the global stage. Better coordination of efforts, increased funding, and addressing the infamy of Canada's colonization of Indigenous Peoples would strengthen the potential for Canadian policy makers, researchers, practitioners, and health leaders to make meaningful contributions to the improvement of health equity (Nixon et al., 2018). Policies are thus required to ensure these types of recommendations are adopted into research and practice.

Practical tools to achieve equity-centred solutions

If health equity is reached when individuals are able to reach their full health potential and are not disadvantaged by social, economic, and environmental conditions, what tools are available for policy makers and professionals to help reach this goal?

Equity-centred principles to guide action

The CCGHR Principles for Global Health Research ("the CCGHR Principles") (CCGHR, 2015; Plamondon & Bisung, 2019) support the exploration of equity considerations in global health activities, and could be adopted through the four phases of emergency management to promote equity informed practice and identify equity options. The Principles include authentic partnership, inclusion, shared benefits, commitment to the future, responsiveness to causes of inequity, and humility (Figure 1) and are already integrated into training modules for the Canadian Institutes of Health Research (CIHR) College of Reviewers as a national standard. The principles apply well beyond global health, with people finding these principles resonate in many fields, facilitating a multi- disciplinary and sectoral approach that helps **examine norms and values that have become invisible to researchers, policy makers, and practitioners.**

Tools to adopt the Principles

A health equity lens becomes paramount with individuals or groups susceptible to harm: that is, marginalized, vulnerable, and under-served populations (Piggott & Orkin, 2018, p. 13). However, associating challenges of labelling must be recognized and considered to avoid losing potential health benefits, as well as to effectively ascertain differences in outcomes associated with certain vulnerable realities of these diverse populations. It is also critical to recognize and critically reflect on the implications of language that problematizes or naturalizes health and climate inequities (see Figure 2). This process facilitates assessing alignment between action and root causes of inequities and can identify ways to move toward more productive actions for equity and climate justice (Plamondon et al., 2018).

Ways we naturalize health inequities	Ways we can problematize health inequities
• Not referring to evidence about causes • Explaining them as mysterious or the result of bad luck • Focusing on symptoms • Placing blame (root causes) in individuals • Blaming culture or ethnicity rather than -isms	• Explicitly naming causes • Describing them as actionable (i.e. human-caused and therefore humans can respond) • Stating that they are unfair or tied to unearned advantages and disadvantages • Shaped by political economy • Situate them in social systems of power

Figure 2 - Implications of language that problematize or naturalize health and climate inequities

Possible actions for an equity-centred approach

When disasters disproportionately affect the ways in which societies function, those responding can consider possible actions for equity. A useful set of guiding questions complementing the table can spark dialogue to an equity-centred approach to all levels of emergency management, specifically mitigation, preparedness, response, and recovery.

- Are we discrediting clear evidence?
- Are we distracting from the root causes?
- Are we overlooking or ignoring the root causes of health inequities?
- Are health inequities recognized without going further to respond?
- Are efforts focused on understanding something new about how health inequities work?
- Do efforts open possibilities for change related to power, privilege, and their distribution in society?

The tool in practice: supporting resilience on a global scale

While it is true that disasters can exacerbate existing vulnerabilities and inequities, it is worth noting that in times of distress, community networks, and organizations continue to foster resilience. Resilience refers to the capacity to build strength following a disaster (Emergency Management Policy and Outreach Directorate Public Safety Canada, 2017). Using the guiding questions above, **resilience offers a way to change perspectives related to power and privilege, examining a more equitable approach to community recovery,** especially as it relates to gender.

For instance, in gender and disaster literature, two primary themes emerge: women as either powerless and victimized or resilient. Statistics show that cases of rape, human trafficking, and domestic violence rise during and after disasters (Alston, 2013). These outcomes of disasters are rooted in pre-existing inequities. Rather than highlighting women's resilience or focusing on their portrayal as victims lacking agency (Stromquist, 2015), it is worthwhile examining how both will influence one another following a disaster.

Despite their potential for massive physical destruction, **disasters are spaces that allow opportunity to build resilience and challenge existing power dynamics**, and can act as a catalyst to progressive changes in gendered relations. A longitudinal study showed that the 2010 Chile earthquake and tsunami in El Morro - one of the most marginalized communities in the region - brought radical change to gendered relations (Moreno, 2018). During the establishment of the El Morro Fisherwomen's organization women were able to contribute to the family income by fishing and collecting seaweed and mussels, resulting in a significant change to women's labour role. As fishing was an exclusively male practice prior to the earthquake, women's productive role adapted and overcame persistent gender-based barriers; the earthquake ultimately leaving women economically empowered. Women-led organizations were vital in creating long-term, sustainable change following one of the most severe earthquakes.

Consulting the guiding questions above forces us to disrupt and question western, patriarchal attitudes to societal development and therefore has potential to tangibly address health inequities globally. Time and again, North American and European countries are deemed the models for progressive and equitable health care systems when in reality, these areas have an opportunity to learn from communities like El Morro. **If Canada is just as susceptible to climate-related disasters, it only makes sense to have a global conversation about how disaster risk reduction can be more equitable,** better preparing us for the future.

Conclusion

Despite the recognized need for equity centered emergency management, there is little evidence of systematic implementation. There are many frameworks that exist offer tools and approaches, but the many constraints that are placed on populations result in a practice that does not examine norms and values that have become invisible to us.

Canadians advocate for equitable disaster risk reduction, but bureaucratic, political, and socio-economic constraints are still deeply ingrained in research, policies, and practice, worsening inequities and ultimately stunting disaster resilience. As a result, integrating equity considerations in disaster and emergency management requires attention to root causes of inequity. Given that the people most affected by disasters often have fewer resources and power to deal with them, including this kind of framework in emergency management would ensure that equity considerations are not lost in the process of planning.

Adopting an equity lens is therefore essential to not only reducing disproportionate impacts on populations but also for creating a more sustainable and equitable approach within disaster management. Some examples discussed in this article, such as the CCGHR Principles provide a practical tool that enables more critical and collective dialogue that shifts us towards more responsive research, policies, and practice. Overall, local and international populations could greatly benefit from such an equity informed approach. If adopted, it could help transform Canada's commitments to equity and global citizenship, positioning us as a leader on the global stage.

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HazNet is a bi-annual magazine of the Canadian Risk and Hazards Network (CRHNet) that brings together the latest in research and practice to enhance resilience in Canada.

HazNet aims to facilitate public, professional and scholarly discussion through analysis, views, lessons learned, and insights into current and future issues of disaster risk reduction in Canada and internationally.

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CRHNet is a not for profit association established to:

- Initiate the development of a Canadian inter-disciplinary and cross-sectoral network of researchers, academics, and practitioners to enhance understanding of emergency management in all dimensions and help build Canadian capacity to deal effectively with threats and consequences from all hazards;
- Create a Canadian annual Symposium for dialogue focusing on disaster risk reduction and facilitate policy formulation and the adoption of best practices in Canada;
- Provide a Canadian venue to learn from the experiences of other countries by inviting internationally reputed scholars, practitioners, and participants to the annual Symposium and to share Canadian experience and efforts in disaster reduction;
- Publish a bi-annual magazine, HazNet, comprised of articles on a wide range of topics within the emergency management and disaster risk reduction sectors.

Canadian Risk and Hazards Network: Knowledge and Practice

Réseau canadien d'étude des risques et dangers: connaissances et pratiques

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