HazNet

The Magazine of the Canadian Risks and Hazards Network

Vol.9 No.2 Fall 2017

Building Back Better

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Content

The *President's* Message

An Authoritative Source

HazNet is intended as an authoritative source of information about disaster research and practice. What does that actually mean? What is our role and what are we really trying to do? Here are a few thoughts on that.

We want to help people to understand what they can do to reduce risk in their lives. We know that compelling stories can inspire people to act. The global strategy for disaster resilience is focused not only on action in cities, where most of the world's population now lives, but also on mobilizing local action to build more sustainable and disaster resilient communities. Canada has many good stories to tell about local initiatives to reduce individual and community disaster risk, and we are proud to showcase some in this edition of Haznet.

We also want public policy decisions to be informed by credible and accurate information. Risk is increasing. We need to encourage behaviours that reduce risk, discourage behaviours that increase risk and have the political and moral courage to impose controls to prevent or mitigate risk. HazNet profiles facts and arguments that illustrate current and future disaster risk and highlight social science on how people and communities can address their risks and vulnerabilities.

Our challenge is the challenge of the age: to disseminate useful knowledge to good effect. We are mindful that we have to resonate with different audiences. We certainly want to profile recent and insightful research that might inform public policy. We also need to connect with people where they live in a meaningful way. Good information presented well can influence people's thinking and actions. We also can observe today how populism, disinformation and self interest can derail public policy and put us all at greater risk. We need HazNet to be authoritative as a credible, accurate and trusted source of information on disaster management. We humbly and respectfully ask that you to join us in that effort.

Ernest MacGillivray,
PRESIDENT
CRHNet

WELCOME *from the Executive Director*

Best wishes,
Marion

Welcome to the 2017 Fall issue of HazNet, CRHNet's signature publication that facilitates the sharing and dissemination of disaster risk reduction and emergency management research, experiences, best practices and observations. This issue is another outstanding effort by the HazNet team. Thank you to Lily Yumagulova and her editorial team.

The past few months have been busy for CRHNet's Board of Directors and the members of our Standing Committees who have been working on the completion of several initiatives and the commencement of new projects. The ongoing commitment by our Board members and our membership is both heartening and inspiring, and the old saying "We couldn't do it without you" is sure true for all our CRHNet work. Foremost these past several months, and involving a Steering and a Program Committee in collaboration with the Board, has been the work to plan and organize the 2017 Annual CRHNet Symposium. With just days to go until the Symposium opens on October 25th at historic Pier 21 during the 100th Anniversary of the Halifax Explosion, the Program agenda is informational, exciting and inspiring as a showcase of work by our members and colleagues in resilience building and reducing disaster risk here in Canada and around the globe. CRHNet creates an environment for Early Career Professionals, Researchers, Educators and Practitioners to share innovative approaches and for building best practices to reduce disaster vulnerability in Canada.

I am stepping down as the CRHNet Executive Director shortly after this year's Symposium. I have been involved with CRHNet and its development since 2005, and it has been an honour and a privilege to have served CRHNet and supported a very dedicated and active Board and Standing Committees. I have always strongly believed that there is a time to open up opportunities for fresh ideas and practices, and this year end seems about right. CRHNet has certainly 'grown' over the years and today fills a critical role in dissemination of knowledge and information sharing around risk reduction. I look forward to staying in touch with the CRHNet membership and will likely find myself involved in some projects in the future.

Enjoy this issue of HazNet, look for information and best practices that will assist you in your work and studies and please say "hello" if you are attending the 2017 Symposium!

Editor's note

Greetings and a warm welcome to the fall issue of HazNet!

Sadly, the year 2017 has secured a place for itself in the record books—and in the minds of the people around the world—as among the most disaster affected years in memory. For disaster practitioners and researchers, it's unlikely to be forgotten anytime soon.

It's appropriate then, that this fall 2017 issue focuses on "Building Back Better", the theme of the Eighth Annual National Roundtable on Disaster Risk Reduction and First Joint Meeting with Canada's Climate Change Adaptation Platform. Bridging these two arenas of policy and practice is a much needed first step toward building resilience across professional sectors and governance silos. Leadership at the political, staff and citizen levels will play a key role in this process. As highlighted by Commissioner of the Environment and Sustainable Development Julie Gelfand in audit released in October 2017, stronger leadership is urgently needed for Canada to move beyond its "endless" planning: "It's time for change. The federal government needs to start doing the hard work to turn this latest broad framework into tangible and measurable actions." Within the 19 departments and agencies examined by the audit, only five had fully assessed risks and taken steps to address climate change. The other 14, including Public Safety Canada and Environment and Climate Change Canada had taken "little or no action" to address climate risks. Moving this agenda forward and communicating to Canadians in a transparent, accountable and accessible way will be key. The spring and fall issues of HazNet highlight innovation in disaster risk reduction and climate change adaptation practice and the gaps remaining to increase resilience.

"Build Back Better" has become the new disaster recovery mantra. Recovery is the least understood phase of emergency management. Recovery requires balancing the immediate need to return to "normal" with the need to reduce future vulnerability, improve equity outcomes and increase resilience. It requires balancing interests across sectors of a community with external pressures.

It requires navigating incentives and fighting disincentives for recovery funding programs. It requires addressing cultural and psychosocial dimensions and understanding recovery as an outcome and as a process. The long haul of recovery requires and understanding of resilience by leaders, government staff and citizens alike. This issue offers distilled lessons for designing thoughtful, inclusive and effective recovery processes, while critically examining opportunities for building back better.

We are excited to bring this content to you in a new format. Our new Stories section will feature stories from Canadians offering their individual perspectives and experiences with disasters. Our new HazNet In Depth series will feature in-depth articles that are carefully crafted by the HazNet team to provide a fresh and thorough look at disaster and recovery that goes beyond the news headlines. In this issue, you will read about the long road to recovery told from the perspective of Marie-Claude Arguin, City Manager for Lac-Mégantic. It is not just the sheer scale of the tragedy that engulfed a small municipality, putting its staff and leadership under unimaginable pressure from post-disaster public service, but the conscious and often difficult choices to build back better that make this story truly unique.

On behalf of the entire HazNet team, we hope that you enjoy this issue and consider contributing in the future.

Lily Yumagulova,
Editor, HazNet
www.haznet.ca

2017 Award Programs

The CRHNet Awards Program is a national awards program established to recognize and honour exemplary individuals participating in and contributing to the study and practice of disaster risk management. The program is run by a standing committee of CRHNet members which reports to the CRHNet Board. CRHNet Awards are presented annually at the CRHNet Symposium held in the Fall of each year. Details of individual awards can be found below.

Lifetime Achievement Award

WINNER: Larry Pearce

The CRHNet "Lifetime Achievement Award" is the organization's highest honour Presented annually, this award is offered to recognize the lifetime contributions and achievements of exemplary individuals to the enhancement of Canadian disaster safety. Eligibility for this award is open to all Canadians, and recognizes individual service to public safety through the disaster management practice, research, education and leadership.

Larry Pearce Education Award

FIRST: Kari Lentowicz

SECOND: Sarah Greenberg

THIRD: Denise Blinn

The "Pearce Education Award" is offered by CRHNet members to deserving post-secondary students undertaking studies in any discipline related to Canadian disaster risk and/or emergency management. The award is Intended to defray the post-secondary education costs for recipients in the year the award is granted. Accordingly, recipients must be enrolled in full-time studies in the year in which the award is given.

Symposium Travel Bursary

Emily Gray

Diamir De Scally

Kari Lentowicz

Arielle Dalley

Brennan Vogel *(declined)*

The Symposium Travel Bursary, or "STuBby", is a travel bursary offered by the CRHNet membership to defray the costs of students and young professionals interested in attending the annual CRHNet Symposium.

Canadian DRM Volunteer Award

Nicholas Chebroux

The "Canadian Disaster Risk Management Volunteer Award" is the newest of CRHNet's awards and will be offered for the first time in 2017. It honours exemplary volunteers, volunteer initiatives, and volunteer programs related to Canadian disaster risk management. Up to three nominees will be recognized each year with a certificate as well as promotion on CRHNet's website and its newsletter, HazNet.

Celebrating **Larry Pearce**

It is our great honour to feature Larry Pearce as the first recipient of the T. Joseph Scanlon Lifetime Achievement Award in this issue of HazNet. Larry is a founder and leader of numerous national initiatives, networks and forums, including CRHNet, a giant in the field of public safety in Canada, a tireless volunteer, and, above all, a deeply caring person.

Larry Pearce has been volunteering in Canada for over 30 years and has been recognized by local and national organizations for his contributions over the course of the past ten years. Larry's passion, both professionally and personally, has been to increase an understanding and awareness of the need for families, neighbourhoods, communities, provinces and territories to be prepared and ready to face the inevitable disasters that will occur.

One of his earliest projects was serving as the Executive Director for Pan-Pacific Hazards '96 - Canada's major initiative as part of the United Nations' International Decade for Disaster Risk Reduction. Larry was elected to the Board of the Emergency Social Services Association (ESSA) of British Columbia in 1996 and was elected President in 1998 and remained in that capacity until 2004. He was a founding member of the Emergency Planning for Industry and Commerce Council (EPICC) in the 1990s, was elected to the Board of Directors in 2000 and took on the role of the EPICC Forum Program Chair, keeping that role until 2014.

Larry helped to establish the CRHNet in 2003, and in 2009, Larry was approached to take on the mostly volunteer position of Executive Director for CRHNet. In 2015, he stepped down and the CRHNet Board of Directors created the CRHNet Larry Pearce Education Award. Now in his 80s, Larry still supports CRHNet and serves as the CRHNet "Ambassador", promoting the organization and its efforts and providing advice to the Board.

Larry founded HazNet as a CRHNet newsletter in 2009 with a vision for a journal that would foster an active exchange between research and practice for disaster risk reduction, a vision that guides HazNet today. We are deeply grateful to Larry's dedication as the Editor of HazNet, a position he held until 2015. To read HazNet issues edited by Larry visit: http://haznet.ca/past-issues/

To learn more about Larry Pearce visit: http://haznet.ca/haznet-fall-2017/

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To learn more about the CRHNet Awards Program visit: http://www.crhnet.ca/programs/crhnet-award-program

Award Bio's

Lifetime Achievement Award

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Canadian DRM Volunteer Award

Nicholas Chebroux, CEM, CGU

Since completing a Masters degree in Emergency Management in 2001, Nicolas has been working in this field for various international, Canadian, public and private organizations in Europe and the Americas. He currently is an Emergency Management Specialist at the National Energy Board (Government of Canada) and has been volunteering within the Red Cross Movement for emergency planning projects. Additionally, Nicolas has volunteered in a number of disasters in Canada and around the world, including New-Orleans, LA (Hurricane Katrina), the Philippines (Super-Typhoon), Fort McMurray, AB (Wildfires), and in Quebec (Major floods). He also volunteers at the Quebec Emergency Management Association as the Certification Committee President and contributes voluntarily as a Member of the Canadian Red Cross governance committee. Over the years Nicolas has consistently promoted the value of the volunteerism to emergency management activities (e.g. conferences, chapter of an EM reference book to be released next winter, promotion of humanitarian organization like the ROHCMUM for an IAEM-Canada Public Awareness Award) and continues to do so. Mr. Chebroux is a certified Emergency Manager with International Association of Emergency Managers (CEM) and in Quebec (CGU).

2017 Winners

Larry Pearce Education Award

FIRST: Kari Lentowicz

Kari currently resides in Northern Saskatchewan in the Village of Denare Beach. With an undergrad in Environmental Toxicology, she worked diligently in the mining industry for 12 years on sustainability. Her opportunities within the mining industry led her to a passion for disaster and emergency management. In 2015, Kari took a leap to pursue further education through a Master of Arts in Disaster and Emergency Management (DEM) at Royal Roads University. A number of her research projects focused on aspects of climate change impacts and adaptive strategies to mitigate impacts within Canada. Kari graduates from the program this winter. As she completes her graduate education, she has gained employment in Manitoba's health sector as a Disaster Management Coordinator. In this role, Kari works collaboratively within the region to increase preparedness levels for both the health authority and the communities in which the clients reside. In addition to this, Kari is diligently working on documented emergency and contingency plans in an effort to ensure knowledge retention, increased resilience, and continuity of health services. Kari is also currently a member of her local volunteer Fire Department and continues to be involved in mine rescue events in western Canada and internationally as well. Kari hopes to increase her knowledge in the field of DEM and apply that knowledge with hands on experience in international aid with Humanity First after completing training with the organization this September.

Larry Pearce Education Award

SECOND: Sarah Greenberg

Sarah attended the University of Manitoba and earned a Bachelor of Science in physical geography in the geomatics stream with a minor in psychology. Upon graduating she accepted a position at KGS Group Professional Consulting Engineers as a GIS specialist. With her experience in working with GIS and remote sensing, she took on additional roles within her department writing proposals, reports, as well as doing project management. She was on the quality assurance team to maintain and create company policy in accordance with the International Organization for Standardization (ISO), and also ran and lead the company's social committee where she planned and organized company events throughout the year. In February 2015 she joined the Canadian Red Cross (CRC) Disaster Management team as a volunteer, and with the emergency response team and the personal disaster assistance team she completed over 60 hours of national-level training. Sarah moved up to a supervisory position and responded to five large-scale disasters and numerous small scale responses with the CRC. Additionally, she worked for the CRC as a project coordinator for a smoke hazard study and this work drove her passion for disaster and emergency management. In September 2017 I began my masters of disaster and emergency management at York University and I am very interested in how GIS and remote sensing can be used in this field to help coordinate logistics, response, mitigation, planning and recovery.

Award Bio's

Larry Pearce Education Award

THIRD: Denise Blinn

Denise Blinn is currently student in York University's Masters of Disaster & Emergency Management Program where she has maintained a consistently high GPA while giving back to her fellow students and her profession. In May, she was awarded the DRIE 2017 Todd Bardes Memorial Scholarship. Previously, Denise worked in film, television and theatre as an award-winning screenwriter and director. In the creative world, she excelled at crisis management which led, in part, to her current passion for emergency management. Since joining the program, Denise has worked as an intern for the City of Toronto's Office of Emergency Management. She currently volunteers with the OAEM where she recently worked as an editor for the Do1Thing campaign materials. She also volunteers as an active executive board member of DEMSA (York's Graduate Disaster & Emergency Management Student's Association). Denise has a passion for evidence-based risk communication which grows out of her professional work in film, television and advertising.

Symposium Travel Bursary

Emily Gray

Emily completed her Master's in Community and Regional Planning at the University of British Columbia in April, 2017. Her research focused on improving the resilience of Canadian communities to coastal hazards and climate change, resulting in recommendations for local governments considering retreat as an adaptation strategy. Emily was awarded a Social Science and Humanities Research Council Canada Graduate Scholarship-Master's and a Canadian Institute of Planners' Trust Fund award for research significance. She was also selected as an international Climate Scholar by the Nippon Foundation-Partnership for the Observation of the Global Oceans, receiving training at the National University of Ireland. Emily gained additional research experience with Resilient Coasts Canada through the Marine Environmental Observation Prediction and Response Network Centre of Excellence. Most recently, she worked as Co-Investigator with the Justice Institute of B.C., researching youth involvement in community resilience for Public Safety Canada. Currently, she is employed as a Science Policy Fellow with the B.C. Ministry of Municipal Affairs and Housing / Office of the Deputy Minister, Emergency Management, researching land use regulations to improve disaster resilience.

Diamir De Scally

Born and raised in Kelowna, British Columbia, Diamir received her Bachelor of Arts degree from the University of British Columbia Okanagan where she completed a major in geography and a minor in political science. In 2016 Diamir began the Master of Environmental Studies program at the University of Waterloo. For her thesis, Diamir is investigating the role of local and traditional knowledge in adaptation to climate related hazards in the small Pacific island country of the Cook Islands. She completed a three-month field season in the Cook Islands this year where she had the opportunity to both conduct her thesis research and collaborate with Climate Change Cook Islands, the lead government entity for climate

2017 Winners

change adaptation in the country, and Te Ipukarea Society, the oldest environmental organization in the country. Her research interests include natural hazards, climate change adaptation, disaster risk reduction, resilience, human vulnerability, government agencies, policy making, traditional indigenous knowledge and gender.

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Arielle Dalley

Arielle is a recent graduate of the Master of Community and Regional Planning program at the University of British Columbia. She graduated with a specialization in hazard and disaster planning, and focused her studies specifically on hazard mitigation, disaster risk reduction, and climate change adaptation. For her master's capstone project, she examined various alternatives for potable water storage, transportation, and distribution which could be implemented by the University of British Columbia in the event of a loss of municipal water supply to campus. For the Spring 2017 edition of HazNet, she wrote an article summarizing research she conducted in Indonesia last year about how to prevent post-disaster resettlement in high-risk areas. The research she will be presenting at this year's annual symposium focuses on engaging youth in emergency management through high school community service hours in order to increase community resilience. This research was conducted in partnership with Emily Gray and Laurie Pearce from the Justice Institute of British Columbia.

Brennan Vogel *(declined)*

Brennan Vogel has a PhD in Geography from the University of Western Ontario (2016), a Masters degree in International Development Studies from Saint Mary's University (2010) and a Bachelors of Environmental Studies from the University of Waterloo (2003). In 2017, Vogel served as a Post Doctoral Research Fellow and 'Response Coordinator', affiliated with the UBC School of Community and Regional Planning and the national Marine Environmental Observation Prediction and Response Network of Centres of Excellence (NCE-MEOPAR), chaired at Dalhousie University. Vogel's PhD and post-doctoral research focused on the barriers and opportunities for governance structures to support capacity-building initiatives for the planning and implementation of local adaptation actions to reduce vulnerabilities to climate risks and hazards, while supporting resilience in First Nations communities and municipalities of Canada.

Let's talk about build back better.

By Robert Glasser

There was never a more appropriate time to examine the issue of building back better in the context of post-disaster recovery than the present. Millions of people are on the move because of disasters.

In Africa, drought continues to drive rural-urban migration; 20 countries have declared drought emergencies in the last 18 months alone. Over 40 million people are impacted by the ongoing floods and monsoon rains in the South Asian countries of Bangladesh, India and Nepal. In the Americas, the lives of millions have been thrown into turmoil by a record-breaking Atlantic Hurricane Season which has thrashed homes, schools, health facilities and other critical infrastructure, including 3.4 million people left without power for the immediate future in Puerto Rico and the abandonment of the island of Barbuda.

The perennial threat of earthquakes was underlined in September by two powerful quakes which claimed hundreds of lives in Mexico. Much was done to build back better in Mexico City following the 1985 earthquake which claimed 10,000 lives, so despite the significant loss of life caused by these two latest events, progress has been made in building a disaster-resilient urban environment in the capital at least.

Turkey, Iran, Italy and Armenia are other examples of countries which have a lot to teach others about the importance of building back better notably in their commitment to ensuring schools and health facilities are safe from earthquakes following harrowing past events.

This year's International Day for Disaster Reduction on October 13 sees the focus on reducing the numbers of people affected by disasters as part of the Sendai Seven Campaign which promotes implementation of the Sendai Framework for Disaster Risk Reduction, the global plan for reducing disaster losses, and its seven targets.

Given the doubling of extreme weather events over the last 40 years, an essential part of reducing the numbers of people affected by disasters is to ensure that massive reconstruction and rehousing programmes such as those now necessary in Mexico, the Caribbean and the USA, are undertaken with future disaster scenarios in mind.

It's a well-known adage in the disaster risk reduction community that the worst disasters which could happen have not happened yet and, in order to minimize the possibility of future losses, building back better means avoiding the creation of new risk, reducing existing levels of risk and managing any residual risk that cannot be eliminated.

The main drivers of weather-related disasters are increased exposure and vulnerability due to poverty, the breakneck pace of urbanization in low and middle income countries, population growth, the destruction of protective eco-systems, low institutional capacity to manage disaster risk and, increasingly, climate change. The magnifying effect of climate change includes sea level rise and associated flood and storm surge hazard, increasing cyclone wind intensity, erosion, saltwater intrusion into coastal aquifers, water scarcity and drought.

The first deadline of the Sendai Framework is to have national and local plans for disaster risk reduction in place by the year 2020. It is vital that these plans dovetail with national and local planning for climate change adaptation given the clear overlaps between the two areas.

UNISDR will be publishing shortly new Guidelines on National Disaster Risk Assessment which will support

these planning processes and which will be available on www.unisdr.org.

The importance of breaking down any demarcation between these two areas is underlined by research published in The Lancet earlier this year, which focused on the possible impact of climate change in Europe and found that weather-related disasters could affect about two-thirds of the European population annually by the year 2100 leaving as many as 351 million people exposed per year compared with 25 million people exposed per year during the reference period of 1981 to 2010.

This is clearly an area requiring further research and focus for the next generation of resilience practitioners especially on the likely outcomes for low and middle income countries where the resilience gap is greatest because of lack of resources. Least developed countries, small island developing states, landlocked developing countries and African countries, and middle income countries facing specific challenges, are all identified for special attention in the Sendai Framework.

Canada has much to offer the rest of the world when it comes to encouraging implementation of the Sendai Framework. The country is no stranger to disasters and has shown its commitment to international cooperation by hosting this year's Americas Regional Platform for Disaster Risk Reduction attended by 55 countries and territories in Montreal which approved a Regional Action Plan.

Canada's experience in building back better after the 2016 fires in Alberta which displaced 90,000 people in Wood Buffalo/Fort McMurray is well worth sharing with the rest of the world, as well as the country's experience in dealing with overland flooding.

One of the most appreciated discussions at the Regional Platform was triggered by the presentation of the new "Federal Flood Mapping Framework" by Canada's Minister of Public Safety and Emergency Preparedness, Ralph Goodale. This approach can be replicated and adapted in other parts of the world facing similar challenges.

Canada has truly embraced the inclusive spirit of Sendai with its whole of society approach to disaster risk management. This is most evident in the Government's development of its new Emergency Management Strategy in partnership with Provincial and Territorial Governments, Indigenous Peoples, and municipalities to better predict, prepare for and respond to extreme weather events and other types of disasters.

The Sendai Framework for Disaster Risk Reduction 2015-2030

The Four Priorities for Action

Priority 1.

Understanding disaster risk

Priority 2.

Strengthening disaster risk governance to manage disaster risk

Priority 3.

Investing in disaster risk reduction for resilience

Priority 4.

Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction

Robert Glasser is the UN Secretary-General's Special Representative for Disaster Risk Reduction and head of the UN Office for Disaster Risk Reduction
www.unisdr.org

Rebuild by Design: insights for building forward with resilience

By Lynn Englum, City and Policy Manager for Rebuild by Design.

On October 29, 2012, Hurricane Sandy made landfall on the New Jersey coastline and swept into the New York City Metropolitan Region as a tropical storm. It unleashed flooding and destruction in its wake and became the second costliest disaster in U.S. history with $65 billion in damages.

The storm brought the region to it's knees, crushing critical infrastructure, damaging and destroying homes and killing at least 186 people. Several elements contributed to its destructive nature including rising sea-surface temperatures (2012 was the hottest year on record at the time) and a full moon which increased the storm's surge levels with higher than average sea tides. Ultimately, Hurricane Sandy exposed the physical and social vulnerabilities the region faced from extreme weather and a changing climate.

When facing the aftermath of a disaster, it's hard to focus on the future. There is a strong desire to return to "normal" as quickly as possible and rebuild back to the previous state. U.S. government disaster spending is geared toward maintaining the status quo. Legal and administrative barriers often impede rebuilding with an adaptive approach that considers future impacts and a changing climate and environment. Instead of building back to the status quo, which had been standard operating procedure in the United States, Rebuild by Design was an experiment in building "forward" to what communities will need for the future.

Seven months after Hurricane Sandy, U.S. Department of Housing and Urban Development (HUD) partnered with The Rockefeller Foundation, NYU's Institute for Public Knowledge, Municipal Arts Society, Regional Planning Association and Van Alen Institute to launch Rebuild by Design. It was an experiment in utilizing government allocated disaster funds (nearly a billion dollars) coupled with philanthropic funding to support an innovative process for addressing both current and future risks. Rebuild challenged federal disaster-spending norms and set a new precedent for a different approach.

The Rebuild by Design competition brought together global talent and an interdisciplinary set of experts to investigate the physical and social vulnerabilities facing the region. This competition took a different approach to a typical design challenge. Instead of asking for solutions, the competition called for teams of experts with various approaches to problem-solving and infrastructure and community building. The goal was to create interdisciplinary teams that brought multiple sectors together and contained a diverse set of expertise—from architecture, design, policy, climatology, and sociology to urban planning, history and hydrology. Ultimately, ten teams were chosen and led through a discovery process to uncover the problems and interdependencies of the impacted region.

The competition had two principal stages—collaborative

New Meadowlands
Meadowlands, NJ

Hunts Point Lifelines
South Bronx, NYC

Resist, Delay, Store, Discharge
Hoboken, NJ

Living with the Bay
Nassau County, NY

The BIG U
Lower East Side, NYC

Living Breakwaters
Staten Island, NYC

Rebuilding with Resilience

Lessons from the Rebuild by Design Competition After Hurricane Sandy

REBUILD BY DESIGN

The ROCKEFELLER FOUNDATION

GEORGETOWN CLIMATE CENTER
A Leading Resource for State and Federal Policy

research and design. The objective of the research stage was to develop a holistic understanding of the social and physical vulnerabilities facing the entire region, while the design stage utilized the research discoveries to develop innovative, implementable solutions. Ultimately, the competition produced ten projects and seven were chosen for funding.

The Rebuild process created project plans that are forward thinking because they address future impacts, are holistic and solve for multiple issues at once. While the chief competition objective was addressing flooding and developing storm surge protection, resulting proposals included a plethora of co-benefits, including ideas for enhanced biodiversity, improved transit options, greater connectivity, safe waterfront access, additional employment opportunities, improved recreational space, wetland restoration and the protection of low-income communities.

As these projects move from conceptual designs to physical projects, The Rockefeller Foundation, Rebuild by Design and the Georgetown Climate Center collaborated on a report — Rebuilding with Resilience — to capture the policy lessons that are being learned throughout the region. These projects provide important lessons about how officials at all levels of government can design and construct infrastructure projects that deliver multiple community benefits and enhance a community's physical, economic, social, and environmental resilience.

align multiple streams of funding & administrative requirements

Implementing large-scale, multi-benefit projects will often require several funding sources. Governments should coordinate administrative requirements, where possible, and allow different funding streams to be combined. This will generate more comprehensive resilience projects that can deliver better, more holistic solutions.

achieving comprehensive resilience requires a long-term approach

Large-scale resilience projects will often have to be constructed in stages due to budget constraints and uncertainty in future changes especially the scientific understanding of the effects of climate change. The most viable projects will be designed so that they can be progressively implemented over time as funds become available or as the impacts of climate change become more severe. Phased construction allows governments to develop long-term solutions without being overwhelmed by the large initial price tags of the needed investments. This example can be seen with the East Side Coastal Resilience Project, also known at the Big U. There are three compartments for building coastal protection all along the lower tip of Manhattan. These are being phased in over time as money becomes available. However, each compartment can stand on it's own in terms of protection.

encourage coordination across agencies and levels of government

Complex resilience projects require unprecedented coordination across jurisdictions, agencies, and levels of government to permit, construct, and maintain these projects. The Hurricane Sandy projects utilized technical coordinating teams and demonstrate how permitting agencies can create vehicles for improving coordination at all stages of a project's lifecycle. These projects also demonstrate the need for regional coordination across jurisdictions to ensure that resilience projects are implemented at the scale needed to be effective.

create more flexibility for disaster recovery funding

U.S. Federal disaster recovery programs are not well suited for broader community rebuilding efforts. Federal agencies and Congress must find ways to give cities and state governments more flexibility to use disaster recovery dollars in ways that allows them to rebuild in more holistic ways with climate change in mind instead of merely reacting to the last disaster.

design for and encourage projects that provide multiple benefits

With a changing climate, increasing urbanization, and budget constraints, infrastructure projects can no longer be built to only serve a single purpose. Governments need to demand that new infrastructure meets multiple challenges and provides a variety of economic, social, and environmental benefits. For example, many of the competition's projects include "berms with benefits"— flood control structures that not only reduce flood risks but also provide environmental and recreational benefits.

robust public engagement and participation during project design

Broad, meaningful, and continued public participation and engagement throughout all stages of project design and implementation has led to broad public support for the Rebuild projects and has improved project design. Community organizations and local stakeholders informed the design of the projects and, as a result, have proven to be important advocates. Governments should encourage officials to move beyond historical practices of "checking" the public outreach box and instead treat the public as an important partner in the design and implementation of projects.

The communities impacted by Hurricanes Harvey, Irma and Maria and the powerful 2017 storm season have an opportunity to rebuild for the future. These lessons, that the City of New York and the States of New Jersey, New York and Connecticut are experiencing, are instrumental for policymakers at all levels of government as they reconsider disaster planning and response in light of climate change and other stressors and as they work to develop successful urban resilience plans, policies, and projects.

Lynn's work focuses on taking Rebuild's process to other cities for addressing issue or place-based problems. She also focuses on identifying and addressing policy barriers to resilience implementation and working to promote governance structures and regional coordination to allow communities to better prepare for the impact of a changing climate.

Previously, Lynn worked at the World Wildlife Fund, focusing on climate change, renewable energy, resiliency, and cities. Lynn's commentary has appeared in the San Francisco Chronicle, Huffington Post, Indianapolis Star, Climate Progress, and Sustainable Cities Collective. Lynn started her climate career at the Center for American Progress, researching climate and energy. She received her MA in Global Environmental Politics from American University and her BS in Public Affairs & Environmental Management from Indiana University.

Rebuild by

Design is reimagining the way communities find solutions for today's large-scale, complex problems by processes for working with a mix of sectors - including government, business, and the non-profit community - to gain a better understanding of how overlapping environmental and human-made vulnerabilities leave cities and regions at risk. Rebuild convenes local communities and experts to drive systemic change, transforming our built environment in ways that are equitable and design-driven.

Learning from Calgary: a conversation with Christine (Chris) Arthurs

By Lilia Yumagulova, Editor, HazNet

On June 20th, 2013, Calgary experienced a 'perfect storm': intense rainfall and saturated ground conditions combined with the significantly sized melting snowpack in the mountains to flood the city via the Elbow and Bow Rivers. This caused significant flooding to about 15% of the geographical area of Calgary, including the downtown and approximately 26 communities. The event required the largest evacuation in Calgary's history, caused significant property damage to homeowners and businesses and created about $400 million in public infrastructure damage. As the Director of Recovery Operations at the time, Chris shares key lessons learned:

Centre Street Bridge 2013 Flood

1. Know your risks and understand that you at some point you will need to recover. Take the time, before an event occurs, to understand your significant risks as an organization and as a community. Understand where those vulnerabilities are and start to talk about them with your stakeholders, and to discuss how you would respond and recover from a significant event.

At The City of Calgary, we understood that our community was at risk for significant flooding. We had done quite a bit of work to consider how we could respond should an event occur: we developed risk models and scenarios, we undertook training exercises and we identified the stakeholders who might be involved and the type of response and recovery that would be needed in the case of major flood. As we did that work, we began to understand that a flood event of this significance would cause enough damage that it would not be a rapid recovery from such an event. We started to think what type of recovery process would be needed. When the flood occurred, and as we responded, we already understood that we would need to support a long term recovery process.

We have a great team of people in our emergency management group that had spent the time to lay out the foundations of what a recovery process might include. An all hazards framework for recovery was developed based on the lessons learned from other events. This recovery framework helped us to identify that we would need leadership, that we would need to take on specific roles to support our community, that we would need to take on specific roles around infrastructure and that we would need major support and resources from internal services such as finance, communications and human resources to help us with that recovery. With our senior leadership team, we exercised an event such as a flood and how we would coordinate ourselves to respond to that level of an event. Recovery roles and responsibilities were defined and practiced.

2. Build relationships and have them in place before an event occurs. Build relationships with your partners before you have to call someone out of the blue and say "we need your help". Use these relationships to identify your risks and vulnerabilities, and to talk about how you might work together under very different circumstances.

3. Ramp up fast, right away and start big. Bring in all of the people you think will need to be involved in the recovery work. Get together – and even though you're under pressure to quickly recover from the event - take the time to put together a plan. It's hard to do because most people want to move forward in operational mode and you really do need to talk to each other to say "What are our priorities?". Our experience has been to put people first: the people in your community as well as the people in your organization.

4. Communicate in as many ways as possible. The biggest risk to your recovery progress is that you are not able to share information broadly with each other and with your community and in a fast enough way. Recovery demands timely actions. When the flood occurred, we accessed many different methods of communication to help with response: we used social media, traditional media channels and some visible leaders to help us communicate key messages. Social media had evolved into a tool that we as an organization understood how to intentionally use to help us communicate broadly with our community. We built on this foundation during the recovery work. We asked our council members and our mayor to help us communicate how recovery was progressing. Bring your information to the community as much as possible: on your website; in a written format, for example using reports and diagrams to help communicate the recovery process; and by meeting face-to-face with the community.

5. Expect anxiety and take care of the community and your city colleagues.

Understand that recovery from any event is an emotional process for everyone, including the people who are responding and helping the community to recover from the event. That anxiety lasts over a long period of time because recovery is a long-term process. It requires a lot of personal resilience from the people trying to recover and from the people who are offering their help to support the comunity in its recovery.

Have the resources to support the community as well as the organization. We worked with other governments and stakeholders to bring support to our communities during our face to face meetings. This was facilitated through the relationships we had established before the event. We also maintained a conversation with our human resources team to better understand if our employees were increasing sickness and accident claims, for example, or increased calls to our employee family assistance program. We made it a leadership goal to keep a pulse-check on the wellbeing of our employees.

From an operational team perspective, as a leader, I was very conscientious about ensuring that the good people doing the recovery work were able to have down time for themselves. We made sure that the team stayed involved in physical activity during the course of the recovery. Inevitably, you are going to have people on your recovery team come and go. Supporting each other for the duration of the recovery program is important. We are still recovering as a community four years later, and we are very fortunate to have team members that have been supporting recovery since the day the event occurred. We have become more aware of the psycho-social impacts of significant events with each event we've experienced. We have more intentional awareness of staff wellness for future events. It is really important for organizations, especially a municipality, to pay attention to this factor both within the community and within your own organization.

6. When you're building your recovery plan, take the time also to ask yourself 'what do you want the story line to be one year from now?'

Our natural instinct is to think 'it has been 3, 6, twelve months since the event' and as a recovery team we plotted out when those timelines would occur. We established goals of what the recovery accomplishments would be for each period of time. As a team we tried to visualize what the news headlines could be at each of those milestones. We wanted the recovery story to be seen as positive, to be seen by our community that we were moving forward in recovery and progressing toward resilience. We envisioned those headlines and crystalized the goals we were working toward as part of our recovery plan.

7. Celebrate milestones.

Building on point 6, once you have identified what those milestones are, take a moment to celebrate them. With the public's help we understood what their priorities were and we tried to create time sensitive goals for those priorities. We had three pedestrian bridges over the Elbow River destroyed as a result of the flood. The community made it very clear to us that those pedestrian bridges were near and dear to them and they were critical for connecting community, and for pedestrian and cycling access to downtown. We worked with the community to really think through a few questions: What would building those bridges back better look like? How could they be more resilient in the future? How could those bridges be better prepared for a future flood event and how could they ensure that the community would stay connected during another flood event? Through a community engagement process, the community helped pick the design for the new flood resilient bridges, and those bridges were opened 18 months post-flood. When the pedestrian bridges were opened, we hosted a community celebration. People were invited to the opening, they could come and walk across the bridge with the Mayor, and a blessing was offered by one of our indigenous leaders. It was a true community celebration. Taking the time to acknowledge the recovery actions helps to establish that there is a forward momentum as a community.

LRT 2013 Flood

Pedestrian bridge June 2013

Pedestrian bridge construction 2014

Pedestrian Bridge Complete 2014

River bank resilience measures

8. Build back better. As you're going through this recovery work, keep your eye on the future and consider opportunities to build back better and to be more resilient. It's really the best time to build on the awareness of risk that the event has created. For example, some of our public building infrastructure had mechanical systems that traditionally would have been housed in the basement. During the recovery process, these systems were elevated to a second floor. We've used our learnings from the 2013 flood to really create a dialogue with the other levels of government about the risks of flooding in our city and to solicit support to help us with improved flood resilient infrastructure for future flood events. Specific examples include strengthening our reservoir and looking at some additional pathway and river hazard adaptation, supported by provincial and city funding. River bank erosion maintenance became critical to reducing future flood impacts. During our recovery work, we created an opportunity to build back better through a very creative, environmentally sensitive and flood resilient approach. A combination of natural materials, such as willow reeds that grow both horizontally and vertically, combined with large boulders of various sizes were layered to provide both a natural habitat for future wellness of the river, in addition to flood resiliency to future flood events. It was this creative approach that supports the health and wellness of our rivers as well as making them resilient to future flooding events.

Throughout this flood recovery process, the core guiding principle has always been: 'How can we provide the best municipal service to our citizens?' The first pillar of our five pillar recovery plan was people first. While those initial stages of recovery were in place we worked with our community to understand their needs. As recovery has prolonged over the past four years our focus has been on ensuring that our municipal infrastructure is recovered and ready to withstand a future shock. Our city's resilience is a blend of understanding our citizen needs, and ensuring that we as a municipal government are able to provide the services needed by our citizens.

As the Director of Resilience and Infrastructure Calgary, and the Deputy Chief Resilience Officer, **Chris** envisions the delivery of a long-term investment and value strategy for a resilient Calgary. Previous to her current role, Chris was the Chief of Staff in the City Manager's Office and contributed solution based approaches to very dynamic and complex issues. After the 2013 Flood, Chris was the Director of Recovery Operations and she still continues to oversee ongoing flood recovery activities four years later. Resilience is a value system for Chris that guides her personal and professional paths.

The road to recovery: healing and rebuilding in Lac-Mégantic

By Lilia Yumagulova and HazNet team

For this HazNet in-depth series, we interviewed Marie-Claude Arguin, City Manager for Lac-Mégantic, Quebec, about her team's dedication and resilience in building back better after an unprecedented tragedy. Read more here:

http://haznet.ca/haznet-fall-2017/

For Marie-Claude Arguin and her family, camping is a much-treasured time together, away from their busy and demanding schedules, away from the media and away from the 24/7 demands of daily work as a communication and network specialist with over 20 years of experience in crisis management. On July 7, 2013, Marie-Claude was taking a break from her job with the Canadian Armed Forces in Ottawa and camping with her family in the Laurentides. On that morning, for reasons she cannot explain, she asked her husband to turn on the radio while they were cooking breakfast on a sunlit picnic table. What she heard that morning forever changed her life. Explosions. Fire. An unknown number of deaths. A downtown completely destroyed. All of this in the small town of Lac-Mégantic, Quebec. Marie-Claude's hometown.

That morning, Marie-Claude rushed to find cell coverage to make sure that her parents were alive. Once she knew that her family members and close friends had survived (albeit with their lives completely changed), Marie-Claude tried

On July 6, 2013, an unmanned 72-car train rolled down a slope from Nantes at 100 km/hr and derailed in downtown Lac-Mégantic, spilling and igniting some six million litres of volatile crude oil. Forty-seven people were killed. Twenty-seven children were orphaned. One hundred and sixty-nine people became homeless. A large portion of downtown was destroyed with 57,000 square metres completely burned and 558,000 metric tonnes of contaminated soil to treat.

Derailment. Picture taken from a Sûreté du Québec helicopter of Lac-Mégantic

to go back to her normal life. Her husband and two sons, ages 6 months and seven, had settled in Ottawa just 12 months earlier after years of military deployment abroad. But for Marie-Claude, there was a sense of unwavering emptiness after the disaster that a "normal life" could not seem to fill: "There was this feeling that I needed to help. I would send cheques to the Red Cross. I would put baby clothes in boxes and send it to the Red Cross. But the feeling of emptiness was never completely fulfilled. It was my husband who actually said, 'You've been in the military for years, and you've been to operational bases everywhere something goes wrong on the planet to help with recovery. Why don't you go to your own community and do the same thing you've been doing for the past 23 years for complete strangers? If you feel that is what you need to do, then we will support you,'" The decision was made right there.

Marie-Claude left her job in Ottawa three days later. Ten months after the tragedy, she returned to Lac-Mégantic to start a new job as Deputy City Manager. When she arrived, the community was still "in the first phase of emergency management. Everything was going 1000 miles per hour". She sat down with her boss and asked, "Where do we start?"

"We talked about what my competencies were, and what I was comfortable with. My boss had to manage the post-emergency but also to continue to run the city. On day one, we decided together that given my previous experience in emergency management (especially at the recovery stage) and my national defense experience at the federal level, I would take over all the tasks related to the emergency, the tragedy, while he would run the normal operational business. A lot had been put on the back burner, because he had to take care of the emergency management".

"It was obvious that one of the first things to do was to meet with representatives of the government of several departments both provincial and federal, organizations like the Red Cross, and determine what type of programs there are in place, if any, to support with the recovery process. What is their involvement? What are their expectations of us? What are our expectations of them? What are the expectations of our citizens: when can they return home? How do they deal with legal issues? Can our citizens be compensated? Do we deal with insurance companies or deal with compensation programs at the government level? There were many unknowns. Not because the government didn't want to support us, to the contrary".

"What I found was that this scale of accident involving so many different government departments had never happened before. So at the same time as I was asking them, 'How do we deal with this,' they were telling me, 'We don't know exactly. This has never happened. We are used to different types of emergencies—for example, for fires or flooding in the springtime, we have compensation

programs that exist to support municipalities—but never for that sort of accident.' Should a particular department be the lead? Should it be the Ministry of Transport because it was a train accident? Was it the Department of Environment because it was a mass contamination and environmental disaster? Was it Health? Was it Municipal Affairs? Was it Public Safety? The answer was 'all of the above'."

Marie-Claude soon discovered that the disaster was unprecedented in the history of Canada. It required an unprecedented level of collaboration across multiple levels of government and departments: "Because normally it is Public Safety for flooding, for example, and they know at this stage they need to talk Municipal Affairs, at this stage they need to talk to Health. But in this case, everybody was there, and everybody was looking at each other thinking, 'Ok, I know I have a part to play in this, but I don't know which one and to what extent.' It was a huge learning curve in terms of situational awareness for all of us. The disaster was so intense, so large, that everybody wanted to be part of the recovery. Everybody wanted to know what they could do to help. We established very good relationships with the government right from the get-go, and four years later, there isn't a single day that I am not in contact with one of them, because it's far from being over."

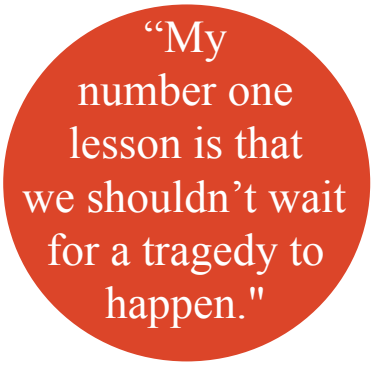
When it comes to lessons learned, Marie-Claude suggests that navigating the complexity of intergovernmental and intragovernmental communications and commitments through a newly created structure called le Bureau d'expertise en coordination (BEC) was something that worked, but could also be improved upon in the future. While she became the focal person in charge of disaster recovery for the municipality, the demands of the recovery required much more than the efforts of one person.

"The [BEC] meant that we needed a single focal point for both the municipality and the higher levels of government. I was the link when the Province wanted to talk to the municipality. The Province named the department of Municipal Affairs and one deputy minister as the focal point for interdepartmental coordination. Under this structure, even if I had issues for which I needed to deal with Public Safety or with the Environment, my point of entry was Municipal Affairs. They had a team that was dedicated to Lac-Mégantic, so they would direct a request to the right department. That worked, and the intention was right. The only problem was, because it was the first time this structure was implemented, and it came with good intentions and with the right resources, what was lacking was the power that comes with it".

"For example, I go to Municipal Affairs and say, 'I've got a problem with the environmental cleanup,' and they say, 'Ok. Thank you. We'll take care of this.' Then, when they went to the Environment, they did not necessarily easily accept or appreciate that another department that would normally be their equal was now asking them things. So more often than not, the Environment would contact us directly as opposed to go back to the central bureau ran by Municipal Affairs. Again, this is not to say that the Environment or any other department for that matter didn't want to follow suit, but in a way, it was simply not the way they were used to do things. So these people were hired with the greatest intentions, but the people were not given the right tools to do their job effectively. We say it openly today as a lesson learned and I still thank everyone for taking part in this effort. Some people even moved to Lac-Mégantic full time to be part of that bureau."

Among the many lessons learned following the event, one lesson closest to Marie-Claude's heart is the importance of community healing.

We know that one day there could be an earthquake or tsunami somewhere and communities may be destroyed. For sure, there are programs already written about how we are going to support evacuating people, how we are going to start rebuilding the city, how we are going to support this and that. But I bet you there is no program written and practiced with resources put aside to help the people two, four, and ten years down the road, because clearly most of them would have lost everything and would have some sort of post traumatic stress disorder. We need to think about that. When I say supporting the people, I do not mean supporting them with financial compensation. Most programs include this. What I mean is creating dedicated programs with a single purpose: the recovery of the human being…healing the soul.



"Everybody had the greatest intentions in Lac-Mégantic. Various levels of government put programs together to help us rebuild our infrastructure. But four years later, although there has been improvement, it's not automatic.

In other words, they didn't consider the reconstruction of the human mind as a priority. They considered all of the infrastructure that's been destroyed, all the taxes the city has lost, and all the programs needed to compensate and make sure that the municipality still has some revenue while it rebuilds. But in most cases, government doesn't think about the human mind, doesn't think about what's required to heal a population that's hurt, and when we have a large number of people who are clearly going through post-traumatic stress. We have professionals who, three years afterward, are also very affected just by listening to stories. It's not easy to be a social worker when, day after day, all you hear about is darkness and pain. You need help as well. We were lucky that in Lac-Mégantic, this sort of program was put into place and we fought really hard to maintain it. I am just not convinced, however, that this is included in standard emergency planning courses. Unfortunately, I believe most governments will continue to plan for the reconstruction of the tangible only".

The programs that were initially put into place didn't systematically address psychosocial needs.

"We could rebuild the most beautiful downtown here. It could be filled with new infrastructure in gold and diamonds. But if we don't have healthy and happy human beings to fill that downtown, then we will have done all of this for nothing." Yet, Lac-Mégantic is known for having taken signi-ficant steps to start the community healing process from very early stages. As Marie-Claude suggests, once the first phase of emergency management was over and all the primary needs were met, engagement and collaboration for rebuilding became key to community healing.

"How do we rebuild? Do we build back exactly the same? Do we take the opportunity—it's a funny word to use in this context—but now that we have to rebuild, do we decide to build better, build in a different way? We knew that the best way to contribute to the healing process of the population was to include them in the rebuilding process. The municipality put together a huge consultation process called 'Réinventer la Ville' (Reinvent your town). We had several evenings where we brainstormed ideas. These sessions were supported by senior urbanists and city planners. Many of them generously offered their services to help us. They helped us draw up different options. This process took place for the better part of a year at several meetings, and it gathered 400-450 people—which, to someone in Vancouver might not seem like much, but in a town of 6,000, that is huge.

Take my parents, for example. They grew up here. They are still here. But their entire downtown is gone. So their history and their memories are gone. It's important to give them the opportunity and the choice to participate or not: 'Well, I've lost this but now I have an opportunity to rebuild and here is how I would like to see it.'"Within the field of disaster management, this participatory decision-making and recovery process is considered to be a best

practice. However, there are often trade offs between the speed of rebuilding and the time needed for meaningful engagement. How did the municipality balance participation and speed? Marie-Claude says it took respect, patience, rigour, and leadership.

We had huge participation. It was not easy. It was very emotional. But we believe strongly that it is not only a recommendation, but an essential step of the healing process to include the people who lost something, who lost their history.

"It was indeed very difficult. It is still difficult today. People wanted to build back quickly, and one of the challenges was that, not everybody, but a good portion of people wanted it rebuilt exactly the way it was. It's like they wished they could wake up from this bad dream, open their eyes and find the same downtown that they always had. That's when the difficult decisions and the challenges came in. There's a lot of psychology in this.

We said, 'OK, we understand, but here is what we could miss if we rebuild the exact same way.' There was a lot of very respectful engagement trying to show people that 'we understand that you love your downtown the way it was before, but it wasn't going so well economically and here's why and here is how we could do things differently.' And, of course, in a small municipality, we would get the support of experts coming from outside, such as from Montreal and other cities. But the first reaction from the townspeople was 'Who is (s)he to tell me what I need? You're not from Lac-Mégantic. You are from Montreal. You don't know what you're talking about.' That kind of thing. What made the difference was leadership. Our Mayor was well respected by everybody. You've seen her on TV for weeks and weeks. She managed to hold the entire population on her shoulders during this whole time. She was already respected before, and she gained more respect after. I think she applied a lot of psychology to her style of leadership, and she was instrumental in telling people, 'I hear you. I understand. Trust us. We will not erase your past. We will not erase your history even if we do this differently.' And she told people, 'Yes, we need these people coming from outside to help us, but believe me I will not let them make something that doesn't look like us.' Building back better required some very difficult decisions, but Marie-Claude says the municipality had a legacy of environmental stewardship to build on and to guide their recovery effects.

"Because of our beautiful lake, it was kind of in our DNA already that our vision and our actions would be guided from the perspective of eco-responsibility and sustainable development. For example, we were the first municipality in Quebec to start an all-inclusive three-way waste collection program (garbage, recycling and composting) long before the phrase 'sustainable development' became popular. It was something the leadership, the administration and the citizens were living by".

"For instance, we decided that we're not going to put large, asphalt parking lots downtown. Instead, we decided to implement a pilot project called a 'green' parking lot. The project offered a lot of co-benefits, such as rainwater management so a lot less runoff ends up in the lake. We also included a lot more room for people walking, people biking, moms with their strollers, and less room

The leadership really made a big difference in terms of making sure we kept people interested in rebuilding better."

for cars. We were proud when we rebuilt the main street in our downtown with sidewalks that were really, really wide and not in black asphalt but in light cement. We added large cycle paths on them. We added a lot more room for active transportation. We only have a few parking spaces along the street. The parking spaces are dedicated to people with limited mobility, such as people with disabilities and the elderly. This is a new culture. We needed a lot of good arguments to make sure we didn't build the street exactly like it was. We're really proud that we decided to rebuild our infrastructure better."

For Marie-Claude, one important approach to enabling economic recovery is through strategic business relocation. "We never expected that it would take two-and-a-half years to decontaminate the soil. Even the experts didn't tell us it would take that long. It was just so heavily, heavily contaminated. We quickly realized that if we didn't relocate our businesses, then we would either lose those businesses or they would establish themselves elsewhere, spreading and eliminating our chances to one day recreate a town's heart/core. So we relocated those businesses fairly quickly. It was hard for them to realize that they were not going back to their previous location.

This took a combination of municipal legislation and encouragement to change the culture of the citizens. We had to say, 'This is your new downtown now. Yes, we

will rebuild the historic downtown. But the businesses you were used to, they are here now, and there are here to stay.' That kind of thing."

This strategic economic recovery process triggered some difficult on-the-ground negotiations, according to Marie-Claude. The land-use changes involved to establish a commercial corridor in a new area were difficult to manage. Leadership was central to this.

"We have the mountains on one side, and the lake on the other. Then, we have people living all over the place. Initially, we had one particular spot that was just a field between the train tracks, where the accident happened, and our sports centre. The city owned the land so we could have built a new street and infrastructure for our relocated businesses. But there wasn't enough space to relocate all of our businesses there. And we didn't want to exclude the downtown. All of the studies demonstrated very clearly that the worst mistake we could make would be to let the downtown—the heart of the city—explode, so all the businesses would establish themselves like polka dots all over the place. We needed to make sure that we would protect the heart of the city while building a new one. It meant the very difficult decision to proceed with some expropriation. We picked an area of the city where we've compensated—we firmly believe—the people fairly. But it meant knocking on people's doors and telling them, 'We're sorry to tell you that you're going to have to leave.' When people asked why, we would say, 'Well, it's going to be our new commercial zone.' So you can imagine that this wasn't well received, because they survived the tragedy, they survived the accident, and now

To rebuild back better we made sure that we protected the businesses that were relocated. We gave them confidence in terms of zoning and everything within the powers of the municipality to make sure they would not end up alone and that the new shiny downtown would fill in very quickly and become the new favourite place.

we're telling them that they don't have a home anymore. It took very, very strong leadership to stick to the plan. It could have been very easy to succumb to the pressure."

Mitigating future disasters

Today, four years after the tragedy, the train still runs through downtown Lac-Mégantic. Marie-Claude says the municipality is fighting for a bypass train track while enhancing their emergency management and response capacity.

Why? Well, even if a new company now owns the tracks and we are confident it has a much better maintenance program, even if the legislation governing Transport Canada has improved, we will never be 100 percent protected from human error. We have the slope, we have the curve, and our downtown is right at the bottom of it. This will never change, period. A human being with the best intentions in the world could always make a mistake, could always forget something. Mechanical safety systems could always fail and the result could be another train coming downtown. In 1918, a very similar accident happened. The only difference from the recent accident was that the 1918 train was transporting wood as opposed to crude oil. So the result wasn't nearly as bad. In terms of what we are doing to protect ourselves better, the most important thing is to keep fighting for the bypass train track. That's for sure".

"Our fire fighters and first responders were really good at emergency management. Right now, we realize the

"We will never feel 100 percent protected as long as the train still passes through downtown.

importance of being well prepared. Last Monday, I was sitting at a panel where Transport Canada was reviewing a law called sécurité ferroviaire in French, and what can be done to be better prepared. It's important to know what dangerous goods are being transported in what quantity so we can at least be better prepared with all the right goods and services. We can put MOUs in place before a disaster strikes. I know during the 2013 Calgary floods, what saved them a lot of time were the MOUs signed in advance. They knew exactly where to get services and goods to help. It was a proper process. This is something being negotiated during peace time, prior to an emergency striking. Once we are in emergency mode, especially when it is 01h30 in the morning, it is not the time to get onto the phone and start negotiating."

When asked about advice for other municipalities, especially smaller ones, to prepare before an emergency, Marie-Claude draws on her military training and experience:

"Practice, practice, practice.

Roles and responsibilities. If it does happen, who does what? Who calls whom? Who is responsible for what? So it becomes almost like we were doing it in the military. So it becomes second nature. I would like to have a magic answer in terms of what to do to prevent an accident, but I don't. The next best thing to accident prevention is ensuring that all your first responders and all of your employees are ready to kick into gear. We don't want accidents to happen, but we need to have scenarios together. Let's say what if it happens and it happens this way, then who's in charge of what and who's doing what and who do we call? That's just from a work perspective. But we need to go a little bit further. What we've learned is that many first responders were here for weeks and weeks and weeks, day and night. They still had families to take care of. That is also part of prevention. If an accident happens, and I'm stuck here for weeks, who is going to take care of my family? We need to go even further. It's not just a professional matter of what we need to do at an accident site: we need to reassure responders and municipal employees that we will give them the time to make sure their family is well."

For the past four years, for example, the long haul and heavy toll of the recovery process was enabled by staff, citizens and key recovery partners such as the province, the federal government and the Red Cross, among others. Throughout this process, Marie-Claude explains, allocating time and resources to take care of these hard-working staff, citizens and social workers was a priority for the municipality. But it is much simpler said than done, she warns.

"It's all about resilience. There are a lot of ways you can increase resilience in a human being. It's about confidence. If you feel confident that if something happened you've got the right leadership and the right people to

take care of you and your family, then your resilience will be much higher. With higher resilience, you'll be more likely to survive the trauma. For example, we still work with the Canadian Red Cross. The way their programs are built is very smart. When a disaster of this scale hits, they arrive very quickly. At Lac-Mégantic, nobody from the municipality called the Red Cross, but they came after receiving a call from one of their local volunteers that, herself, had to evacuate. They didn't wait for orders from anyone, and they got all the gear in trucks and they arrived only a few hours later. It was still dark outside when they started to show up. The organization is structured in such a way that they know exactly what to do in what I call Phase Zero: the emergency, its primary needs. That means ensuring people are evacuated and sheltered, that they have food, and that they are reassured. But four years later, the Red Cross is still with us, and they still have money that they've raised. They're very smart in making sure that they're not going to spend everything in the first six months, because a lot of their programs four years later are actually geared to power resilience. Sometimes their educational programs—the babysitting courses, courses on how to stay alone for young kids and elderly people—are actually building back resilience. Unconsciously, it's bringing back safety and confidence to citizens. And that's what we need to rebuild, too. We have been told many times that we are a resilient community, and it was probably true. But resilience can also decrease. Four years later, although we are getting back up, it would be a lie to say that our resilience level is the same as it was in 2013. So if we were going to get hit with the same tragedy today I know for sure we would not be as resilient because we are not done recovering from the first one. So right now, in terms of prevention, what we need to do is make sure that in their every day life people are actually feeling safe from trains that pass. They need to feel safe when they're at work. They need to know their 12-year-old who comes home after school will be safe, and they need to know what to do if they cut themselves with a knife cutting carrots. All these little things will add to resilience. A person with a ''full resilience tank'' would not even think about these little details.

Planning for social recovery is something that rarely happens before a disaster strikes. Yet, that is where Marie-Claude feels the focus should be placed. In Lac-Mégantic, several innovative, accessible and effective practices were adopted. One of them, known as the Proximity Team, follows the Red Cross' Red Bib model. The Proximity Team used white bibs.

"Red Cross members are visible in the community because of their red bibs. So we put together, at the community level, what we called 'the Proximity Team,' a team of social workers. Most of them were external, from different municipalities, different cities, so they could be completely neutral and rational and not emotional. Their role was to talk to people, to help them. But it was not like, 'OK, we've increased the social worker team at the Lac-Mégantic hospital by 10 people. Make an appointment and go see them.' What we quickly realized was that people who need help, especially in a small town where everybody knows everybody, might not seek it through formal channels. For example, the most influential citizen might have too much pride to make an appointment to see a social worker. Yet, if the person has suicidal thoughts, someone needs to talk to that person".

I also believe that it is worth putting a lot of energy into a spreading positivity. I call it THE POSITIVE CAMPAIGN. For every bit of bad news, let's bury it with good news. We have so much good news but the media rarely wants to hear about it…it is sad, truly sad".

"The Proximity Team still exists today (but without the bibs). It was cut by the government, but we fought for it and we got it back. What is unique about this model is that social workers are completely embedded within the community. Yes, they have office space, but what they do daily is they walk around. They go to restaurants, they listen to discussions, they ask questions, they look at people's non-verbal communications and then they reach out to people who are displaying signs of still needing help. They reach 95 percent of their clients that way. They see, they live, they feel and that's how they reach out. They are so good it's crazy".

"During the immediate recovery phase, these teams had white bibs on. They knew we had people who had just lost kids or relatives or friends. We realized that these people were not reaching out to get help. We realized that we

needed to reach out to them to offer safe accessible space to seek help as part of their daily routines. To this day, it has been really, really helpful that The Proximity Team is working right here with our locals in the city. We know that there are still a lot of people that need help. We give them that help in a different way, we reach out to them, we establish some sort of a continuous space for connecting and getting people to talk when they are ready."

Despite the heavy burden of Lac-Mégantic's immediate recovery needs and the pressure to rebuild as quickly as possible, city staff made a priority of listening, engaging and proactively learning on the job, says Marie-Claude.

"When things like this happen, we gather strength. We were supported by people giving us ideas, but we also learned as we went along, because an event of such large scale was unprecedented. We were very open to reading about lessons learned from other places, other places on the planet where we knew something bad happened, like the earthquake in Christchurch, New Zealand."

"One thing that became very obvious to us was that our children seemed okay at first, but then things changed. We had a team consulting all of our youth in primary and secondary schools and in the college. Basically, the team would go to the school, and tell kids 'here is a piece of white paper; draw how you dream your future downtown. What do you see there?' We have hundreds of pictures of kids drawing candy stores, etc. But at the same time, we also observed that some kids' drawings were really black. There wasn't any pink and yellow. It was in black and burnt colours. So, the Proximity Team and all of our psychosocial teams are putting together a special effort in terms of following our youth to make sure we don't forget about them. They were strong at the beginning, but I guess that was like a natural defence mechanism. As long as they felt their parents were wounded, they stayed strong. When their parent found their strength back, many fell".

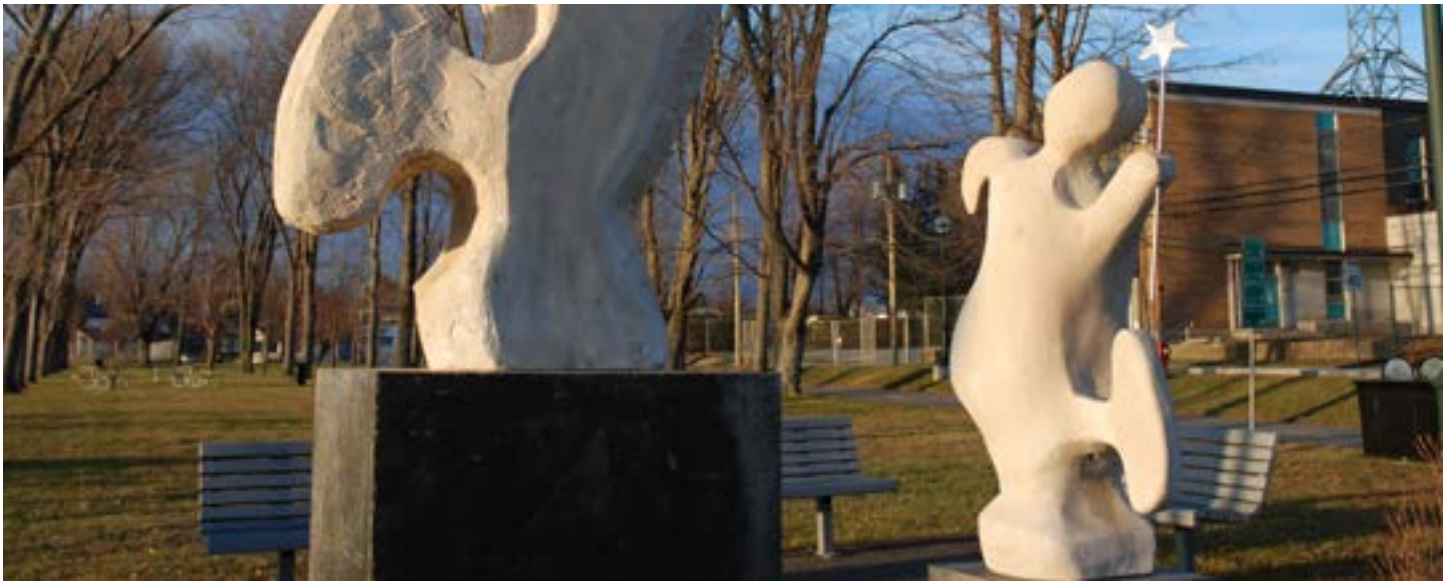
"We didn't want to forget about our elderly either. We sent mobile teams to the homes of our elderly, because they're kind of left alone. They're in the community. They watch TV. They know what's happening, and they're sad because all of their memories are gone. They're too old to take part in the rebuilding process, and they couldn't get to the evening sessions. So we sent mobile teams. It was really important that we got representation from everyone".

Recovery from disaster is never simple, says Marie Claude, but she is grateful for her military training in emergency management. A key lesson from that training, she says, is the recognition that the hardest work comes well after the dust of the tragedy has settled.

"In Phase Zero, the immediate response, everyone has the same objectives. It's primary needs. Are we OK? Are we going to survive? Etc. So we all go in the same direction without even asking. And because the disaster was so large in our case, everybody was offering help. Four years later, we still have people helping us. But the population is at a different place. Some are healed already, and some are far from healing. And it's normal that, four years later, we don't have all the attention and help that we had at the beginning. We are however overworked. We can still see that for years to come we are not going to be fully recovered. We don't have the same level of resiliency. We are tired. Sometimes when we ask for help, we are told no, after four years we should be back to normal. A regular citizen of Quebec Province that doesn't live here cannot imagine that we are still far from being recovered. They cannot imagine that the staff here still work on average 50-60 hours a week and that's because I do not allow them to work more. That's why it's harder: our reality is difficult to understand and believe because it never happened before elsewhere. And when I talk about different stages, about where we are in terms of healing process, we're back to our regular municipal management where some citizens wonder why it isn't all rebuilt yet. So, really

the phase are we in is the most difficult phase, and it is going to last for many more years".

"We are still so overwhelmed with everything. We're almost still in survival mode. So our guiding principle might be to make sure that the team doesn't break, that the population doesn't break, and we need to find a way that we can all keep going. Because we need the investors



from outside to come, and if the picture portrayed shows that we're all sick, we're all suicidal (some media called us that!), we're all tired, then they won't come. This is where I bring back my POSITIVE CAMPAIGN. There are people who are going to be in shock. There are people who are going to be in post-traumatic stress, and we're going to need to help them. There are people who are going to get tired. It's normal. But what we don't want to forget is that we have done so much already. We need to celebrate our successes, even the smallest, every day.

We need to remember all of the good we've done already.

And that will give us the energy to keep going. We have the responsibility to tell this to everybody. Sometimes journalists interview me, and they ask, 'How much money have you lost? How many buildings have you lost?' And I tell them I'm not going to answer that, but what I will tell you is how many new families we have in town and how many new buildings we have started to rebuild. So I guess one of our guiding principles, while it's far from easy, is to focus on our positive campaign because there are a lot of positives being done; it's just that the context is a bit difficult to see.

What happened was tragic. But if it is going to make some legislative changes that are critical to public safety for communities across Canada, that would be a good thing".

A note from the editor: This interview stands out for me from among the hundreds of disaster-related interviews I have conducted over the years. It is not just the sheer scale of the tragedy that engulfed a small municipality, putting its staff and leadership under unimaginable pressure from post-disaster public service, but the conscious and often difficult choice to build back better. Exceptional leadership at the political, staff and citizen level along with innovative ways of addressing and investing in social, economic, and environmental recovery while rebuilding infrastructure make this story truly unique.

Build Back Better–a Balancing Act

Build Back Better (BBB) has become the new disaster recovery mantra. In this series, we explore recovery as a balancing act. Based on case studies from around the world and around the corner, we collectively explore key tensions during recovery. These include balancing the immediate need to return to 'normal' with the need to reduce future vulnerability, improve equity outcomes and increase resilience; balancing interests across sectors of a community with external pressures; navigating incentives versus disincentives of recovery funding programs; addressing cultural and psychosocial dimensions of recovery; seeking synergies between economic development and emergency management before and during recovery; and understanding recovery as an outcome and as a process. We have brought together an exceptional team of researchers and practitioners to distill some of the key lessons for designing a thoughtful, inclusive and effective recovery process and critically examining opportunities for building back better.

The beautiful illustrations for this article were contributed by Margaret Anne, a former resident of Fort McMurray, Alberta. She has been living in the Kootenays, British Columbia, for the past four years.

Building back better is both an outcome and a process: *Lessons from the South Pacific*

Lisa Strychar,

Urban Planner, Vancouver, BC

The following empirical findings of post-disaster 'building back better' are the result of 2016 fieldwork from Vanuatu, an infrequently studied South Pacific island nation. Vanuatu's vulnerable and at-risk islands endure an annual cyclone season, though 2015 Tropical Cyclone Pam caused record high destruction. Three differing peri-urban communities of the capital city Port-Vila were interviewed for their evaluation of housing reconstruction programs. The key findings of this consultation offer robust, qualitative evidence that building back better (BBB) is just as much about integrity of process as it is about rebuilding with structural integrity.

Technical professionals and planners can and should develop housing and land use policies that reduce potential hazards and make communities more resilient to future disasters. However, respondents identified as imperative designs and plans that resonate with, have internal validity with, and are fundamentally appropriate to community needs and norms. Agencies responsible for recovery processes who genuinely consulted with affected communities created a learning feedback loop whereby the agencies explain BBB requirements and rationale, and communities offer local knowledge and context to put flesh on the bones of the BBB framework.

Through collaborations, learning and partnerships, agencies helped build vital community capacity and resiliency rather than just building houses. All communities' housing was designed to cyclone standards; however, communities involved in the process reported greater success across various indicators. Conversely, communities not adequately and appropriately consulted demonstrated how inappropriate processes lead to long-term technical failures in housing and even enduring social harm.

Read full article here: http://haznet.ca/haznet-fall-2017/

The Disaster Recovery Program in Alberta following the 2013 floods

Eva Bogdan,

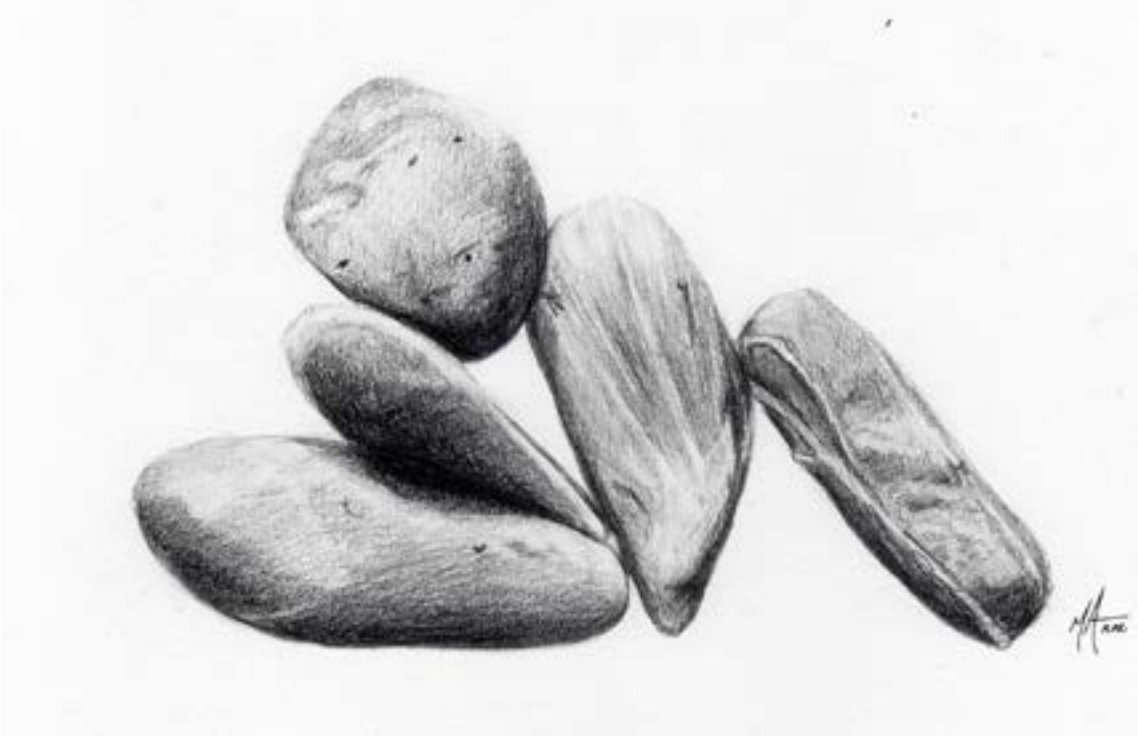
PhD Candidate, Department of Sociology,
University of Alberta, Edmonton, Alberta

The 2013 flood impacted 30 communities in southern Alberta. The greatest shortfall in Alberta's recovery efforts was identified as the Disaster Recovery Program (DRP) for individual claimants. Alberta's DRP provides financial assistance for uninsurable property damage, loss and other expenses resulting from a disaster and helps return property or contents to a basic, functioning level. Albertans are fortunate to have the DRP since in many jurisdictions around the world it is not available or is not as generous.

However, improvements are needed to enhance resilience in the short- and long-term for individuals and province-wide. My research on perceptions and practices of flood management in High River following the 2013 floods, as well as official reviews of DRP, revealed numerous areas for improving DRP, including reducing the complexity and length of application processes and providing opportunities to "build back better." One research participant summed up the impact of dealing with DRP: "To be honest, every single person…says that it was not the disaster itself that has caused the most emotional stress and strain and general ability to move forward. It has been the DRP."

Read full article here:

http://haznet.ca/haznet-fall-2017/



Balancing Economic Resilience and Economic Development

Jeremy T. Stone

Recovery and Relief Services, Inc. /
University of British Columbia

Following the 2013 Colorado floods, the US Economic Development Administration (EDA) and the Department of Local Affairs at the State of Colorado commissioned the evaluation of economic resilience planning in 25 affected jurisdictions. Our key findings included the following:

1. Economic resilience planning in most jurisdictions was under-developed or non-existent. From a 52-element tool used to evaluate economic development and emergency management plans, nearly two-thirds of the elements were not present. Validation interviews with staff supported these results.
2. Economic developers and emergency managers are rarely integrated for planning. Few jurisdictions exhibited any systematic coordination between economic development agencies and emergency managers.
3. Emergency managers were often circumspect in their interest in economic resilience. EMs tended to assert that economic recovery and resilience was not in their realm of responsibility.
4. Economic developers and local government officials were often persuaded by an emphasis on low-cost growth initiatives. When economic resilience was described in terms of initiatives to increase growth, local officials were far more engaged than recovery-only suggestions.

Overall, bureaucratic silos seem to be the largest barrier to economic resilience planning. Economic development agencies and emergency managers need to be better aligned for planning.

Read full article here: http://haznet.ca/economic-resilience-and-economic-development-reflections-on-breaking-down-silos-in-planning/

Ratmate, Nepal: "*Once the earth settles, we will build back better*"

Martina Manna,

MSc, International Cooperation Sustainable Emergency Architecture

Nepal is one of the most seismically active regions in the world. When talking about earthquakes it's not a matter of 'if' but a matter of 'when'. On April 25th 2015, a 7.8 magnitude earthquake struck Nepal. Despite the high frequency of earthquakes, disaster risk reduction is underfunded. Further contributing to the vulnerability of the country is the political instability that delayed legal enforcement of the building code until 2005.

In the aftermath of the earthquake, owner-driven reconstruction was promoted and the Rural Housing Reconstruction Program was launched, seeking to foster 'build back better' practices, training, technical support and subsidy programs. Ratmate, a rural village strategically located at the center of Nuwakot (one of the most affected areas) was explored as representative of other rural areas of the country. Although exposed to some best practices on how to build back better, when observing the reconstruction process of private homes, some inconsistencies were readily noticeable. When villagers were informed of the increased vulnerability caused by certain reconstruction practices, and asked their reason for neglecting the building back better criteria, most of them revealed a surprising reasoning: "The earth needs time to settle and it is not worth building back in a good way now, on unstable earth. Once the earth will settle, we will build back better" (interviews, December 2016). This shows the temporal tension with regards to implementing BBB approaches on unstable (physically and politically) soil.

Read full article here: http://haznet.ca/once-the-earth-will-settle-we-will-build-back-better-rebuilding-in-remote-areas-in-nepal/

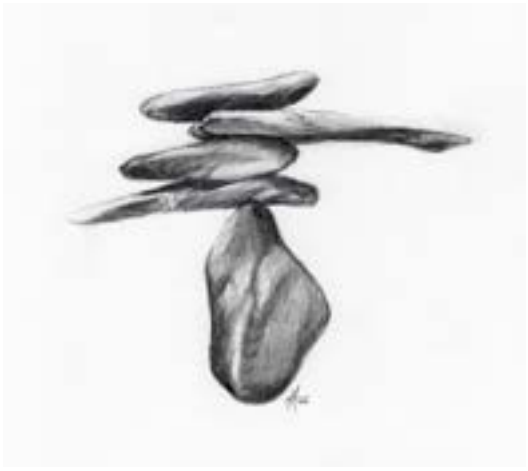
Building Back Better – *Observations from Aceh*

Dilnoor Panjwani,

PhD University of British Columbia,
Toronto, Ontario

Enabling a culture of resilience through "building back better" was a core component of recovery aid efforts following the 2004 Indian Ocean tsunami in Aceh, Indonesia. A community level exploration of the long-term impacts of these efforts almost a decade after the disaster point to a number of indirect impacts that have resulted. These include the emergence of new characteristics of social vulnerability grounded in increased inequalities within and across communities in Aceh.

New and exacerbated inequalities at the community level have surfaced across Aceh. Some examples include disparities between relocated and non-relocated communities, host communities and newcomers, renters and homeowners, aid recipients and non-recipients. For example, though situated away from hazard-prone land on the coast (and therefore "safer"), communities relocated to high ground face substantive challenges in earning and accessing traditional sources of livelihood (i.e. fishing). Inclined slopes for certain relocation sites have led to levels of inequality based on factors such as elevation of home and quality of view, along with well-being outcomes due to ease of access to key infrastructure including health clinics and schools. Lottery assignments for community members assigned to particular resettlement villages have resulted in a breakdown of social networks, community identity and trust. In several cases the built environment (i.e. standard housing design) has disguised the distribution and prevalence of social vulnerabilities. For example, interactions with villagers point to an inability to identify fellow community members struggling to meet ends, in comparison to those who were thriving.



How (or why) to BBB in Shrinking cities?

Lorenzo Chelleri,

Chair, Urban Resilience Research Net–
International University of Catalonia

The city of L'Aquila (central Italy) was almost completely destroyed by an earthquake in April 2009. During the reconstruction of the city, dozens of medieval mountain villages sprawled within the surrounding provinces were hit by a chain of earthquakes that took place between August 2016 and February 2017. The complexity of simultaneously managing multiple reconstruction processes at different stages posed serious challenges both at the technical and governance levels.

However, among the many lessons learned from these challenges, one particular trade-off embedded within the BBB paradigm needs to be highlighted. The energy, investments, technology, planning and public engagement (if any in Italy) for a better city have been focusing during the recovery and reconstruction processes on how to reduce future risks by upgrading previous infrastructures though smarter and modular networks, upgraded building codes with new seismic standards, and a recently launched open public database for tracking the reconstruction process.

The process of building the city and the surrounding villages and towns back better temporally masked the uncertain future of the region prior to the earthquake, the major (pre-existing) challenge being the shrinking regional economy of central Italy. An aging population, declining economies and demographic emigration represented a slow variable stressing and characterizing the recent economic history of central Italy. The earthquake brought an unprecedented infusion of funding and resources from the central government for reconstruction and governance support. As the build back better process continues, central Italy will soon be better planned and prepared to withstand future earthquakes. The questions remains: who will live there?

Lessons Learned or Lessons Ignored?–
A Commentary on Disaster and Hazard Mitigation for the Navajo Nation and Beyond

***by* Rosalita (Rose) Whitehair (Dine' Nation)**

Emergency Management Specialist,
New Mexico Department of Homeland Security & Emergency Management

There is great hesitancy to write of successes and "lessons learned". The lessons are not being learned. The successes are trial and error, and FEMA's After Action reports on the "next disaster" will reflect an accelerated degradation of natural and human environments. This will be most severe for marginal areas (such as tribal lands) least able to recover from the aftermath. Moreover, these areas will see a rise in "secondary disasters" (lost infrastructure, human disease, livestock death, despair and suicide) that follow the initial disaster. How do we prepare for the next "200-year flood" that will occur in less than 5 years? How do we teach our Native children their heritage of smoking salmon, or elk, caribou when there are cancerous spots in the meat of what sustained our people previously? How do we teach our children to use every part of butchering a sheep, when the organs are the main parts that will be affected by lead poisoning?

Climate change and the disaster it brings will continue to wreak havoc with the practiced norms and lifeways of Native peoples. It is with a heavy heart that it is written, again and again, that harmful change is occurring at an increasing pace. For the Emergency Managers, there is job security, but for the people there is ever increasing imbalance in our human condition. So how do we, as Tribal people, move forward towards disaster resiliency? How does a tribal nation with historically very little funding and poverty stricken communities prepare for disasters and move towards recovery?

In one word: Resiliency. It is in our bones; it is in our blood. The earth has always moved, and our People have always moved with her. Adaptability and awareness of our surroundings has always been key. Adaptability to ever-changing policies and accelerated disaster events can be somewhat mitigated through federal funding. This is facilitated by training, testing and credentialing of Native American professionals in the policies and practices of FEMA.

Read the full article here: http://haznet.ca/lessons-learned-and-lessons-ignored-a-commentary-on-disaster-and-hazard-mitigation-for-the-navajo-nation-and-beyond/

Series: BALANCE

This series pays homage to our surrounding Selkirk Mountains in the Valhalla of Slocan Valley.

From the eroding mountains, along the shoreline, fractured and tumbled slate is found as small stones rounded and worn smooth by the unremitting waves of Slocan Lake.

For this project, these stones were collected, stacked, sketched, dismantled and scattered as they were found.

The images in this series are meant to be calming and lead to introspective thought. The precariousness of "balance" contrasts with the endurance of rock. Each drawing is to be symbolic of the balance we strive for in our lives and surroundings.

The stacking of stones is an ancient practice. Canada's historical Inukshuk is a human-like rock stack marking the right way, the safe way, which others have gone before.

Margaret Anne is primarily a self-taught artist practicing since 2008.

Being creative has always been a defining part of my character and shapes my daily experience and perception. I recognize a driving force to express myself creatively. It is something I must do and so I choose visual art as one of the ways to express this creativity. There is a fulfillment in beginning with an idea or inspiration and taking it through a chosen process that makes it into art.

I look to create balance, harmonies and interest in my life, my home and the art I produce. It is important for me to create art from the foundation of personal experience.

I would like people to take away from the series: BALANCE a sharpened interest in examining varying perspectives and an impetus to explore beyond their usual routine.

Public Alerting in Canada Bridging the Gap

By Dan McArthur and Cynthia Weeden

Since early 2015, numerous emergency response agencies, governments, academics and others across Canada have supported the need for Wireless Service Providers (WSPs) to start using their systems to carry public alerts. This support was largely in response to the Canadian Radio-Television and Telecommunications Commission (CRTC) mandate in 2014 that called for Canadian Radio and TV Broadcasters to implement Public Alerting capabilities, but failed to include the same requirement for WSPs. As a result, the CRTC held a public consultation in 2016 to review the need for WSPs' participation in the nation-wide system. Nearly one year later, the CRTC ruled that the WSPs needed to participate in the National Public Alerting System no later than April 2018. This mandate is a victory for all First Responders and Emergency Management Agencies across Canada and a huge win for the Canadian public. However, when compared to other countries around the world it quickly becomes apparent that more needs to be done to address these lengthy timelines and include First Responder organizations in governance processes to ensure effective, timely implementation of the tools they use each day.

Canada has been focusing on public alerting since 2001 when the Federal Government earmarked dollars to support it. There had been much hope that broadcasters would volunteer and start carrying public alerts on radio and TV. However, with no consolidated nationwide approach in place, nothing much happened. It wasn't until 2008 that a Senate Committee identified that only the CRTC can mandate broadcasters to carry alerts, and that alerting participation should not be on a volunteer basis. Since that time the Federal Government worked to establish the CAP/CP alerting standard and also the National Alert Aggregation and Dissemination (NAAD) System, bringing the capability to disseminate alerts to broadcasters. Soon after, private industry worked with Radio/TV Broadcasters and Wireless Service Providers to successfully test alerting capabilities by 2014, serving as a prelude to where we are today with the recent CRTC mandate. But it didn't have to take this long.

For many years now countries around the world have enjoyed the use of Wireless Public Alerting as an important part of their alerting strategy to help safeguard the public against all hazards that have life-threatening potential. However, among the G10 nations, Canada has fallen behind in the use of wireless technology to alert the public during emergencies. In fact, Australia mandated wireless public alerting soon after a horrific wild fire occurred near Victoria, Australia, on February 7, 2009, otherwise known as Black Saturday, tragically claiming the lives of 173 people in one afternoon. In a move that focused solely on public safety, the Australian Government, First Responders and Wireless Service Providers worked successfully together for approximately a year to implement a system that was auditable, accountable, and reached all of its cellular subscribers: a capability provided in a system that allows two-way communication, Location Based Short Message Service (LB-SMS) Text.

Many countries around the world use LB-SMS technology for public alerting and just as many use alternate technologies such as Cell Broadcast, a technology that basically turns cell phones into radio receivers to receive radio broadcast messages. There are good arguments for use of both technologies, but the fact that Cell Broadcast

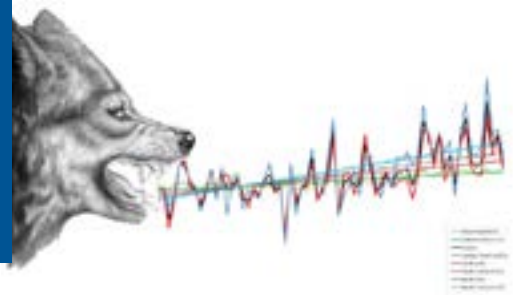
requires new phones to be manufactured for it to work, leaves this system out of reach for many for years to come. And with continuing advancements in technology today, additional solutions are emerging that can further reach and send alerts to members of the public, such as Internet Protocol (I/P) providing the ability to pop up alerts on computers or perhaps any device that is connected to the Internet such as I/P TV. However, the time taken to implement an approach, if left unchecked, will undoubtedly leave us chasing the next greatest technology and force us into an environment where we never fully realize the true potential of each technology before it is well on its way to becoming ineffective due reduced use trends. We have to look no further than our own public alerting timeline to get a sense how this can be applied.

When the focus is placed on the safety of the public, political and technological aspirations take a back seat and Governments, First Responders and Wireless Service Providers work together effectively to ensure implementation is quick and solution effective. Australia serves as a prime example of what can happen when First Responder organizations are provided an avenue to work effectively with governments and technology providers. **Until a greater focus is placed allowing First Responders a greater involvement in the governance of the very tools that they use each day, we continue the risk of being caught in the chase for the next greatest technology.** Australia provides us with much to learn. Placing community safety first and bridging the gap between First Responders and those that provide technology services does save lives.

Dan McArthur has over 30 years of experience in the Nuclear Industry, more recently as Department Manager, providing management and oversight of Emergency Preparedness, Fire Protection and Security Programs at Bruce Power. Now, as Senior Strategist, he maintains and leads Emergency Preparedness Projects and has worked with others to enhance Public Alerting in the region, resulting in a first-in-Canada Cellular Location Based SMS Text Public Alert demonstration conducted in 2014.

Along with being a proud member of the Saugeen Historic Métis Community, Dan is a speaker on Emergency Management in the Nuclear Industry and is an active member of the Conference Board of Canada Council on Emergency Management, a member of the Canadian Advanced Technology Alliance (CATA) e-Crime Cyber Advisory Council to the RCMP, and a member of the Canadian Standards Association providing technical input and guidance on Emergency Preparedness requirements for Nuclear Power Plants in Canada.

Cynthia Weeden has over 24 years of recognized experience in strategic leadership roles, including senior management at global companies such as LANSource Technologies (acquired by 3COM) and Opalis Software (acquired by Microsoft). She has spent the past 12 years working directly in the area of public safety technology as Founder and President of FutureShield. She was named 2011's Runner-up for the Canadian Women in Technology Women Entrepreneur of the Year.



Adapting to the changing risk of climate hazards

by Don Lemmen and Liette Connolly-Boutin

Climate change adaptation requires a fundamental shift in the approach used to manage risks.

Canada's climate is changing; overall, it is hotter, wetter and the frequency of extreme weather events is changing. The impacts of climate change are evident across the country, and pose risks to communities, health and well-being, the economy and the natural environment. Canadians are already responding to address these risks, but reactive adaptation is insufficient for us to thrive in a changing climate. We need to enhance our resilience through planned, proactive adaptation that incorporates future climate change considerations into disaster risk reduction.

Climate Change Impacts in Canada

Canada is warming faster than much of the rest of the world. Between 1950 and 2014 the Earth as a whole warmed approximately 0.7º C, while Canada has warmed by 1.6º C and northern Canada by 2.2º C (Figure 1). These trends are important. They suggest that even if countries are successful in meeting the temperature goal of the 2016 Paris Agreement of the UN Framework Convention on Climate Change and limit global warming to less than 2º C above pre-industrial levels, Canada will still experience at least 4º C of warming and northern Canada will warm even more.

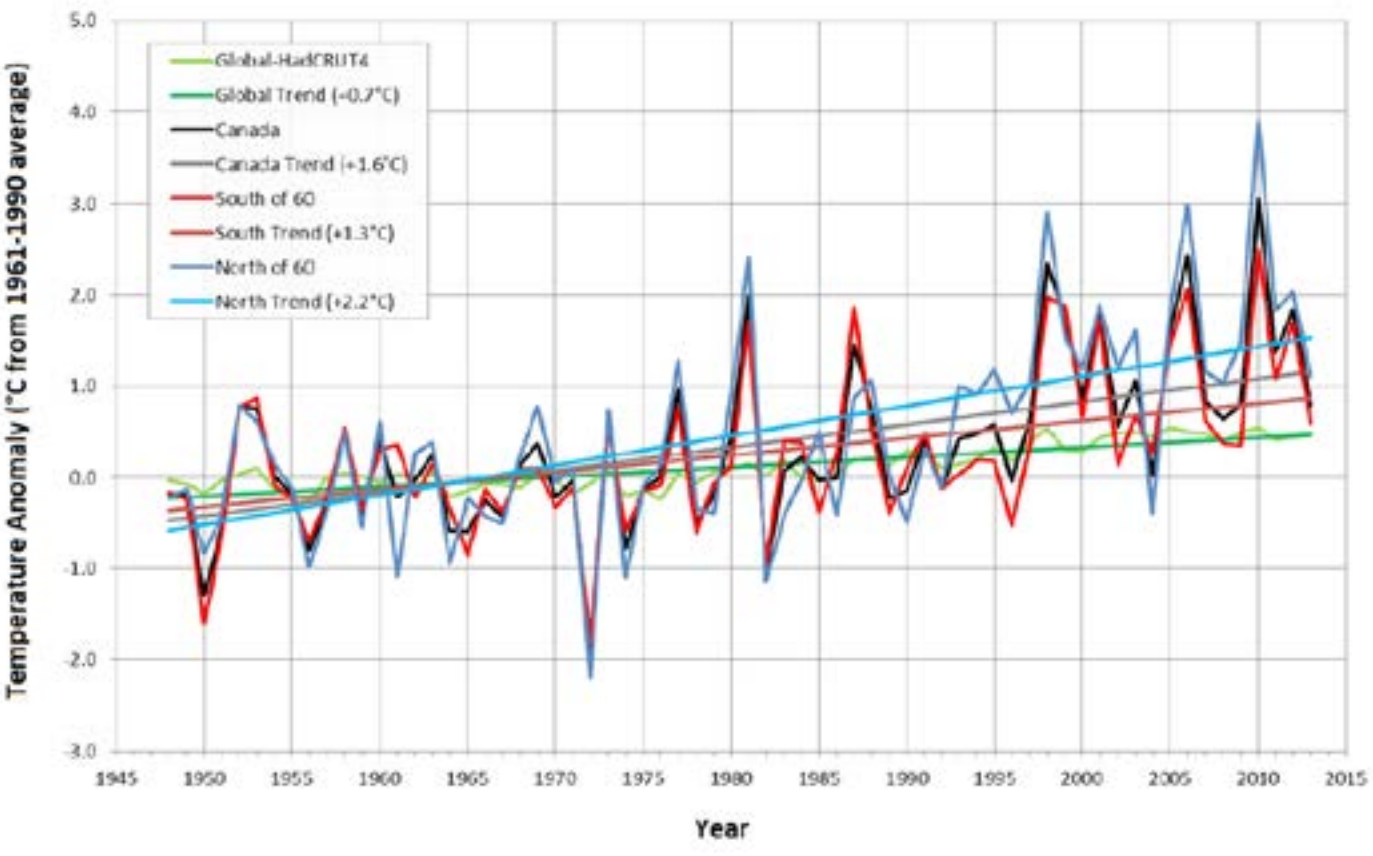


Figure 1. Observed climate warming, globally and within Canada, from 1950 to 2014 (from Environment and Climate Change Canada, 2016).

Beyond increases in average temperature, climate change is affecting precipitation and wind patterns as well as the severity and frequency of extreme weather events such as severe storms, drought and heat waves. Recent climate changes have been associated with wide-ranging impacts (Figure 2) affecting most sectors of the Canadian economy, ecosystems, livelihoods (particularly of Indigenous peoples) and public health and safety. As the climate continues to warm, these impacts are expected to worsen. Adaptation is therefore essential.

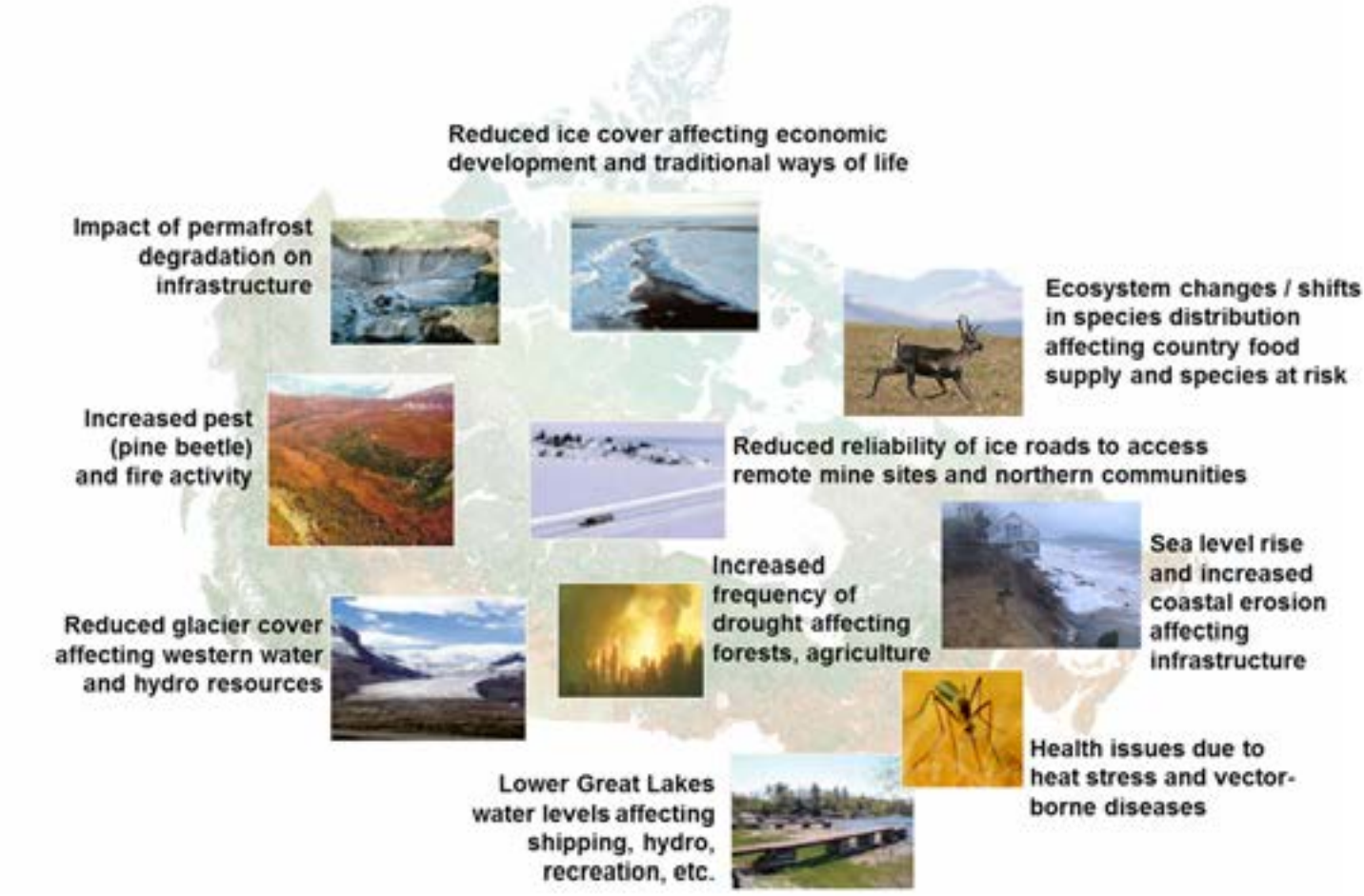


Figure 2. Examples of climate change impacts of concern in Canada.

What impacts of concern in Canada.

Adaptation involves making adjustments in our decisions, activities and ways of thinking in response to observed or expected changes in climate in order to reduce harm and to take advantage of possible opportunities. The Pan-Canadian Framework for Clean Growth and Climate Change **(Box 1)** positions adapting to climate impacts as a key feature of Canada's approach to address climate change, recognizing the necessity of both reducing greenhouse gas emissions and adapting to unavoidable climate changes. This recognition is the product of more than two decades of research on climate impacts and adaptation by universities, governments and non-government organizations, including pioneering work by Ian Burton and colleagues, as well as the innovative policies and practices by a range of adaptation practitioners, such as planners and engineers.

Box 1 - The Pan-Canadian Framework for Clean Growth and Climate Change (PCF).

The PCF, adopted by Canada's First Ministers in December 2016, establishes four pillars for addressing climate change in this country: carbon pricing; other actions to reduce emissions; adaptation and climate resilience; and clean technology, innovation and jobs. The adaptation and climate resilience pillar encourages measures to strengthen Canadian communities in the face of several anticipated effects of climate change. These measures include:

1. Translating scientific information and Traditional Knowledge into action
2. Building climate resilience through infrastructure
3. Protecting and improving human health and well-being
4. Supporting particularly vulnerable regions
5. Reducing climate-related hazards and disaster risks

Learn more: https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html

To prepare Canadians for the impacts of climate change, research has evolved from a focus on understanding climate impacts and the risks that they present to Canadians, to an emphasis on exploring solutions. Research has also expanded greatly in scope, with the social and economic sciences being critical to understanding the process of adaptation. Exciting new directions in research include improving our understanding of how global climate impacts and the adaptation actions taken to address them will affect Canada in terms of trade and global value chains, migration and the need for humanitarian assistance.

The evolving research agenda has been complemented by capacity building within key practitioner communities, including planners, engineers, landscape architects and accountants and by the development of tools that help them incorporate climate change into their daily work. For example, the engagement of professional engineers resulted in the development of a protocol for assessing infrastructure vulnerability, which has been applied in more than 40 case studies within Canada and internationally (https://pievc.ca/). Overall progress on adaptation in Canada, documenting the increased scope of adaptation research, as well as implementation of adaptation measures, particularly at the municipal scale, is presented in a series of assessment reports, beginning with the "Canada Country Study" in 1997 and continuing with the "Canada in a Changing Climate" series since 2008. Links to these reports, tools, and additional information are provided in **Box 2**.

Box 2 - Resources

Assessments, tools and research reports

http://www.adaptationlibrary.ca/#/options/
http://www.nrcan.gc.ca/environment/resources/publications/10766
https://pievc.ca/

Climate scenarios

http://ccds-dscc.ec.gc.ca/?page=main&lang=en
https://www.ouranos.ca/publication-scientifique/Guidebook-2016_En.pdf

Moving forward, adaptation requires a fundamental shift in how we manage climate risks to better protect people, the economy and the natural environment. The new climate reality requires a culture of resilience where consideration of climate vulnerabilities is part of routine planning and decisions by people and institutions with responsibility for developing and implementing policies, programs and plans, or for managing assets that are, or may be, affected by changing climate conditions.

Linking Climate Change Adaptation and Disaster Risk Reduction

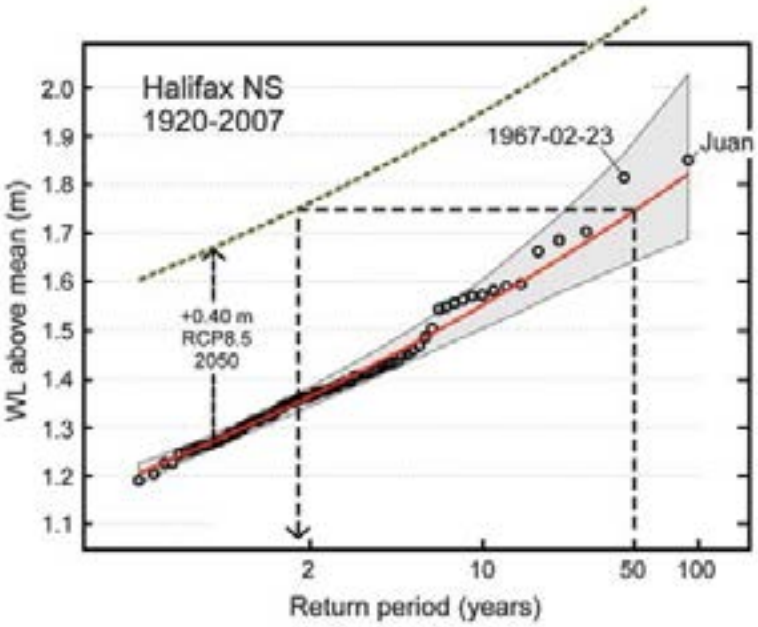


Figure 3. Annual maximum hourly water levels (metres above mean) in Halifax Harbour, NS, 1920–2007, and associated return periods in years, indicating the average recurrence interval for any given annual maximum water level today (red line) and the change in return period that results from a rise in mean sea level under a high-emissions scenario by 2050 (from Lemmen and Warren, 2016).

While the communities of researchers, policy makers and practitioners who deal with climate change adaptation and those concerned with disaster risk reduction use different terminology[1] , they share the common objectives of reducing the impacts of extreme weather events and increasing resilience in the face of disasters. While disaster risk management has often relied on historic climate observations to assess the likelihood of extreme events, climate change adaptation relies on projecting the future climate based on a range of probable climate futures. An example of how the changing climate affects extreme weather events can be seen in the relationship between sea-level rise and storm-surge flooding in the Port of Halifax (Figure 3). A 40 cm rise in sea level, as is projected for about the year 2050, results in a high water level with a current return interval of 50 years being more than a 1 in 2 year event by mid-century. Changes in the frequency and severity of inland and urban flooding, wildfires, droughts, extreme heat and other climate impacts have potential to increase the number of climate-related disasters. There is an urgent need for improved linkages between the groups focused on climate change adaptation and those focused on disaster risk reduction. An important starting point for improving these linkages is to encourage collaboration between two relevant national-scale forums: Canada's Adaptation Platform **(Box 3)** and Canada's Platform for Disaster Risk Reduction. The two platforms operate very differently but share a common goal of enhancing collaboration and action to strengthen resilience. In October 2017, they will meet jointly for the first time in Halifax. The theme of the meeting is "building back better". The theme is intended to emphasize that recovery from disasters represents an important opportunity to enhance resilience.

[1] For example, the climate change research and policy communities use "mitigation" to refer to actions that reduce the sources or enhance the sinks of greenhouse gases (e.g., mitigate the cause of climate change), whereas the disaster risk reduction community uses "mitigation" to refer to actions that reduce the severity of disaster impacts (e.g., mitigate risks).

Exciting Days Ahead

Climate change presents daunting challenges both globally and within Canada. Such challenges also create opportunities for innovation. One example is the role that green/natural infrastructure can play in both helping manage climate risks (e.g., restored wetlands and salt marshes can reduce flooding and erosion) and reducing greenhouse gas emissions. The Pan-Canadian Framework on Clean Growth and Climate Change provides direction for federal, provincial and territorial governments. This policy commitment, along with leadership across the country from local governments, practitioners, industry and non-government organizations, provides an encouraging base for greatly accelerating action on climate change.

Box 3 -
Canada's Climate Change Adaptation Platform

Canada's Adaptation Platform brings together representatives from research, industry, Indigenous groups, professional and not-for-profit organizations and federal, provincial and territorial governments to tackle shared climate change adaptation priorities. Platform participants are both the users and producers of adaptation knowledge and tools. As a result, the Platform's work is demand-driven, facilitating the analysis and implementation of adaptation action and directly responding to the needs of decision-makers in Canada's public and private sectors. By providing the structure to pool financial resources, knowledge and people, the Adaptation Platform works to create new information and tools for adaptation and to get these products to appropriate users. Current working groups are focused on agriculture, biodiversity, coastal management, economics, energy, forestry, infrastructure and buildings, mining and the Far North.

http://www.nrcan.gc.ca/environment/impacts-adaptation/adaptation-platform/10027

Dr. Don Lemmen is a Research Manager in the Climate Change Impacts and Adaptation Division of Natural Resources Canada. Since 2000 he has led development of three Canadian national assessment reports, and has helped design and implement domestic adaptation programs. Internationally, he has been involved in the United Nations Framework Convention on Climate Change (UNFCCC) process since 2003, and the Intergovernmental Panel on Climate Change (IPCC) process since 2005. He is currently Chair of Canada's Adaptation Platform and co-chair of the UNFCCC Adaptation Committee.

Liette Connolly-Boutin, P.Eng., is a policy analyst in climate change adaptation policy development with Environment and Climate Change Canada. She has previously researched food security and climate change vulnerability and adaptation in Canada and the global south.

As the HazNet team was working on our Spring and Fall issues, stunning pictures that illustrate Canada's turbulent weather and changing climate change captured global attention. Here are some stories behind these images.

Capturing Change

The unforgettable image of a lawn-mowing man defying a tornado. In early June, a photo by Cecilia Wessels from Alberta became a social media sensation when it showed her husband, Theunis Wessels, casually mowing their backyard lawn as a fearsome tornado swirled behind him. "My beast mowing the lawn with a breeze in his hair," – Cecilia wrote on her Facebook page which took global media by storm. David Sills, a tornado expert with Environment and Climate Change Canada suggests Canadian homeowners should be cautious in the face of storms like these. "If tornado winds get inside your home or garage, it becomes much easier for the tornado to remove the roof and even the walls," he said. "So when Environment Canada issues a tornado watch or threatening weather approaches, make sure to close all windows and doors, including garage doors, and secure objects that could become missiles and break windows, such as lawn furniture should you have time to do so."

We thank Cecilia for sharing her stunning images with HazNet.

You can view the full gallery here: http://haznet.ca/visual-story-behind-lawn-mowing-man-defying-tornado/

An iceberg casually passing the town of Ferryland, Newfoundland. This beautiful, drifting iceberg created a stunning backdrop to Jody Martin's photo. A spectacle normally reserved for early summer, hundreds of massive icebergs began showing up off the coast of Newfoundland and Labrador before the official arrival of spring this year. As of April 6, 2017, 481 icebergs were spotted in the region by the Canadian Coast Guard Ice Operations in what could be the start of a record season. We thank Jody Martin for sharing her image with HazNet.

"River piracy" on Slims River, Yukon. Climate change is causing surprising geological changes. Scientist Dan Shugar shared this and other images to illustrate

how the Slims River, which once flowed out to the Bering Sea, has had its

watercourse transformed by the dramatic, climate-affected melt of the Kaskawulsch Glacier so that it now flows into the Kaskawulsh River. What typically takes centuries, this example of "river piracy" was documented over the course of one spring with the largest shift occurring virtually overnight. "Nobody's ever seen a river piracy occur in modern times, at least to my knowledge," Shugar told the BBC. Climate change "may bring surprises that we are not appreciating fully and that we're not necessarily prepared for". We thank Dan Shugar for sharing his image with HazNet. You can view the full gallery here:

https://www.flickr.com/photos/uwnews/

sets/72157682346806236/river-to- disappear/

A letter from Cariboo

By George Emery,

resident of Williams Lake, the Cariboo Regional District, British Columbia

I have noticed something from the crisis we are experiencing here in the Cariboo. I would like to share it. Before we got into this situation, life carried on pretty normally for most of us. We got up, went to work, did our thing, and complained. We called each other names, went through 'this is yours and this is mine', 'those people are no good, send them home!', 'why don't you all just go back where you came from?', 'you'll get your pipeline over my dead body', 'this politician is no good, mine is better', 'your god sucks while mine is good'…. Remember all that?

Life was pretty normal, at least to our way of thinking. It was the way it was. That was a week ago. We focused on the things about ourselves that made us different.

And then crisis struck…and a week later most of that is gone. It just doesn't have the same importance anymore. It's been replaced with other things – things that bring people together. Fighting in some cases for our homes, our lives, the things we all have that are important to us.

Now we hear 'how can I help?', 'what can I do?', 'we'll feed you, shelter you and give you a sense of safety'. We have felt sorrow at their losses, our situations. We see the uncertainty in the faces we meet. What will tomorrow bring? Will my home be safe? Will my children be safe? Will we survive?

And it hasn't just been here that the sorrow has been felt. It's been from everywhere across the country from one end to the other. People have been instilled with a sense of helplessness in not being able to do more. Yet they have done their part. Trucks with supplies have arrived from everywhere, firefighters have come from countless places, aid has come from the world. All of a sudden, we have become one: one with each other. None of those differences matter anymore.

From the ashes, smoke and destruction, there has been one thing that has shone far brighter than the glow of the fires. This country is shining with the far brighter light of compassion and empathy. It is shining with the things that we have in common: our humanity.

I live and work in Williams Lake and have lived there since 2007. I woke up one morning and made an observation of what was happening around me without judgement. Then I just shared it.

To Be Published by Routledge, 2017

Community Engagement in Post-Disaster Recovery

Editors: Graham Marsh, Iftekhar Ahmed,
Martin Mulligan, Jenny Donovan, Steve Barton

Community Engagement in Post-Disaster Recovery reflects a wide array of practical experiences in working with disaster-affected communities internationally. It demonstrates that widely held assumptions about the benefits of community consultation and engagement in disaster recovery work need to be examined more critically because poorly conceived and hastily implemented community engagement strategies have sometimes exacerbated divisions within affected communities and/or resulted in ineffective use of aid funding. It is equally demonstrated that well-crafted, creative and thoughtful programming is possible. A wide collection of case studies of practical experience from thirteen countries around the world is presented to help establish ways of working with communities experiencing great challenges.The book offers practical suggestions on how to give more substance to the rhetoric of community consultation and engagement in these areas of work. It suggests the need to work with a dynamic understanding of community formation that is particularly relevant when people experience unforeseen challenges and traumatic experiences.

Focused on the concept of community in post-disaster recovery solutions—an aspect which has received little critical interrogation in the literature—this book will be a valuable resource to students, scholars and practitioners in disaster management as well as humanitarian agencies.

The key lessons emerging from the book's diverse case studies point to a set of guiding principles for good policies and practice for the future, all of which hinge on the need to be context sensitive. These principles for effective post-disaster community engagement include the following:

- Remembering that people with the best intentions can sometimes trigger or amplify tension or conflict within traumatised communities.
- Making as few assumptions as possible. Everywhere is unique. Being informed is important—through reading or consultation—about the history, culture, structures of authority and dynamics of communities being worked with. Confirming that understanding with the people with and for whom the work will be undertaken.
- Remembering that all local communities include sub-communities or interest groups which may have external linkages and are constantly evolving, so there is a need to proceed cautiously and consult widely.
- Recognising the landscape of influence, and identifying people who can represent groups of people within the community or communities, even if they do not hold formal positions.
- Looking for people who have particular skills or abilities which can create better options for those people and/or their community at large.
- Proceeding patiently, in case the work causes unforeseen resentment or resistances.
- Ensuring that the criteria being used to address particular needs are always made known to the community.
- Being aware that people, families and groups may face difficult choices about their futures after a disaster, and therefore avoiding the cultivation of expectations that are unrealistic or may close down options.
- Looking for creative and culturally appropriate ways to help build an inclusive sense of community for those who have been traumatised by a disaster.
- Remembering that community consultations and engagement are processes over time rather than discrete events. Outside participants are likely to only see the process of recovery for a relatively short time. They may give it a momentum that might either make it easier or harder for the community(ies) to progress down the road to recovery.
- Outsiders can also have the ability to change expectations and cultivate hope. Without it, locally generated recovery becomes much harder.

To conclude: there is a lot to be learnt by examining practices in a wide range of geographic, social and cultural settings to reveal what has proved effective and what hasn't helped people overcome the impacts of disasters. However, perhaps a more important message is not so much about techniques that may prove useful, as about the underlying approach needed to assist recovery and renewal. All communities are unique, influenced by geography, social processes, the momentum of history and the unique perspectives, experiences and capacities of the people who make them up. By extension, all places are experienced by people who hold a diversity of views and values and are tied to each other and their physical surroundings in many different ways, making the notion of a single community in a single place unreliable. Consequently, whatever techniques are used, the practitioner should not assume once a community has been identified that this is the only community. Care needs to be taken to search out and respect the perspectives of others besides those most loudly put.

Furthermore, disasters are by their nature extraordinary events, disrupting the familiar and often challenging the landscape of authority in the places where they occur. They destroy the social and physical fabric of the people impacted by them.

If outside experts are to help these people to go down their own paths of recovery, then these experts should remember that what worked elsewhere may not work here. To paraphrase the Australian academic Trevor Budge: "Once you have seen one disaster, you have seen one disaster". The practices outlined in this book revealed that there are some underlying principles for good practice which are context-sensitive, but there are no universal models. At the end of the day, there is no substitute for humility, patience and an ability to listen to a wide range of voices.

An iceberg casually passing the town of Ferryland, Newfoundland. This beautiful, drifting iceberg created A stunning backdrop to Jody Martin's photo. A spectacle normally reserved for early summer, hundreds of massive icebergs began showing up off the coast of Newfoundland and Labrador before the official arrival of spring this year. As of April 6, 2017, 481 icebergs were spotted in the region by the Canadian Coast Guard Ice Operations in what could be the start of a record season. We thank Jody Martin for sharing her image with HazNet.

HazNet is a bi-annual magazine of the Canadian Risks 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.

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