

10th Annual
Canadian Risk and Hazards Network Symposium
November 5-8, 2013 Regina, Saskatchewan, Canada



Canadian Risk and Hazards Network 10th Annual Symposium

ABSTRACTS

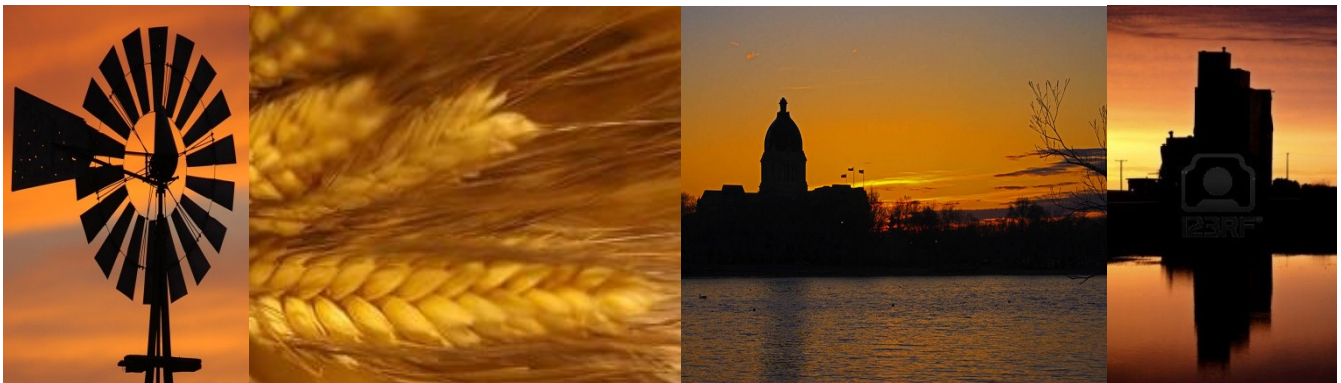


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Government Building at Sunset – Rae McLeod, Saskatchewan

Table of Contents

Thematic Session 01: Novel Approaches to Emergency Management Policy, Research and Development	5
Multi-agency Partnerships: Adapting and Evolving in Emergency Response.....	5
Bridging the GAP from Destruction to Rehabilitation – Balakot Town, Pakistan.....	6
Canada – U.S. Resiliency II Experiment (CAUSE II) – Improving Cross-Border Interoperable Communications.....	6
Using Network Analysis to Inform Policy Development.....	7
Thematic Session 02: Measuring the Risk of Hazards and Benefit of Adaption: Local Knowledge, Qualitative and Quantitative Methods.....	8
The Landscape and Infrastructure Resiliency Assessment, Lessons Learned and Progress Towards Application.....	8
Community Based Risk Assessment and Adaption to Natural Hazards in Haor (Wetland) Regions of Bangladesh.....	9
A Flood Risk Assessment Tool for Canada.....	10
A Metro-Vancouver Risk-based Land-use Guide.....	10
Disaster Risk Reduction Planning- At What Scale Can it be Realistically Done?.....	11
Community Resilience from an Essential Services Perspective.....	11
Thematic Session 03: Promoting Aboriginal Resilience: Building on Existing Strengths and Reducing Future Impacts.....	12
Traditional Opening: Tim Eashappie, Sr.....	12
Tackling the Root Causes of Vulnerability in the Face of Disaster – The Canadian Red Cross, Social Inequality and Indigenous Sovereignty.....	14
Case Study: Whati Resilience Initiative.....	15
Integration of Aboriginal Knowledge, Needs and Values, Landscape Hazard Assessments and Climate Change Scenarios to Inform Sustainable Community Planning in Nunatsiavut, Northern Labrador.....	15
Métis, Inuit and First Nation Disaster Resilience: Moving Away from Pan-Aboriginal Perspectives	16
Understanding Hazards Coping Strategy of Indigenous People: The Case of Khasi Community of Bangladesh.....	17
Global Changes and Aboriginal Resilience: The Role of Social Media.....	17
Cumulative Regional Integrated Operability Scores (CRIOS): Risk and Emergency Management Cooperation among Tribal Inclusive Geographic Areas in the US.....	18

Traditional Closing: Tim Eashappie, Sr.	18
Thematic Session 04: Planning to Improve Critical Infrastructure Resilience.....	19
Public Works and Emergency Management.....	19
Critical Infrastructure Owners and Operators – Working with Government for a More Resilient Province and Country.....	19
Thematic Session 05: Exploring the Expansion of an All Hazard Risk Assessment at a National Level.....	20
National Risk Assessments in the Canadian Context.....	21
Regional Resilience Assessment Program.....	21
Disaster Scenarios: Loss-estimates for Hazard Risk Analysis.....	21
Brainstorming Session.....	22
Thematic Session 06: Yesterday’s Weather in Today’s Landscape.....	22
Possible Impacts of Climate Change on Future Wind Gust Events at Local Scale over Canada.....	22
Yesterday’s Culture in Today’s Hazardscape.....	23
Quantify the 2013 Flood Event in Alberta Using a Classic Engineering Approach.....	24
Flood and Drought: Surface Water Coverage Tracking for Decision Support in Disaster Reduction.....	24
Thematic Session 07: Gender and Disasters: Developing Capacities and Reducing Impacts.....	25
“I don’t want to go back to the life I had before the tsunami” – Understanding Hidden Issues and Root Cases of Gender Vulnerability in the Case of the 2011 Great East Japan Earthquake and Tsunami.....	25
Supporting LGBTQ Resilience in Canadian Emergency Management.....	26
Thematic Session 08: Challenges and Opportunities in Risk Communication.....	27
Social Media and Disasters – How to Plan for the Worst.....	27
State of Emergency in the Big Land.....	28
Thematic Session 09: Simulations for Better Decisions.....	29
Praxis – Computer Simulation for Public Safety Training and Education.....	29
Decision Simulations for Safer Risk-based Land-use Recommendations.....	30
General Session 01: Wildland Fires.....	31
Incorporating Integrative Complexity into Wildland Fire Management.....	31
How a Primary Resource Extraction Industry was Affected by Wildfire.....	31
General Session 02: Health.....	32
Self-Care Decontamination Protocols and Psychosocial Considerations.....	32
Improving our Treatment Options: Developing a Intravenous Formulation of the Nerve Agent Antidote HI-6.....	33
Climate Change on Canadian Health Care Facilities.....	34
General Session 03: Social Science.....	34
Relocation and Housing Issues in the Aftermath of the 2011 Great East Japan Earthquake and Tsunami.....	34
Implementation of the New Zealand National Disaster Recovery Strategy.....	35
Disaster Resilience in Developed and Developing Worlds: A Case from the Calgary, Canada 2013 Flood with Critical Comparisons from a Nepal Perspective.....	35
Poster Sessions.....	36
Cumulative Regional Integrated Operability Scores (CRIOS) and Organizational Cooperative Model: Risk and Emergency Management Cooperation among Tribal Inclusive Geographic Areas in the US.....	36
Analysis and Comparison of Geohazard Management in Diverse Geographic Locations Inhabited by Indigenous Communities.....	37
Protest to Risk Cycle (PTRC).....	37
Historical Ecology for Risk Management: Youth Sustainability.....	38
Nasal Spray Delivery of Antiviral Drugs Against Avian Influenza.....	39
CRTI 08-0112TA, Human Monoclonal Antibodies Against Ricin.....	39
Abandoned Rails Trail: A Debris Flow Study in Glacier National Park, British Columbia.....	40

Thematic Session 01: Novel Approaches to Emergency Management Policy, Research and Development

S. Verga, K. Kaminska and S. Norton

In order to maintain stability and proper functioning, societies require well informed and current public policies. There exists an interesting dynamic between public policies and changes to societies. Policy has a key role in introducing societal change, while at times it is finding itself in need to adjust to reflect emerging patterns in collective behaviour. Disasters, and crises in general, often bring to the spotlight requirements for policy review and renewal; this is true both in terms of updating policies to better guide the society's response to a crisis situation, as well as of adjusting policies to acknowledge and account for de facto changes in the behaviour of the public. Therefore, better understanding the processes that shape public policy can potentially lead to improved governance and effective change.

This session focuses on new perspectives on how science can support policy research, development, and analysis. It is intended to showcase new and innovative methods and tools that address the needs of policy development in the modern world. For example, this session would like to explore how network analysis tools and methods can be employed to better understand policy links and governance for emergency management. The role of Social Media as an agent of change as well as an enabler to the development and implementation of emergency management policy is another topic of interest.

Affiliations: Defence R&D Canada Centre for Security Science, Ottawa ON, Canada

Oral Presentations:

Multi-agency Partnerships: Adapting and Evolving in Emergency Response

Author(s): S. Norton and S. Verga

Presenter(s): Sean Norton

For any disaster event, there are in essence three questions that need to be answered: What needs to be done? Who should do what? How best to do it? A conventional approach to emergency response is to have government officials who reside outside of affected communities address these questions by coordinating efforts from the top-down. It is a difficult and expensive approach that can be slow to respond or lead to service gaps when undertaken from the outside without significant community-level involvement. If there is a paradigmatic shift occurring in governments, it is away from a government-centric approach to emergency response towards a process-driven, bottom-up focus on whole-of-community engagement and resilience. It appears that public officials are increasingly concerned with helping communities to develop networked processes and capacities so that when a disaster occurs, all parts of the community are better enabled to quickly respond and adapt without the same need for outside assistance and with fewer deleterious effects and costs. As such, in our view, governments should be increasingly concerned with: How best to enable communities to self-organize to reduce risks, and to quickly respond and adapt when disaster strikes? This paper explores the limitations of conventional approaches to emergency response, using illustrative examples of community-level adaptation in action during major disaster events in Canada and worldwide.

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Bridging the GAP from Destruction to Rehabilitation- Balakot Town, Pakistan

Author(s): *Lieutenant Colonel(Retd) Muhammad Abrar Ismael, TI (M)*

Presenter(s): *Lieutenant Colonel(Retd) Muhammad Abrar Ismael, TI (M)*

A 7.6 at the rector earthquake of 2005 in Pakistan annihilated over 73000 people and destroyed more than 600,000 houses, 5000 schools and 2700 health facilities in the area covering 30,000 square km, equal to the size of New Zealand. Most of the houses were located in the rural areas i.e. on the mountains or inside the deep mountainous valleys; thereby making it very difficult for the disaster managers to manage this disaster. The ill-fated town of Balakot with estimated population of 37,000 people was destroyed completely. 5000 people died and 95% of the infrastructure facilities were destroyed. To rehabilitate these towns and to provide safe living environments to the affected people living in the world's one of the most remote areas in Northern Pakistan; a strategy was formulated and launched by the Earthquake Reconstruction and Rehabilitation Authority. In this paper an attempt has been made to highlight the components of development Strategy and its implementation methodology to bring life back to normalcy, following the principal of building back better.

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Canada–U.S. Resiliency II Experiment (CAUSE II) - Improving Cross-Border Interoperable Communications

Author(s): *P.C. Dawe, J. Pagotto, K. Forbes, D. O'Donnell, A. Vallerand*

Presenter(s): *P.C. Dawe*

The Canada–U.S. Resiliency II Experiment (CAUSE II) focused on Enhancing Trans-Border Resilience in Emergency and Crisis Management through Situational Awareness (SA) interoperability. It was jointly sponsored by the U.S. Department of Homeland Security's Science and Technology (S & T) Directorate First Responders Group, the Defence Research and Development Canada's Centre for Security Science (DRDC CSS), and Public Safety Canada. This experiment supported the Beyond the Border (BTB) Action Plan, which sets out joint priorities and specific initiatives for cross-border collaboration during large-scale, multi-agency emergencies. The experiment successfully integrated and harmonized CA/US

SA systems and provided evidence that this S & T-based capability facilitates the development of shared SA among the partnering emergency management (EM) organizations, and enhances the planning, coordination and delivery of cross-border responses.

CAUSE II used a scenario-based approach to simulate two cross-border emergencies that required a coordinated response from partnering EM organizations. The first scenario involved an oil refinery explosion in Saint John, New Brunswick, affecting the supply chain in that region and across the border into Maine. The second scenario involved a motor vehicle accident between a specialized road tanker truck and a trailer, resulting in an explosion of compressed natural gas that occurred at the border between Canada and the United States in Calais, Maine. Both scenarios required a cross-border response from Canadian and U.S. agencies.

The experiment included a data collection plan to gather participant feedback which reflected their understanding of the integrated SA technology used during the experiment and the impact of integrated software tools on operator work load and decision making and risk management. This paper will describe the experimental design, software systems and will document the overall qualitative findings and the specific lessons learned and recommendations that were derived from the study.

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Using Network Analysis to Inform Policy Development

Author(s): *S. Verga, K. Kaminska and S. Norton*

Presenter(s): *Simona Verga*

This presentation showcases how network analysis methods and tools can be used to provide the evidence-base to inform policy development. Specifically, it will show how researchers from the Defence Research and Development Canada (DRDC) Centre for Security Science (CSS) used such methods and tools to map the current policy and legislation landscape across the pillars of emergency management, national security, and crime prevention, in support of Public Safety Canada's efforts to develop a new national resilience strategy. Resilience is a complex concept, which requires a systems thinking and a "whole of community" approach. Through a review of the literature, policy research, and surveys administered to stakeholders, DRDC CSS collected and analyzed data which allowed them to build a multi-mode network map, with layers that show linkages between policy, legislation, programs and activities, as well as a social network of people currently engaged in resilience building programs and activities. The type of analysis and results presented here provide an enhanced understanding of the resilience stakeholder community, and of the structure of relationships and activities, as well as their links to legislation and policy.

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Thematic Session 02: Measuring the Risk of Hazards and Benefit of Adaptation: Local Knowledge, Qualitative and Quantitative Methods (e.g. HAZUS and LIRA)

H. Hill and L.C. Struik

This session provides a forum to present your methodology, tools, experiences, problems, studies, stories and lessons learned in aspects of measuring and reducing disaster risk: primarily in floods and earthquakes. These include qualitative and quantitative approaches to measure and address potential disaster losses through mitigation and adaptation. The session welcomes studies that evaluate the role and capability of understanding risk posed by hazards, ways to calculate damage losses, the use of economic analysis techniques to help determine viable adaptation options, as well as experiences faced in low-data environments. Case studies and lessons learned are encouraged. Examples using the Agriculture and Agri-Food Canada Landscape and Infrastructure Resiliency Assessment (LIRA) and HAZUS Canada tools will be presented. We explore these along with other advances or new innovations including modeling the probability of hazards, exposure, vulnerability and consequences and the effect of adaptation investments for natural hazards. Risk measure and mitigation are key to enhance Canada's disaster risk reduction efforts due to recent and anticipated catastrophic events.

Affiliations: Agriculture and Agri-Foods Canada, Saskatoon, Canada; Natural Resources Canada, Vancouver, Canada

Oral Presentations:

The Landscape and Infrastructure Resiliency Assessment, Lessons Learned and Progress Towards Application

Author(s): C. Kayter, H. Hill, A. Hershmillier, J. Kindrachuk, G. Sparks, R. Armstrong, P. Christensen, L. Swystun

Presenter(s): Harvey Hill and John Kindrachuk

The Landscape and Infrastructure and Resiliency Assessment Methodology (LIRA) has progressed from a concept to an increasingly refined methodology to support excess moisture vulnerability and adaptation/mitigation benefit cost assessments in rural landscapes. This presentation will describe the portfolio of tools and how they are integrated to support the implementation of a LIRA analysis.

Lessons learned from the last three years of on-site applied case studies in Saskatchewan and Nova Scotia will be presented. Issues that have been identified and steps that have been taken to address those issues will also be presented. The presentation will conclude with a description of:

1. The most recent version of the LIRA manual, the accompanying software, and progress to making it

available; and

2. How it could potentially support disaster risk reduction in light of excess moisture events across the country.

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Community Based Risk Assessment and Adaptation to Natural Hazards in Haor (Wetland) Regions of Bangladesh

Author(s): *Khandakar Hasan Mahmud and C. Emdad Haque*

Presenter(s): *Khandakar Hasan Mahmud*

The inhabitants of Haor (wetland) region in north-eastern part of Bangladesh have been suffering from multitude types of natural hazards. Despite serious adaptation efforts were made throughout centuries by local community, they remain vulnerable to vagaries of nature due to geophysical, social, economic and cultural attributes. The objective of the present research was to assess vulnerability of selected sites of the haor region through risk identification and measurement of risk elements. The spatio-temporal distributions of the hazards have been analyzed through community level field investigation techniques. The research reveals that the probability, intensity and magnitude of damage of the hazards is exclusively site specific and their characteristics vary widely over the geographical space. The occurrence and magnitude of the hazards also vary within and between years. GIS and Remote Sensing techniques have been applied to prepare Social Map, Hazard Map and Risk map by integrating secondary information from different published and unpublished sources. Although it is the local community who identifies their risks and assesses the vulnerability of specific hazards, the compilation of local level assessment with secondary data and the scientific aspects of physical geography were made through their comprehensive integration into GIS. This Risk Map has revealed the potential damage extent which can be used for the development of adaptation strategy at community level. The distribution of hazards presented in maps identifies the vulnerable place, people and social asset at risk. The research reaffirms that risk and vulnerability assessment can be done by identifying vulnerable sectors and elements.

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A Flood Risk Assessment Tool for Canada

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Presenter(s): N. L. Hastings

The last year in Canada has seen significant flood events in Alberta, British Columbia and Ontario causing property damage and loss of life. At present, there are no national tools to assess the risks associated with floods in Canada. Within the Public Safety Geoscience program at Natural Resources Canada, a research team has been adapting the United States Federal Emergency Management Agency (FEMA's) methodology for estimating potential losses from natural disasters.

This method has been embedded in a GIS system to allow graphical representation of identified zones. To date, The Hazus-MH methodology has been adapted for use in Canada to model losses from earthquake scenarios and is currently being adapted to model flood scenarios. Hazus is widely used in the United States for mitigation planning at local and national scales. The tool will allow a user to input a flood depth grid and estimate losses to community assets based on an input scenario. The presentation will provide an overview of the tool and describe how it is being adapted for use in Canada.

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A Metro-Vancouver Risk-based Land-use Guide

Author(s): L.C. Struik, L.D. Pearce, J.J. Clague, J.D. Allan, F. Dercole, M. Ulmi, L.D. Pearce, J. Shoubridge, N. Hastings, J.M. Journeay, M. Wojtarowicz, M. Weston, C. Jeromin, and R. Walker

Presenter(s): L.C. Struik

We provide the key elements of the draft version of the risk-based land-use guide for Metro-Vancouver, British Columbia. The presentation shows how the guide intends to strengthen community safety and resilience by supporting informed land-use decisions. This presentation is a step in the longer term goal of sustaining a dialogue to improve the guide and have other local guides developed. The land-use guide shows how to measure and understand the risks of actual and proposed land-use, and how to maintain acceptable levels of risk. Effective risk management is achieved through open and transparent sharing of knowledge by citizens, developers, and municipal and regional staff and elected officials, and requires a clear division and sharing of responsibility. The land-use guide audience is municipal and regional officials because they are responsible for strategic and operational land-use recommendations and decisions. Those officials contributed to creating the land-use guide and their input was used to ensure practicality and relevance. Guide practice uses existing local legislative, regulatory, and managerial instruments that balance social, economic, and environmental concerns. The guide shares tools to evaluate land-use risk, to improve hazard and risk management, and metrics for determining the success of the decision-making process. It defines hazard and risk concepts and contains case studies.

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Disaster Risk Reduction Planning - At What Scale Can it Be Realistically Done?

Author(s): Harvey Hill, L. Swystun, G. Sparks, and P. Christensen
Presenter(s): Harvey Hill

The Insurance Industry of Canada is increasingly sounding the warning that current flood risk mitigation is inadequate. At the Macro-economic level the recent floods in Alberta have actually impacted Canada's Gross Domestic Product significantly for 2013 with possibly longer term impacts. What can realistically be done in terms of planning and implementation to proactively reduce exposure and vulnerability to hazards in Canada to increase the resilience of local areas, regional and national economies, and as well as Canada's capacity as a stable exporter?

To address these issues the presentation will consider potential ways to address these issues at differing scales. Key technical and governance issues will be discussed and examples of how these issues have been addressed in other jurisdictions will be described.

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Community Resilience from an Essential Services Perspective

Author(s): Lynne Genik
Presenter(s): Simona Verga

This presentation provides a high level overview of the Community Resilience Pilot Study that was undertaken in Pemberton Valley under a collaborative project between the Defence Research & Development Canada (DRDC) Centre for Security Science (CSS) and Emergency Management British Columbia (EMBC). The purpose of the study was to gain a better understanding of the factors that underpin the resilience of communities and to identify steps they can take to improve their protection against threats and hazards. The study was designed to: identify and model those capabilities which Pemberton Valley depends on as its 'life support' systems (shelter, food, water, etc.); identify and record the key capabilities supporting these and the degree to which key capabilities have shared dependencies; model disruption to one or more of the key capabilities through the simulation of an incident that isolates the community or individual aspects of it; and test the community's ability to ride out problems where

provincial and national resources exist but are focused elsewhere, or available but on a long lead time. The approach, outputs and the utility of the methodology will be discussed.

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Thematic Session 03: Promoting Aboriginal Resilience: Building on Existing Strengths and Reducing Future Impacts

Dr. Brenda Murphy, Valerie Cere and David Diabo

This theme is focused on addressing issues associated with hazard and disaster resilience in an Aboriginal context – either North American or from an international perspective. Resilience is often defined as being about building on current strengths and effectively managing all types of change, including disasters. However, Aboriginal perspectives of these ideas and the literature specifically about disaster resilience in Aboriginal contexts are quite slim. This theme continues a conversation started at CRHNet 2012.

Sessions within this theme could deal with such issues as:

- 1) From an Aboriginal perspective, how is disaster resilience defined? Does this differ from non-Aboriginal perspectives? Are there analogous concepts within Aboriginal traditions?
- 2) What are the current strengths and challenges associated with Aboriginal disaster resilience?
- 3) What are the factors that support or undermine the development of Aboriginal resilience to hazards and disasters?
- 4) What could be/should be the role of traditional knowledge in developing resilience?
- 5) What are the most prevalent lifeline issues in Aboriginal communities?
- 6) How has the colonial legacy affected disaster resiliency?
- 7) What principles and guidelines should be followed when undertaking disaster resiliency research/consultation with Aboriginal peoples?
- 8) Examples of Aboriginal/non-Aboriginal disaster resilience partnerships (e.g. mutual assistance agreements)
- 9) Aboriginal resilience or disaster management case studies
- 10) Other?

Oral Presentations:

Traditional Opening: Tim Eashappie, Sr.

Born January 1, 1959 at Wolseley, Saskatchewan. He was raised in a traditional extended family that included aunts and uncles, as well as parents and grandparents. As the oldest grandchild of Ruben Ryder and Lucy Goodvoice Ryder, he received instruction in the traditional way of life of the Nakoda people at Carry the Kettle First Nation. With great-grandparents from Standing Buffalo and Wahpeton, he also

learned the Lakota and Dakota ways, building strong understanding of the relationship of the people and their beliefs.

As a young boy, he spent most of his time at Carry the Kettle Reserve in the care of his paternal grandparents who taught him to dance powwow and to attend traditional ceremonies and cultural gatherings. He was forced to leave their home and attend residential school in Le Bret, SK until age 16. Although this was a difficult time in his life, he credits the knowledge of prayer and tradition taught to him by his Elders with helping him make his way through this time and helping him navigate all the new and challenging situations and circumstances in his life.

Powwow dancing has been the center piece of his life. He has danced since childhood. It was something he shared with his grandparents and through dancing and attending powwows he learned the language, songs and protocols important to maintaining the powwow traditions. He also created and strengthened relationships between himself and Natives from other bands and tribes. This became a more important aspect of his career as he became an accomplished, award winning traditional dancer. The notoriety resulting from his championships propelled him to be recognized as a cultural speaker, consultant, performer and expert.

If he has a secret to his success it is his capacity to focus all his energies on the task at hand. Spiritual practices and beliefs are key to this focus as he understands that to follow the traditional way means hard work and perseverance. These are messages he has tried to impart to young people. While he was raising his own children, he developed methods of working with youth that combine athletics through dance along with traditional songs and stories to support youth in staying away from alcohol and drugs. He has accomplished this through public speaking, the classroom and by creating programs where none previously existed. An example of this type of programming is the Little Rockies Dance Troupe.

This dance troupe required students to join, maintain good grades and good school attendance while practicing Native song and dance twice weekly. Performances throughout the region in Montana, resulted. This model has been used at Carry the Kettle as well. Tim also initiated alcohol and drug free activities for young and old. The Annual New Year's Round Dance is in its' 10th year and continues to be a place where young and old, gather to celebrate in a healthy way the coming of the New Year.

Once he had attained international recognition for his powwow dancing and Native cultural knowledge, doors opened to him to opportunities to perform and speak. As a cultural consultant, his expertise has been recognized by Universities, schools, First Nations and federal government organizations and communities. He has presented historical, traditional and cultural information as well as directed, created and wrote theatrical performance pieces that express his Native heritage with the intent of educating and bringing Native and non-native people into a state of better understanding.

His performances include international tours in the US, Canada and Europe at such large venues as the Festival Du Monde in France, the Goodwill Games in Russia, the Hula Bowl in Hawaii and the World Exposition in Lisbon, Portugal. He did two tours with the American Indian Dance Theatre, performing in Europe, across North America and finally in New York, New York off-Broadway. He extended his artistic career into film when he performed in two movies, War Party, directed by Frank Roddam in 1988 and then in the movie Grey Owl, directed by Sir Richard Attenborough in 1999. It was said by Sir Attenborough that for the movie they were able to get the "best of the best" dancers and singers from the Native people. This sentiment was echoed by Wayne Reels, Cultural Resource officer of the Mashantucket Pequot Tribal Nation in Mashantucket, Connecticut.

The Foxwoods Dance troupe toured Europe, including Russia, with Tim as Lead Dancer and Artistic Director. The goal of the Mashantucket people was to bring together the “best of the best” to produce the finest performances possible. From this commitment, and with the assistance of people like Tim, they built the largest Native powwow and World Championship of Native American Song and Dance. Tim was the recipient of the Championship in Men’s Northern Traditional Dance in 1998, 1999, 2002, and 2003. The only thing that prevented Tim from more multiple World Championships was the fact that he was a part of the staff of the powwow as Arena Director during 1997, 2000, 2001 and 2004.

Tim’s interests include hunting and horses and in 2000, as sole proprietor, he started his own camouflage and sports clothing manufacturing business. In 2008, after serving as a band councilor and as an education assistant in the Nakoda Oyade Education Center on his home reserve of Carry the Kettle, he returned to school earning a Bachelor of Education degree from the University of Saskatchewan in 2012.

Tim continues to serve as an Arena Director in powwows throughout North America and Canada. This position is one that recognizes not only his expert knowledge of powwow, but also his commitment to fairness in competition. Having learned the traditions of powwow from his grandfather, Ruben Ryder, who was an early Saskatchewan champion of Grass Dance, Tim has built his knowledge of traditional ceremonies. He met many Elders and ceremony leaders in his travels. Throughout his life, when at home, he assisted Elders and learned how ceremonies were conducted. Although it is not the norm to list these types of activities on a resume, he acknowledges the importance of ceremonies like the sacred pipe, sweatlodge and sundance as they are an intrinsic part of the continued existence of the Native people. After a period of 50 years without a Nakoda sundance, Carry the Kettle First Nation was the site of his first sundance as sundance chief. Being able to return this ceremony to his own people was a goal that he had long held. It was only after building support within his family and community that they, as a group, were able to achieve this. His next sundance will take place in the summer of 2014. His belief is that these ceremonies, like the ceremonies of all indigenous people are not his, nor do they belong to any one person, but should be shared with all, respecting one another and sharing the knowledge that the Creator is the primary giver of healing and life.

Tackling the Root Causes of Vulnerability in the Face of Disaster – The Canadian Red Cross, Social Inequality and Indigenous Sovereignty

Author(s): Melanie Goodchild

Presenter(s): Melanie Goodchild

In this presentation, the social construction of vulnerability will be examined and, Resilience, via the “provision of aid” will be discussed. We will explore a consideration of collective social constructions of meanings as it relates to natural disasters and Red Cross programming. Recognizing that these meanings are determined by social and cultural processes this presentation will examine how the naturalist perspective may conceal the social dimension in the definition of vulnerability and risk. Melanie will provide an overview of lessons learned in disaster response and disaster recovery by the Canadian Red Cross and the International Federation of Red Cross and Red Crescent Societies, including the findings from a comprehensive study of Red Cross Red Crescent Societies tsunami operation.

What do communities perceive as the most important characteristics needed to be safe and resilient? Are there a set of characteristics that are common across all communities, despite being located in different countries and different settings? Meeting basic needs (food, water, shelter, and health) is a prerequisite to

building resilient communities. At the Canadian Red Cross we are learning more about resilient communities and recently completed a preliminary study of hazards and risks across Canada. Based upon our research and the lessons learned from our recent flood response in Alberta we are working on a national Risk Reduction & Resiliency Framework, founded upon our Fundamental Principles and a respectful relationship with Indigenous peoples, to enrich our programming with Indigenous communities in Canada.

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Case Study: Whati Resilience Initiative

Author(s): Chief Alfonz Nitsiza and Eric Bussey
Presenter(s): Chief Alfonz Nitsiza and Eric Bussey

This Case Study was a pilot project testing the relevance of the Rural Disaster Resilience Project (RDRP) community disaster resilience planning and assessment process and tools in a remote Aboriginal community in the Northwest Territories. The pilot project tested the RDRP tools but the entire resilience process was also intended to engage residents and partner agencies in disaster risk reduction and activities to enhance local capacity and resilience. Specific strategies to address community strengths and areas of low resilience developed as a part of this. The community's subsequent work to advance community resilience through its preparations for a nearby mine development will be highlighted to illustrate resilience as a community-driven initiative which is both flexible and participatory.

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Integration of Aboriginal Knowledge, Needs, and Values, Landscape Hazard Assessments and Climate Change Scenarios to Inform Sustainable Community Planning in Nunatsiavut, Northern Labrador

Author(s): R. Riedlsperger, C. Baikie, S. Belbin, T. Bell, C. Furgal, C. Goldhar, S. Hatcher, J. Knight, and T. Sheldon
Presenter(s): R. Riedlsperger

Nunatsiavut, homeland of the Labrador Inuit, faces housing challenges and shortages of building land in

all five of its communities. Rapid population growth and resulting community expansion coupled with recent climatic and environmental changes are exasperating these conditions, threatening the resilience of communities to maintain healthy housing and traditional livelihoods. Recognizing this urgency and the fiscal return from appropriately designed and planned, low maintenance infrastructure, the Nunatsiavut Government, together with its partners, established the SakKijanginnatuk Nunalik (Sustainable Communities) initiative to inform best practices and provide guidance for enhancing community sustainability. Acknowledging that healthy homes are inextricably linked to well-planned communities, research efforts have in part targeted sustainable community planning and development through the production of hazard assessment and planning constraint maps. These maps combine Inuit Knowledge with new geoscientific data to highlight suitable areas for development and to support community infrastructure planning decisions. For example, participatory mapping sessions held in Hopedale and Postville gathered local knowledge of resource harvesting (e.g., berry picking, shore-based fishing, small game hunting), recreational areas (e.g., swimming holes, picnic areas, walking trails), and places of cultural and spiritual significance (e.g., heritage sites, cemeteries). Meanwhile, analysis of remotely sensed imagery, field mapping, geophysical surveys, geotechnical reports and local construction experience generated information on terrain characteristics and stability in these communities. The integration of these data will help inform current revisions of land-use plans and planning policies to build sustainable and resilient communities in the face of changing climate and environmental realities.

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Métis, Inuit and First Nations Disaster Resilience: Moving Away from Pan-Aboriginal Perspectives

Author(s): B. L. Murphy and A. Chretien

Presenter(s): B. L. Murphy

This presentation was inspired directly by conversations with First Nations professionals working to enhance emergency management and disaster resilience in their communities. As academics from non-Aboriginal and Metis backgrounds, the co-presenters cannot speak directly about the First Nation experience, but instead will highlight what needs to be considered when moving away from pan-Aboriginal perspectives. We will address the following questions: What needs to be considered when defining disaster resilience from different ‘ways of knowing’? What does it mean to focus on ‘different ways of knowing’, rather than ‘bodies of knowledge’? How can we begin to understand how our own biases and knowledge influence how we understand the very idea of disaster resilience? Using examples from a Métis perspective, we argue that there are several factors that need to be considered when thinking about multiple resilience. These include: processes of colonization, self identification and political organization; community rather than an individual focus; role of Indigenous Knowledge, culture and language; location (access/remoteness); and capacity and resourcing. In turn, we will outline how these factors impact how resilience might be envisioned, how it could be supported and enhanced, and the type of communication and outreach that could be effective.

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Understanding Hazards Coping Strategy of Indigenous People: The Case of Khasi Community of Bangladesh

Author(s): *M. I. Choudhury, C. Emdad Haque and M. Salim Uddin*

Presenter(s): *M. I. Choudhury*

Located in the foothills of the Himalayan mountain chain, the economy of the Khasi community of Bangladesh heavily relies on betel leaf cultivation. Such regions are vulnerable to irregular flush flooding, locally known as pahari dhal that causes severe damage of properties and housing structures as well as adverse health effects. How the Khasi community cope with floods and their related risks has not yet been investigated though some of their indigenous coping mechanisms might have significant policy implications. The primary objective of this research has been to explore into coping strategies of Khasi indigenous communities to natural hazards and to analyze their resiliency to them, both at household level and community as a whole. The study area of the research was Jafflong, Sylhet of northeastern Bangladesh. Pertinent data were collected through 15 in-depth personal interviews, 6 focus group discussions (3 for male and 3 for female groups) and 10 key informants' interviews. The findings of our study have revealed that the Khasi communities are enriched with high level of social capital through which they are able to exercise the collective agency. At the household level, local community members adopt various short-term (i.e. taking loan from others) and long term strategies (i.e. building houses on pillars), using their local indigenous as well as modern scientific knowledge. Lessons learned from the Khasi community's coping mechanisms can be adopted for modifying national disaster management policies, especially to build further social capital in local Bengali communities.

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Global Changes and Aboriginal Resilience: The Role of Social Media

Author(s): *Valerie Cere*

Presenter(s): *Valerie Cere*

In this presentation, we will look at Aboriginal Resilience through the Disaster Anthropology and Social Ecology lenses. How do Global Changes (the impact of the financial crisis, the economic pressure on communities to allow mining and other development in the North, web 2.0 communications vs. the tradition way of communicating) affect the resilience of Aboriginal communities? In order to understand

such a complex problem, we have to look at the social creation of vulnerability and opportunities to enhance resilience. In particular, the presentation will focus on how social media is used by communities to maintain a tight-knit Aboriginal social fabric in this time of change and can contribute to the overall resilience and the development of sustainable risk reduction solutions.

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Cumulative Regional Integrated Operability Scores (CRIOS): Risk and Emergency Management Cooperation among Tribal Inclusive Geographic Areas in the US

Author(s): *Natalya Sousa; John Cole; Spencer Garland; Anne Garland; Lloyd Mitchell; Regina Jacobs*
Presenter(s): *Anne Garland*

Based on DHS Secretary Napolitano First Action Directives of January, 2009, about state, local, and tribal integration, this project was designed and implemented by a student team from the CREATE sponsored Working Together for A Safer Tomorrow (WTST) program. This project applies a three-step model to determine the ability of multi-jurisdictional, demographically diverse areas, particularly tribally inclusive geographic areas (TIGA), to integrate emergency management resources with the goal of operating cooperatively as resilient communities in the event of natural and manmade disasters. First, a risk matrix is used to determine a risk ranking of regional disaster and terror events. Second, an area in the study region is chosen and a real time tri-level status report is conducted by area stakeholders. Third, an integrated operability score, or IOS, is then calculated to determine cooperative mitigation resources, services, and capabilities. As the model is incorporated for each area, a cumulative regional integrated operability score, or CRIOS, is cooperatively derived. The broader impact of this study ranges, for example, from:

- a.) The creation of a risk ranked database that can be used for the establishment of resource allocation priorities based upon the CRIOS, to
- b.) The development of qualitatively derived statistical indicators related to stakeholder perceived abilities to function as resilient communities in the event of a natural disaster or terror attacks, to
- c.) The reduction of economic impacts from disaster and terror events, which is in alignment with DHS CREATE's mission (http://create.usc.edu/2011/03/working_together_for_a_safer_t_2.html).

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Thematic Session 04: Planning to Improve Critical Infrastructure Resilience

Murray Sanders and James Gulak

In our increasingly complex and interconnected society, the need for effective planning within and between Canada's critical infrastructure sectors is necessary to ensure our nation's resiliency and the ongoing security of our prosperity. Public and private sector entities have different planning considerations in areas of security, business continuity and emergency preparedness, response and recovery. Trusted partnerships are required in order to effectively understand and share the planning objectives that will result in an increasing integration of approach, where appropriate and required, and improve the resilience of the critical infrastructure Canadian's depend on.

Affiliations: Ministry of Government Relations, Government of Saskatchewan; Public Safety Canada, Prairie Region

Oral Presentations:

Public Works and Emergency Management

Author(s): Valerie Céré

Presenter(s): Valerie Céré

When a disaster strikes, first responders play a crucial role in saving lives. But who are the first responders? Police, EMT, or Firefighters, of course. If there are trees or debris on the road which prevent these first responders from accessing the site, however, who would you call?

Public Works' role during an emergency may sound obvious, but they are rarely referred to as first responders. This presentation will explore how we can involve them more in EM planning and recognize their vital role as first responders.

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Critical Infrastructure Owners and Operators- Working with Government for a More Resilient Province and Country

Author(s): Steve Hess

Presenter(s): Steve Hess

Relationships between government and private industry have many dynamics but a positive working relationship in relation to emergency response and crisis management and recovery can greatly enhance each side's resilience. This kind of relationship doesn't happen all of a sudden, it's the product of regular networking, an ability to see the other side's perspective and understand their needs and a willingness to

establish trust. This session will explore, from a private industry perspective, some successes in developing relationships, how they have come about and the value these can bring to each side.

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Thematic Session 05: Exploring the Expansion of an All Hazards Risk Assessment at a National Level

C. Cheung and S. Friesen

National preparedness is based on the core capabilities of Canada to support safety, security and resiliency to threats and hazards. Leveraging on the Emergency Management Framework for Canada (2011), dialogue, knowledge sharing and information should be initiated to determine the scope of risks across Canada. The purpose of attaining a national risk picture would be to work collaboratively to build upon an all hazards approach towards emergency management that reflects Federal, Provincial and Territorial (FPT) contributions. A comprehensive risk picture will integrate the different tiers and factors that influence the likelihood and impact of risks. Furthermore, it will assist in formulating a comprehensive national strategic emergency management plan, which will include PTs and Regions, through a national risk picture. The AHRA is a process which could promote readiness and resiliency thus creating a common view of risks at all levels of government.

This session will consist of a dialogue, which discusses the outcome from the initial assessment conducted in PTs and Regions. This assessment also examines how the AHRA methodology could be applied through community mapping. More importantly, this session will provide insight into the forward approach that leverages on FPT, regional and local components regarding threats, hazards, impacts and likelihoods. Finally, the session will facilitate discussion on the future plans which incorporates the results from the AHRA at the federal level with input from PTs and Regions thus:

- Expanding the scope of risk by generating information which could translate into risk profiles, dashboards or taxonomies;
- Elevating the information compiled to generate a national risk picture;
- Reducing the impact of threats and hazards and;
- Strengthening emergency management planning, capability and interconnectedness between FPT and partners.

Sponsor(s): Public Safety Canada; Defence Research and Development Centre for Security Science

Affiliations: Public Safety Canada; Defence Research and Development Centre for Security Science

Oral Presentations:

Co-chair (s): B. Struik and E. MacGillivray

Session Co-sponsor: Public Safety Canada

This session will broadly discuss national risk assessment and provides an overview of the different risk assessment methodologies used nationally from the perspective of critical infrastructure and natural hazards to frame that discussion.

Following the panel speakers, an interactive session will foster discussion between Federal, Provincial and Territorial (FPT) counterparts on risks of concern, the different risk assessment methodologies used and how results from risk assessments are incorporated in risk reduction decision making. We will explore the concept of a national risk assessment in terms of its potential purposes and what it could provide in terms of analysis and evaluation of both malicious and non-malicious threats and hazards. For illustrative purposes, a practical application using the hurricane scenario, developed during the federal 2011 – 2012 All Hazards Risk Assessment cycle will be demonstrated. The goal of this session is to expose participants to an all-hazards risk assessment methodology.

Panel Presenters:

National Risk Assessments in the Canadian Context

G. Paoli

Mr. Paoli from Risk Sciences International will provide an overview of comparative risk assessment experience in multiple domains. The discussion will focus on the many dimensions upon which a national comparative risk assessment can be designed, and the inevitable trade-offs that are required. Experiences in other disciplines and in other countries will also be considered.

Utility of Risk Assessments from the Federal Perspective

1. Regional Resilience Assessment Program

Presenter(s): J. Gulak and R. Hunt

Public Safety Canada will provide a presentation on the importance of a regional approach to managing risks to Canada's critical infrastructure, and in particular the Regional Resilience Assessment Program (RRAP). The RRAP is an integral part of the Beyond the Border Action Plan, and is central to Public Safety Canada's efforts to enhance the resilience of Canada's critical infrastructure. The RRAP brings together owners and operators of critical infrastructure and governments to conduct site assessments, identify and address resilience gaps and conduct exercises to validate mitigation measures.

2. Disaster Scenarios: Loss-estimates for Hazard Risk Analysis

Presenter(s): L.C. Struik

Disaster scenarios describe the consequences of a hazard event that severely impacted something people care about. This presentation describes why you need disaster scenarios to analyze disaster risk, what constitutes a disaster scenario and how they are derived in quantitative and qualitative analysis. Risk is described as the probability of a consequence. In the field of hazards, risk of concern is when the consequence is a disaster; an event severe enough to impact lives, destroy substantive numbers of buildings and infrastructure, and cost society millions or more dollars (CDN). The catalogue of such losses is the disaster scenario caused by the hazard event. To estimate a probable disaster scenario, people and structures of some vulnerability to a particular hazard are exposed to a

plausible event of that hazard of some probability (a hazard scenario). An example is used from the Hazus loss-estimation tool. A plot of various probabilities of disaster scenarios provides a measure of the risk. In summary, risk will be shown to be the profile of various disaster scenarios caused by various hazard scenarios. Know your scenarios and know your risk.

3. Brainstorming Session

Presenter(s): E. MacGillivray and C. Cheung

This session will be led by the Ernest MacGillivray on the concept of a National Risk Assessment and Register for Canada. A National Risk Assessment discussion will take into consideration: risks of concern to FPTs, the different risk assessment methodologies utilized and strategies to address how different risk-based approaches might be harmonized to form a national risk picture.

Thematic Session 06: Yesterday's Weather in Today's Landscape

Graham Strickert

The Canadian climate can lead to severe weather in all parts of the country, of many different forms and impacts. From tornadoes to heavy snowfalls and ice storms, Canada sees it all. Severe weather affects infrastructure, transportation, food production. It causes loss of life and loss of property. As it has been in the past, severe weather will be part of our future but as cities grow, populations increase, and infrastructure becomes more complex, risks posed by severe weather will also increase. Looking at past severe weather events in the context of a present and future Canadian society can help us put the risks that severe weather poses in perspective. In this session I will be looking at past severe weather events, like hurricane Hazel, which impacted southern Ontario, and the Regina tornado of 1912 and will examine the breadth of their impact and the impacts of similar events in today's landscape.

Affiliations: Environment Canada

Oral Presentations:

Possible Impacts of Climate Change on Future Wind Gust Events at Local Scale over Canada

Author: C.S. Cheng

Presenter: C.S. Cheng

The overarching purpose of this study was to project changes in the frequency and intensity of future hourly/daily wind gust events under downscaled future climate conditions over Canada. Wind gust factors were employed to simulate hourly/daily wind gusts based on observed hourly/daily wind speed. Regression-based downscaling methods were used to downscale future hourly/daily wind speed to each of the selected 104 cities over Canada for eight GCM models with IPCC SRES A2 and B1 scenarios. The wind gust simulation models were then applied using downscaled future GCM wind speed data to project changes in the frequency and intensity of future hourly/daily wind gust events. Downscaling transfer

functions and wind gust simulation models were validated using a cross-validation scheme and comparing data distributions and extreme-event frequencies derived from both downscaled GCM historical runs and observations over a comparative time period 1961–2000. The results of the verification, based on historical observations of the outcome variables simulated by the models, showed a very good agreement. By comparing the current-past observed conditions, the frequency and intensity of future hourly/daily wind gust events in the study area are projected to increase under a changing climate late this century.

This talk will introduce the research project and outline the modeling exercise and verification process. The major findings on future wind gust projections from the study will be summarized in the presentation as well. One of the major conclusions from the study is that the procedures used in the study are useful for climate change impact analysis on future wind gusts events and extremes. The implication of the projected increases in future wind gust events should be taken into consideration when revising engineering infrastructure design standards and developing adaptation strategies and policies.

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Yesterday's Culture in Today's Hazardscape

Author: Graham Strickert

Presenter: Graham Strickert

Culture has a significant influence on the manner in which humans respond to catastrophic natural events. Based on a case-study of Exercise Domino – a catastrophic flood scenario for Saskatoon, Saskatchewan - the paper will highlight the hegemony of command and control as but one possible ‘way of organizing’ in a natural hazard. Comparisons between Exercise Domino and other real catastrophes will highlight the complementarity and necessity of incorporating other approaches to emergency response training. Drawing upon the human dynamics of culture (cultural theory), a template for emergency response exercises will focus on productively recombining five different ways of organizing including: Hierarchy, Individualism, Egalitarian, Fatalist, and Autonomous ways of organizing.

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Quantify the 2013 Flood Event in Alberta Using a Classic Engineering Approach

Author: Chun, K.P., Wheeler, H.S., and Strickert, G.

Presenter: Chun, K.P.

The 2013 flood event in Alberta leads to extended media coverage and serve financial loss. The vast 2013 flood volume is more than two times of the size of the 2005 flood in Calgary which has raised a lot of public awareness. However, some historical records may show that the 2013 event is not an unprecedented event. In this study, long observation of stream flow records are assessed along with the mitigation recommendations from the 2005 flood. To further understand the dynamics of the 2013 flood event, precipitation characteristics and hydrological conditions before and during the flood are assessed. Regarding the existing tools for quantifying flood risk, engineering approaches that widely applied are evaluated using the observed and naturalized flow records. Possible improvement are proposed for characterizing precipitation and flow extremes while considering the latest information available from multiple sources. Based on the results, a framework for quantifying extremes is discussed in terms of its efficacy for supporting policy and decision making.

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Flood and Drought: Surface Water Coverage Tracking for Decision Support in Disaster Reduction

Author: Jay Sagin, Anton Sizo and Karl-Reich Lindenschmidt

Presenter: Jay Sagin

Tracking weather and landscape changes, including hydrological changes is a complicated task for many regions in the world. Particularly, tracking flood and droughts are critical for the decision support in disaster reduction. The objective of this paper is to present the GIS based automated routine calculation based on the modified Normalized Difference Water Index (mNDWI) to extract the surface water coverage area (SWCA) from optical satellite datasets, the surface water extraction coverage area tool (SWECAT) . The satellite data processing is time and resource consuming process. The developed tool was applied to measure SWCA during the drought, regular, flood, and flood peaks from the satellite datasets: Landsat (30 m pixel size); SPOT (10 m) and RapidEye (5m). Landsat results are compared and validated with Canadian National Hydro Network (CNHN) GeoBase data. The difference between the SWCA shapefile and the base CNHN GeoBase shapefile is 2 %. The optical satellites sensors (Landsat, SPOT, RapidEye) have limitations in use during the fogs and clouds. In comparison to the optical satellites the Radar satellites see through clouds and fog, and can collect data in almost any environment day or night. RadarSat has limitation in temporal resolution because it is based on the customer request system in comparison to Landsat, which consistently collects data and data available by well-developed methodology by row and path. Combination of the optical and radar sensors would be reasonable for the

similar research work. The introduced tool and methodology can be applied to other regions worldwide for similar studies.

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Thematic Session 07: Gender and Disasters: Developing Capacities and Reducing Impacts

Dr. B. Murphy, S. Pacholok and M. Cianfarani

Gender categories (e.g. male/female/lesbian/gay/queer/transsexual/intersex) play a dominant role in defining what is expected, allowed and valued in people; how power, resources, responsibilities and opportunities are distributed; and in structuring relationships within and among groups of people across time and space¹. As such, gender impacts the way in which people cope with hazards and their vulnerabilities and/or resiliencies to disasters. Gender also interacts with other factors such as age, ability, ethnicity, geographic location and so on to further influence people's capacities to mitigate, prepare for, respond and recover from disasters. For instance, men are least likely to ask for assistance and women, boys and girls are more likely to die in a disaster. This session will be focused on exploring the ways in which attention to gender in disaster and emergency management research and practice can contribute to increasing capacities and reducing disaster impacts. Topics could include, but are not limited to:

- Methodologies for conducting gender disaster research
- Case studies that document and analyze gendered experiences of disasters
- Bridging the gap between academic knowledge and practice
- Conceptual or theoretical approaches for framing gender disaster research and practice
- Inclusion of gender in risk assessment
- Gender-aware risk communication and education
- Gender-sensitive public participation
- Gender-awareness in developing emergency management plans

Gender and Disasters, UNPD, <http://www.undp.org/content/dam/undp/library/crisis%20prevention/disaster/7Disaster%20Risk%20Reduction%20-%20Gender.pdf>

Oral Presentations:

“I don’t want to go back to the life I had before the tsunami”—Understanding Hidden Issues and Root Causes of Gender Vulnerability in the Case of the 2011 Great East Japan Earthquake and Tsunami

Author: E. Yasui

Presenter: E. Yasui

Although the "number of deaths" in disasters is often used to indicate human vulnerability, it does not reveal the particular conditions that generate women's vulnerability. In Japan, women's oppressed and stigmatized conditions are the root causes of their vulnerability. Lack of access to financial resources, limited political participation, and cultural structures that undermine women's voices are conditions that have existed for many years in Japan, and that can be preserved or accentuated in the aftermath of a disaster. Unless women challenge the existing systems that lead to their marginalization, they remain especially vulnerable to future disasters. After the 2011 tsunami in Japan, some evidence suggests that women, especially those who are the mothers of young families, prefer to stay in temporary housing rather than return to their pre-disaster locations to rebuild their homes. However, there is no clear explanation why they intend to stay in new post-disaster locations where the resources are scarce and uncertain, which means they continue to be vulnerable. This study explores some factors that might explain why these women are silenced and reluctant to return to their pre-disaster living conditions.

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Supporting LGBTQ Resilience in Canadian Emergency Management

Author: M.Cianfarani, S.Pacholok

Presenter: *M. Cianfarani*

It is well-established that disasters reinforce social inequalities based on race, class, ability, ethnicity, and gender, but little is known about the experiences of lesbian, gay, bisexual, trans, and queer (LGBTQ) people. A small body of recent research indicates that sexual minorities face discrimination during and after disasters because of their sexual orientation and/or gender identity and that often their skills and capacities are overlooked. This presentation will build on the work of those at the forefront of this field who call for more attention to be paid to the capacities of LGBTQ people and communities and will discuss the findings from two exploratory studies that examine the disaster experiences of urban LGBTQ people. The results draw on survey data from 76 LGBTQ people in Toronto, Canada and from 6 interviews in New York City, USA with LGBTQ people who were affected by Hurricane Sandy. We examine the capacities of the broader LGBTQ community to mobilize and organize that may stem from a history of political action/activism in urban settings like Toronto and New York. The existing networks of support, belonging, and activism are resources that can be utilized both in preparing for and responding to disasters and there is very little literature that we are aware of that examines to what extent those outside of the 'heterosexual matrix' utilize these resources in disasters and other emergencies. We conclude by discussing the broader theoretical implications for social change stemming from this work as well as the practical implications for those involved in disaster and emergency planning.

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Thematic Session 08: Challenges and Opportunities in Risk Communication

J. Descurieux

From Early Warning Systems (EWS) to social media, from development to evaluation, this session intends to present contributions to the field of research and practice in risk communication. It will focus on process and practices and their relevance to all hazards risk management and social capacity building

Affiliations: Environment Canada; Meteorological Service of Canada

Oral Presentations:

Social Media and Disasters - How to Plan for the Worst

Author: *Candace Lamb and Kelsie Fraser*

Presenter: *Candace Lamb and Kelsie Fraser*

Alberta floods saw an unprecedented level of social media activity for Western Canada. It was utilized from a city, police, and disaster management perspective that required an intimate knowledge of twitter, 24/7 monitoring and open and direct lines of communication. This presentation will show you how you can be prepared to successfully manage any potential issues of your own.

Specifically, this presentation will help emergency planners understand the benefits that social media can have to mobilize people, release information, monitor activities and improve overall situational awareness before, during and after a disaster.

Before:

What are the expectations of the public?

What tools do you need to start putting into place now?

Do you have enough people with access to your accounts?

Which of your people need to have a basic understanding of social media? Who should be leading social media?

How prepared can you be ahead of time without knowing what will happen?

During:

What should you do during the first 48 hours? The first few weeks?

What tools do you need to handle the situation effectively?

What lines of communication and permissions do you need to put in place and by what point in the crisis?

How can Social Media feed information to your responding team during a crisis?

How can you get your audience to help you?

After:

When can you gear down your social media activity back to normal levels?

What should you do afterwards?

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State of Emergency in the Big Land

Author: Jim Stanton

Presenter: Jim Stanton

Do the names Cowboy Creek, Moose Head Lake, or Blueberry Hill resonate with you? Probably not; these are locations in Western Labrador that went through a major forest fire in the summer of 2013.

How about facing the following? – a 17,000 hectare forest fire, declaration of a State of Emergency, evacuation of the community, power failure, loss of cell and landline phone connections, closure of the main highways and railway, boil water advisory, sever smoke conditions, ditching of a water bomber – all inside 48 hours with temperatures in the 30°C range.

That's what the mining community of Wabush, Newfoundland and Labrador faced in late June – early July 2013.

The community response was amazing with hundreds of volunteers working. The business community provided bulldozers to create a huge firebreak, water bombers, helicopters, and an eight-train rail car fire response unit with 10 NFPA-trained firefighters and other resources.

Jim will explain his role as the community public information officer and how this tiny town of less than 2000 people responded to the biggest emergency in the history of Western Labrador.

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Thematic Session 09: Simulations for Better Decisions

R. Walker and L.C. Struik

This session provides a venue to share and examine innovative uses of simulation methodologies and technologies to test, learn and improve decision making in disaster planning, mitigation, response and recovery. Presentations, demonstrations and posters of new applications, approaches and technologies, case studies and experiences are encouraged.

In recent years, simulations have demonstrated their usefulness in testing emergency response processes and for training emergency responders. Whether delivered in the field, a simulation laboratory, a classroom or the imagination, simulations can be a key method for understanding the decision-making process. New developments in simulation theory have increased the complexity and realism of these exercises while advances in technology have allowed simulations to be delivered virtually through the Internet.

Affiliations: Justice Institute of British Columbia, New Westminster, British Columbia
Natural Resources Canada - Geological Survey of Canada, Vancouver, British Columbia

Oral Presentations:

Praxis – Computer Simulation for Public Safety Training and Education

Author: *Colleen Vaughan and Robert Walker*

Presenter: *Colleen Vaughan and Robert Walker*

For decades, emergency management tabletop exercises have looked pretty much the same: a facilitator reads out a narrative, paper inputs are handed to participants, and notes are recorded on flip charts. While still effective, learning is enhanced when individuals are engaged in a more immersive environment. Computer simulations can provide such an immersive environment. Simulation training promotes critical thinking and has proven invaluable as a means of developing decision-making skills; conveying deeper conceptual understanding of complex, dynamic processes; and developing strong, highly functioning individuals and teams.

Praxis utilizes simulation technology to create an immersive learning environment where participants gain experience in major event and critical incident decision-making within a safe training setting. It is designed to deliver interactive, problem-based scenarios where participants receive information about an incident through immersive multi-media or relevant real-world documents. Participants work through scenarios by completing tasks and making decisions. All activities are monitored, and all decisions and decision rationales are stored to a database for review and after action reporting. While the primary focus is decision-making, other benefits can include practicing, testing and critiquing operational plans and procedures; familiarization with protocols; promoting inter-personal and inter-agency cooperation; and group dynamics.

The presentation will provide an overview of and demonstration of the Praxis simulation technology as well as examples of how the technology has been successfully incorporated into public safety and emergency management education and training by the JIBC.

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Decision Simulations for Safer Risk-based Land-use Recommendations

Author: L.C. Struik and R. Walker

Presenter: L.C. Struik

Exercises that simulate a municipal approval to develop land are being used to write a risk-based land use guide and build risk assessment capacity. The simulation exercises were run at the Dr. Donald B. Rix Simulation Laboratory of the Justice Institute of BC. The exercises guided staff and interested parties from Metro Vancouver, British Columbia, through a decision scenario for development proposals in debris-flood and flood prone areas. The scenarios examined the municipal need to ensure safe development for intended use. The scenarios were used to determine the real-life needs of municipal staff making recommendations for safe development in high risk situations. Potential solutions to those needs were then collated for the risk-based land-use guide. The Justice Institute of BC's simulation technology is designed to deliver interactive, problem-based immersive scenarios. Participants, working in small groups receive information about an incident through scripted streaming video and audio clips, and relevant real-life documentation. Participants work through scenarios by completing tasks and making decisions. Individual groups can interact with each other or work independently depending on the design and objectives of the simulation. All activities are monitored, and all decisions and decision rationales are stored to a database for review. The presentation highlights the benefits of using simulation technology in land-use decision scenarios for professional development, situational awareness, team building, process improvement and finding low-risk solutions for developments proposed for high-risk situations.

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General Session 01: Wildland Fires

Incorporating Integrative Complexity into Wildland Fire Management

Author: M. R. Czaja

Presenter: M. R. Czaja

The purpose of the study was to determine respondents' level of integrative complexity toward prescribed fire and to develop a conceptual model to assist forest managers in assessing, understanding, and incorporating it into the management process. The study's primary goal was to further validate a recently-developed measurement tool for integrative complexity and apply it to a new research scenario. Integrative complexity measures how complexly people think about an issue. It examines the diversity of arguments people recognize about the subject. The data came from residents living in three study areas in Colorado and Wyoming. Results suggest that integrative complexity affected the relationship between basic beliefs and attitudes toward prescribed fire. Findings should assist forest managers with developing prescribed fire-related policies, management actions, and communication strategies. Potential areas of study include examining integrative complexity in different emergency management scenarios and the analysis of integrative complexity at various management or leadership scales within the emergency management and defense communities.

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How a Primary Resource Extraction Industry was Affected by Wildfire

Author: Greg Bartlett and Larry Fremont

Presenter: Greg Bartlett and Larry Fremont

We live and work in a fire adapted environment. The impact wildfire can play on rural and remote work sites can be devastating. This presentation will illustrate how a primary resource extraction industry was affected by wildfire. The presentation focuses on the operational experiences of the two speakers in dealing with this incident. This talk will include how academic theories can be applied in protection and mitigation of wildfire. Understanding the impact of wildfire is key but communicating risks and making informed budgetary decisions is paramount. The objective of the session is to further open a dialogue with rural employment sectors on how to mitigate the impact wildfire has on their workplace.

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General Session 02: Health

Self-Care Decontamination Protocols and Psychosocial Considerations

Author: *L.D. Pearce, R. Monteith, C. Vaughan, A. Vaughan, B. Larcombe, J. Pinette*

Presenter: *L.D. Pearce*

On March 13 2013 in North Vancouver, B.C. Canada, a cold-weather drill was held to test a new Self-Care Decontamination Protocol which was developed as part of the research being conducted by the Simulation Training and Exercise Collaboratory (SIMTEC) project at the Justice Institute of British Columbia.

Over 30 persons were subjected to a simulated release of chlorine gas and pepper spray. In addition to testing this new protocol, additional supporting protocols were developed to address the specific needs and psychosocial considerations of at-risk and mainstream populations.

Following the drill, interviews and focus groups were held with both responders and exercise participants. The findings were used to refine the self-care protocols and decontamination kits. These kits include the materials for completing self-care decontamination and items introduced to reduce stress and anxiety.

Building on these findings, a simulation exercise, Exercise Green Cloud, has been developed and will be tested on October 1st 2013 with a community-based EOC, Incident Command Post, Hospital EOC, members from the RCMP Integrated National Security Enforcement Team and Health Canada.

The presentation will outline the detailed research findings and recommendations from this drill, an opportunity to view the training videos and supporting materials, and the preliminary findings from Exercise Green Cloud. It will be of interest to any first or second responders, psychologists or health professionals and researchers involved in decontamination and disaster-related psychosocial supports.

The SIMTEC project is funded by the Canada's Safety and Security Program, Development and Research Defence Canada; and championed by Health Canada.

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Improving our Treatment Options: Developing an Intravenous Formulation of the Nerve Agent Antidote HI-6

Author: C. Stewart (1), J. Mikler (1), G. Cowan (2), S. Dragisic (3), M. Patel (3), C. Corman (4), M.-A. Beaulieu (5)

Presenter: *Dr. John Mikler*

Topical exposures of organophosphorous nerve agents can readily cross into skin layers and become sequestered, creating a depot. This depot provides a prolonged source of nerve agent exposure as it is slowly released into systemic circulation, necessitating prolonged treatment. Currently, there is not an intravenous formulation of the nerve agent antidote HI-6 approved for use in Canada to treat nerve agent exposure. Resultantly, a capability gap exists in Canada's treatment options for chemical casualties. The objective of this project was to develop and demonstrate an intravenous formulation of HI-6 for continual intravenous treatment of nerve agent poisoning.

An industrial process for the production of an intravenous formulation of HI-6 was developed by UGM Engineering Ltd. Defence Research and Development Canada (DRDC) Suffield developed experimental procedures required to conduct pivotal regulatory studies to achieve regulatory approval from Health Canada. DRDC Suffield also conducted a technical demonstration of the efficacy of continuous intravenous HI-6 in the treatment of topical nerve agent exposure in a live tissue model; both military and civilian first responder communities participated in this event.

The results of the technical demonstration will be presented, along with a summary of the progress toward filing for Extraordinary Use New Drug regulatory approval with Health Canada.

Development of an intravenous HI-6 formulation will provide a more flexible and effective treatment regimen for nerve agent poisoning.

This project was funded by Defence Research and Development Canada's (DRDC) Centre for Security Science (CSS) and the Chemical, Biological, Radiological and Nuclear Research and Technology Initiative (CRTI).

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Climate Change on Canadian Health Care Facilities

Author: *L.D. Pearce, R. Monteith, C. Vaughan, A. Vaughan, B. Larcombe, J. Pinette*

Presenter: *L.D. Pearce*

Climate change poses significant risks to the health of Canadians and impacts are already being observed. Recent weather-related disasters have demonstrated that health care facilities in Canada are vulnerable to climate change. Public health and health care officials are taking actions to adapt to these impacts. In partnership with federal, provincial and local health authorities, the Canadian Coalition of

Green Health Care developed the "Health Care Facility Climate Change Resiliency Toolkit". This toolkit can be used by hospitals to assess their resiliency to the impacts of climate change through the use of a facilitator's guide, assessment checklist and best practices resources. The resiliency toolkit will contribute to increasing health sector adaptation in Canada and other jurisdictions.

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General Session 03: Social Science

Relocation and Housing Issues in the Aftermath of the 2011 Great East Japan Earthquake and Tsunami

Author: *E. Yasui*

Presenter: *E. Yasui*

This unprecedented Mg. 9.0 earthquake and the tsunami that followed devastated the coastal areas of Tohoku, Japan on March 11, 2011. The mega disaster not only has caused 19,000 human losses and US \$200-300 billion material damages, but also has destroyed the livelihoods and neighborhoods of 470,000 survivors. These two components are essential for their successful recovery, yet two years after the event, many of those survivors are not certain about the future of their home, work, family, and their communities. The central and local levels of governments have developed various housing policies to provide temporary shelters promptly, while continuing projects focus on relocation and the elevation of ground foundations for the communities. These efforts are essential to ensure the safety of the local people; however, the implementation has been slow as the governments made little effort to involve the displaced communities since the disaster. There is a lack of consensus among survivors and governments about whether to relocate or raise the foundations to rebuild the communities. This study finds that the governments have limited capacity to allocate the resources to meet diverse and complex needs of the local communities. The communities, therefore, need to be informed about their choices and options in order to make collective decisions without relying heavily on the governments' support, and learn how effectively utilize external resources such as NGOs, small interest groups, and volunteers.

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Implementation of New Zealand National Disaster Recovery Strategy

Author: J. Lindsay

Presenter: J. Lindsay

In 2010/2011 Christchurch New Zealand experienced a series of earthquakes that changed the urban landscape and, at the same time, has changed how New Zealand approaches disaster recovery. The presentation will examine how New Zealand's National Disaster Recovery Strategy (2005) was implemented in the aftermath of the Canterbury earthquakes and explore the implications of the creation of the Canterbury Earthquake Recovery Authority. The question of whether Canada has a national recovery strategy that could cope with a similar impact, in scale to that of the Canterbury earthquakes, will also be raised.

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Disaster Resilience in Developed and Developing Worlds: A Case from the Calgary, Canada 2013 Flood with Critical Comparisons from a Nepal Perspective

Author: B.R. Sinclair, P.S. Marahatta, J. Subedi

Presenter: B.R. Sinclair

June 2013 a devastating flood in Southern Alberta severely affected many parts of Calgary and area. The ensuing response and subsequent recovery that the city witnessed left notable marks on the history of Disaster Management, in Canada and beyond. Despite significant and severe impact including on the city's downtown area, Calgary regained normalcy in a fortnight. The Stampede Grounds, one of the most severely affected areas hosted the 2013 Stampede Exhibition within 14 days of the disaster's arrival. During a similar period, part of the far western region of the Himalayan nation of Nepal was severely affected by floods which resulted in direct loss of lives and serious disruption of business for many months which is still struggling to return to normalcy. Despite of dramatic difference in terms of level of economic development and technological sophistication, the present paper explores degrees of resiliency in the two contexts outlining key factors that contributed to the better resiliency of Calgary compared to cities in Nepal. Central issues examined include governance systems and community contexts. It is observed that the preparedness, response, recovery and reconstruction are less effective and less efficient in Nepal. Recent studies on community-based disaster risk management in Nepal have identified that emerging Disaster Resilience models best comprise a sustainable livelihood approach involving social, physical, financial, natural and human capital dimensions. This paper analyses the success story of disaster management in Calgary and seeks to determine the lessons learned to be better prepared for future calamities in global jurisdictions.

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Poster Sessions

Cumulative Regional Integrated Operability Scores (CRIOS) and Organizational Cooperative Model: Risk and Emergency Management Cooperation among Tribal Inclusive Geographic Areas in the US

Author: Anne Garland, John Cole, Spencer Garland, Lloyd Mitchell, Regina Jacobs

Presenter: Anne Garland

Based on DHS Secretary Napolitano First Action Directives of January, 2009, about state, local, and tribal integration, this project was designed and implemented by a student team from the CREATE sponsored Working Together for A Safer Tomorrow (WTST) program. This project applies a three-step model to determine the ability of multi-jurisdictional, demographically diverse areas, particularly tribally inclusive geographic areas (TIGA), to integrate emergency management resources with the goal of operating cooperatively as resilient communities in the event of natural and manmade disasters. First, a risk matrix is used to determine a risk ranking of regional disaster and terror events. Second, an area in the study region is chosen and a real time tri-level status report is conducted by area stakeholders. Third, an integrated operability score, or IOS, is then calculated to determine cooperative mitigation resources, services, and capabilities. As the model is incorporated for each area, a cumulative regional integrated operability score, or CRIOS, is cooperatively derived. The broader impact of this study ranges from a.) The creation of a risk ranked database that can be used for the establishment of resource allocation priorities based upon the CRIOS, to b.) The development of qualitatively derived statistical indicators related to stakeholder capabilities to be resilient during disaster events, to c.) A game theory study about *behavior economics* developed in conjunction with TIGA EM collaborators. The pilot is implemented with an Interagency Partnership survey among TIGA EM partners to apply organization cooperation of Zhuang and Coles (JHSEM, vol.8, 2011).

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Analysis and Comparison of Geohazard Management in Diverse Geographic Locations Inhabited by Indigenous Communities

Author: Anne Garland, Kurt Swalander, Lloyd Mitchell

Presenter: Anne Garland

This study is designed to assist leaders in and near indigenous communities through the fusion of knowledge of relationships between geological hazards and politico-cultural factors, especially in local decision making processes related to geohazard risks. People of tribally Inclusive Geographic Areas (TIGA) from five international geographic locations were selected: 1) Inupiat: Alaska's North Slope, 2) Aborigines: Australia 3) Maori: New Zealand 4) American Indian Tribes, USA, and 5) Wum, Nyos: Africa's Rift Valley. Constructed weighted matrices were utilized to rank geohazard risks. Three politico-cultural factors reviewed and analyzed: 1) Concept of tribal sovereignty in government to government relationships, 2) Blood Quantum enrollment (USA), and 3) politico-economic relationship with local, federal governments. Six geologic hazards in TIGA were reviewed: 1) Tsunami and Ivu (North Slope), 2) Volcanic Eruptive Events and Lahars, 3) Floods, 4) Geomagnetism, 5) Earthquakes, and 6) Landslides, roadside, and roadbed soils degradation. Identification of common politico-cultural factors of indigenous communities related to geohazard risk management was analyzed. Results to date indicate that geomagnetic events are the least managed but pose primarily a temporary economic risk, and where applicable, tsunami hazards and earthquakes pose the greatest risk. Results of data collected from field site visits indicate, a.) Responses to geological disasters in TIGA worldwide are inconsistent and significantly influenced by tribal politico-cultural factors, and b.) In the United States, irresponsible sovereignty efforts actually increase geohazard risks, thereby not always safeguarding all TIGA residents and guests. Future work will refine and add data across TIGA worldwide.

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Protest to Risk Cycle (PTRC)

Author: Anne Garland, Kurt Swalander, Lloyd Mitchell, Lynnette Ansell

Presenter: Anne Garland

When civil disturbance and terror events occur, there is a process or cycle of risks that can be examined to identify changes as a consequence of intentional threats. Adaptations occur in behavior, attitude and knowledge that result in a continuum of reactions to official efforts at risk reduction. This project examines adaptive risk in local, tribal, and regional communities where civil protest has escalated to civil disturbances or terror events. The intention is to develop methods that identify triggers of unacceptable risk thereby providing mitigation targets. All case studies were specific for civil disturbances that escalated, some of which resulted in terror events. Case study variables were examined for relevance to the changes in adaptive risk. These Variables of Relevance (VOR) include political, social, economic, ideological, geographical, and chronological. Within these variables,

Factors of Relevance (FOR) are identified that determine changes in civil impacts. From observations of the FOR, Indicators of Relevance (IOR), which are based on the knowledge, attitude, and behavior (KAB) of those causing threats, are scored according to a graduated scale of adaptive risk (SAR). A Cumulative Adaptive Risk Score (CARS) and Averaged Adaptive Risk Score (AARS) are derived from the scale of indicators. Observations from web data, field research, and real-time data are compared several times weekly and integrated for scoring among an interdisciplinary team. This unitive research combines qualitative and quantitative data into a software tool available for use *with* local officials during critical real-time escalations identified in the risk cycle via e-notices.

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Historical Ecology for Risk Management: Youth Sustainability

Author: Anne Garland, Natalya Sousa, Simone Balog, Michael Brady, Hollis Yenna, Kathleen Fischer

Presenter: Anne Garland

Applied Research in Environmental Sciences Nonprofit, Inc., ARIES, the Barrow Arctic Science Consortium, BASC, the North Slope Borough of Risk Management, and Cooperative Extension of Ilisgavik Collage are collaborating to develop and implement a historical ecology model for the North Slope Coastal Region of Alaska. Historical ecology is an applied research program that focuses on interactions of people and their environments in both time and space to gain a full picture of all of its accumulated effects. The research program can be applied to understanding changes among community landscapes that can assist strategies for the future. For this proposal the emphases align with the ARIES mission that combines research, education and community outreach. The emphases are 1) a bibliographic database of relevant historical resources, 2) an examination of the shoreline to provide a time-series baseline 3) simulation models to demonstrate socio-natural cycles of change for the North Slope shoreline, 4) the historical ecology study of the shoreline, interactive mapping and database available as a web based resource to assist academia, industry, regional government and local communities for socio-cultural and management purposes, 5) an integrated team who can work with interested researchers, industry planners and Risk Management of the North Slope Borough to extract data and provide simulation models that apply to current studies of the region and 6) provide a variety of eco-heritage opportunities that include community participation in research, educational products, age level appropriate activities and outreaches for community service learning such as Teen CERT for the "Next Generation".

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Nasal Spray Delivery of Antiviral Drugs Against Avian Influenza

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Presenter: J.P. Wong

There is an unmet medical need to develop broad-spectrum antiviral drugs which can protect against emerging avian influenza viruses with pandemic potential. Towards this end, a nasal spray that can deliver an antiviral drug called LE Poly ICLC (liposome-encapsulated Poly ICLC) and which can provide rapid protection against both seasonal and avian influenza viruses was developed. In various animal studies, nasally delivered LE Poly ICLC provided highly effective and broad-spectrum protection against several pathogenic viruses including Ebola, western equine encephalitis and dengue fever viruses. Efficacy testing in animal studies have shown nasally delivered LE Poly ICLC was efficacious in protecting experimental animals against both seasonal (H1N1, H3N2), as well as against avian influenza H5N1 viruses. Recent toxicological studies have also affirmed the safety and tolerability of LE Poly ICLC in animals, and a phase I clinical study can be conducted in normal healthy volunteers upon regulatory approval. Nasal spray delivery of LE Poly ICLC provides a safe, effective and needle-free means of drug dosing which can be self-administered without clinical assistance. LE Poly ICLC works by stimulating the host's innate and antiviral immune responses, and this mode of drug action is therefore less likely to give rise to drug resistance when influenza viruses mutate. When fully developed, this nasal spray formulated with LE Poly ICLC will greatly enhance Canada's capability to protect military, civilian, and first responder communities against influenza viruses with pandemic potential, whether caused by a natural pandemic outbreak or bioterrorism event.

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CRTI 08-0112TA, Human Monoclonal Antibodies Against Ricin

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Presenter: J.W. Cherwonogrodzky

Ricin is a potent toxin within beans of the common castor bean. Attempts to use it for terrorism have occurred in the United States, United Kingdom, France and Canada. Death to casualties occurs within a few days and currently no medical countermeasures exist to treat victims. As a pro-active initiative, DRDC and industrial partners sought an antidote. Using innovative approaches, mice were vaccinated with ricin, 2000 hybridoma were created and, after poisoning the cells with 10 LD50 of ricin, 65 that secreted anti-ricin antibodies survived (18 of which produced IgG). From these the best IgG clone was selected. The anti-ricin antibody was unique in that its neutralizing action on the toxin was 5000-fold more active than animal antiserum, 50-fold more active than any other reported anti-ricin monoclonal

antibody. Five micrograms protected mice from 5 LD50 of ricin for 6 weeks. For treatment, if mice were challenged intra-nasally to mimic a respiratory attack, mice could be rescued 24 hours later, at a time believed too late to save a life. Like grafting a twig onto a tree, the binding site of mouse-D9 anti-ricin antibody was genetically inserted into a human IgG to create human-D9 antibody. There was no loss of anti-ricin activity for this human monoclonal antibody.

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Abandoned Rails Trail: A Debris Flow Study in Glacier National Park, British Columbia

Author: L.C. de Montreuil and S.R. Cail

Presenter: L.C. de Montreuil

Debris flows are a common geomorphic hazard occurring in Glacier National Park every year. These debris flows pose a significant threat to park visitors, staff and the transportation corridor. Mitigating the impacts of debris flows requires an understanding of their nature, characteristics, and triggering mechanisms, as well as regional climatic conditions, physiography, history of land use, and geologic setting.

On June 23rd 2012, a debris flow occurred on the eastern slope of Cheops Mountain at the Roger's Pass summit. The site was later investigated by a UVic field school project team. The shape and extent of the flow was mapped and sediment collected for further analysis. This field work enabled the project team to provide a morphologic description, topographic profile and transect map.

Off-site analysis included the examination of precipitation, snow depth, and temperature records for June 2012 which were compared with 46-year climate normals. An investigation of the correlation between various climate indices and the occurrence of debris flow activity in the park concluded that the depth of snowpack combined with heavy rainfall events might be the most significant factor in the initiation of slope failure and triggering of a debris flow event. Sediment analysis concluded that due to the character of the sediment profile (dominant in fine material), the entire slope could be considered at high risk of failure should similar climatic conditions occur in the future. The results from this analysis can be used to inform mitigation plans for future hazards in the region.

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