

## **Sustainable Cities**

### **Strengthening Community Resilience**

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**April 2005**

**Abridged Version Oct 2007**

## **Acknowledgements**

The author wishes to express appreciation to Brent Mueller, Doug Macfarlane Ken Cameron, Brooke Hayes and Dave Scott of the Province of BC; Ardath Paxton-Mann of Western Economic Diversification Canada; Jim Cooney of Placer Dome; David Parker of Teck Cominco; Richard Rabnett; and Greg Halseth, and the ICSC team: Alison Ritchie, Jennifer Ferguson and Kim Feltham. They each read various drafts of this paper, gave feedback or responded to requests for information and ideas. Much of the perspective contained in this paper has been shaped by the authors participation in cities<sup>PLUS</sup> – the award winning 100 year planning project for Greater Vancouver and its legacy the *+30 Network* of cities planning for long-term urban sustainability. I have also been profoundly influenced by my experience with the Huairou Commission and grassroots women’s organizations in response to the Marmara earthquake in Turkey and the South Asian tsunami. The contribution of others to these concepts has been very important and I am sorry that I have been unable to incorporate more of the ideas.

This paper has been written for the Province of British Columbia, Community, Aboriginal and Women’s Services, with support from Western Economic Diversification Canada and the International Centre for Sustainable Cities. The views expressed are solely those of the author and do not represent the opinions or policy of any of the supporting institutions.

# **Strengthening Community Resilience**

## **Executive Summary**

Crises and disasters, whether caused by humans or nature, impose significant threats to sustainability. Both have the power to affect the environment, economy and society. While some disasters, such as tsunamis and extreme weather are beyond our control, our preparations and responses are not, and we have much more control of how we choose to deal with known crises. To successfully plan, prevent, mitigate and recover from disaster and crises is to be resilient and requires not just an understanding of what prevention/mitigation measures could be used, but more importantly how to develop the political will and infrastructure to deliver on the ideas. That is, how to make cities and communities more resilient.

In popular terms, resiliency is the capacity of a community to survive, adapt and bounce back from a crisis or disaster. The author argues that resilience related to a wide variety of catastrophes, whether caused by humans or nature, has a common set of lessons and approaches. This paper reviews the literature and practices using a Disaster Risk Matrix, which provides a flexible framework and schematic model that puts hazardous events on a continuum from crises to catastrophe and distinguishes between them as related to human or natural causes. The paper is presented in two parts.

Part One attempts to explore the concept of a continuum of risks that face cities and communities. The Disaster Risk Matrix is elaborated to bring forward lessons learned related to each quadrant of the matrix. Although the methodology and approaches reviewed are from widely different sources and professional groups (the disaster community and the development/sustainability community), and often are couched in different language, there does seem to be a body of principles and practice that are held in common:

- all of the approaches centre around managing change and risk;
- the solutions for each tend to be similar – affecting systems, planning, buildings and infrastructure;
- the mind-set and assumptions are similar – seeing the relationships between natural and human interactions, and using a systems approach;
- the lessons point to the value of an adaptive management framework;
- they require multi-stakeholder collaboration across sectors, disciplines and jurisdictions;
- they are focused beyond survival on sustainability; and,
- they require preparedness and prevention.

It appears that the cause or nature of the hazard is not as significant as the timeframe or the perception of its urgency (or lack thereof). That is, resilience related to a wide variety of catastrophes whether caused by nature or humans has a common set of lessons and approaches. Those related to long term-crises are less generalized and remain known to a smaller group of issue-related specialists.

The table below summarizes the major lessons.

<b>Table 1: Common Lessons</b>	
<b>Natural and Human Made Crises</b>	<b>Natural and Human Made Disasters</b>
<ul style="list-style-type: none"> <li>• Anticipate and plan for outcomes from the earliest possible time (i.e. mine closures, climate change, pest infestations, desertification)</li> <li>• Leadership and ownership are key</li> <li>• A vision of change is necessary</li> <li>• Local governments involvement essential</li> <li>• Adaptive management is needed</li> <li>• Treat community as one system</li> <li>• Build Social Capital (trust)</li> <li>• Involve all the stakeholders – process is key</li> <li>• Transparency and timely information needed</li> <li>• Increase community and economic diversity (incorporate immigrants)</li> <li>• Develop or maintain a middle group (class)</li> <li>• Use a wide range of economic and social incentives and measures</li> <li>• Transition financing measures are needed to assist in the move to economic diversity</li> </ul>	<ul style="list-style-type: none"> <li>• 4 phases : rescue, restoration, rebuilding and remembrance</li> <li>• Integrated approach needed</li> <li>• Total community (including women and marginal groups) participation and empowerment necessary – as partners not victims</li> <li>• Prevention and mitigation need to be embedded in reconstruction and future planning</li> <li>• Narratives of hope and opportunity are necessary</li> <li>• Inertia often prevents the introduction of new ideas that might be better suited to prevention, adaptation or mitigation</li> </ul>

Additional factors identified in cities<sup>PLUS</sup> - the importance of a long-term timeframe, a systems approach and adaptive management, add to these lessons. The paper then explores the question of risk perception; the need to understand human responses in the face of threats; and the factors that motivate change in human behavior. It is argued that these additional concepts need to be incorporated into strategies related to strengthening community resilience.

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# Strengthening Community Resilience

Dr. Nola-Kate Seymoar

## Background

In 2004, the Province of British Columbia contributed a significant paper on *The Resilient City* to the Vancouver Working Group's World Urban Forum Preparatory papers<sup>1</sup>. Based on national research and consultation, the paper focused on the resilience of small rural resource-based towns faced with the closure of their major industry and identified a series of lessons from several Canadian cases. The paper developed a schematic model that attempted to capture a range of experiences. It put hazardous events on a continuum from crises to catastrophe and distinguished between them as related to human or natural causes. As part of the same series, the Liu Institute for Global Studies produced a paper on *The Secure City*<sup>2</sup> which began an exploration of the relationships between adaptive security, preventive security and human security. The International Centre for Sustainable Cities (ICSC) contributed a case study, *The Livable City*,<sup>3</sup> which analyzed the progression of concerns in the Greater Vancouver region from issues of livability, to sustainability, to resiliency. Together these three papers represent an emerging Canadian interest in the concept of resiliency as a key component of rural and urban sustainability.

At an international level, in 2004 UN HABITAT produced a paper on sustainable relief and reconstruction in post-conflict, natural and human-made disasters.<sup>4</sup> A draft was discussed at the World Urban Forum in Barcelona and a revised paper was used as the basis of a resolution passed at the Governing Council meeting in Nairobi in April 2005 to ensure that it becomes a legitimate part of UN HABITAT's mandate and programs. A large international conference on Disaster Reduction was held in Kobe, Japan in January 2005. Attendance was high, largely due to concerns raised by the recent tsunami in South Asia. The role of communities and civil society in disaster relief and mitigation was reiterated throughout the conference<sup>5</sup>. ICLEI – *Local Governments for Sustainability* is leading a UN Type II Partnership<sup>6</sup> project on Resilient Cities and Communities and recently concluded a survey of their members. This topic will be part of ICLEI's World

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<sup>1</sup> Walisser, B., Mueller B and C. McLean (2004). *The Resilient City: A Vancouver Working Group Discussion Paper for the World Urban Forum 2006*. Vancouver BC: Ministry of Community Aboriginal and Women's Services, Government of British Columbia.

<sup>2</sup> Axworthy, L., Fallick, A.L. and K. Ross (2004). *The Secure City: A Discussion Paper in preparation for the World Urban Forum 2006*. Vancouver, BC: The Liu Institute for Global Issues, University of British Columbia et al.

<sup>3</sup> Timmer, V and N.K. Seymoar (2004). *The Livable City: A Discussion Paper in Preparation for the World Urban Forum 2006*. Vancouver, BC: International Centre for Sustainable Cities.

<sup>4</sup> UN HABITAT, *Post-conflict, natural and human made disasters assessment and reconstruction* HSP/GC/20/05.

<sup>5</sup> United Nations (2005), *Report of the World Conference on Disaster Reduction, Kobe, Hyogo, Japan, 18-22 January 2005*, United Nations A/Conf.206/6.

<sup>6</sup> Partners include, ICSC, UN HABITAT, ISDR, the Huairou Commission, GROOTS International, UNEP, UNESCO.

Congress discussion in Cape Town, South Africa in March 2006. The *Huairou Commission for Women, Homes and Communities* has established a ‘Disaster Watch’ program aimed at bringing women into the decision making process in post disaster relief and reconstruction. Prior to the Barcelona World Urban Forum, they held a workshop to share lessons learned between grass roots women and local authorities.

As can be seen, the intersection between the policies and practices of sustainable development, disaster relief and reconstruction, and local authorities is a field that is growing in importance, locally, regionally, nationally and internationally. It represents an emerging desire to place resilience in the daily realm and balance the periodic disaster focus.<sup>7</sup>

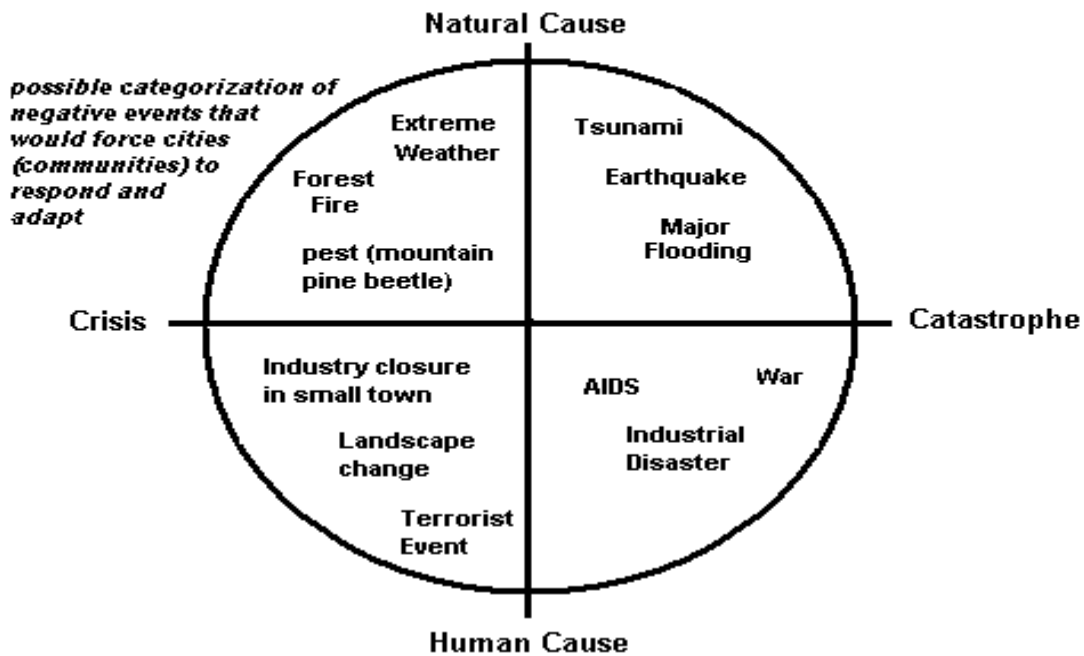
**The Disaster Risk Matrix**

In this report the following diagram from *The Resilient City* paper will be referred to as the Disaster Risk Matrix. This matrix holds the seeds of what may be a new and useful idea about knowledge related to community resilience. This report itself is a first attempt to explore the different communities of thought that are relevant to the matrix.

**Box 1. The Disaster Risk Matrix**

***Community Resilience***

**Communities need to be resilient in a world of change**



<sup>7</sup> Richard Rabnett, personal correspondence March 24, 2005.

According to Walisser, Mueller and McLean,

*It is worth noting that resource-based communities facing industry closure have much in common with other communities based on single industries, such as manufacturing. As well, the plight of these communities bears some similarities to the challenges faced by communities struck by natural disasters like hurricanes and earthquakes or human-caused calamities like terrorism and war. The illustration above positions natural and human events on a continuum from crisis to catastrophe. Although these events are separated for viewing purposes, it should be recognized that the events may not be discrete and that the lines between events are permeable: some natural events have human causes and some communities must confront more than one event simultaneously. While acknowledging that the causes and impacts of these upheavals differ significantly, it is important to recognize that all of these communities share a sense of devastation and loss when threatened by any of these events. All must face the need to overcome and adapt to the upheaval. In many cases their preparation for worst case scenarios and their response to these events will be similar to or overlap the strategies adopted by resource-dependent communities facing industry closure.*

This paper uses the Disaster Risk Matrix to review literature and practice. It is divided into two parts. Part One explores the nature and importance of community resilience (and the matrix) and answers the question – are there common lessons and a community of practice that could guide cities and communities to improve their resilience? It also raises the challenges of communicating about risks and changing human behavior. Part Two addresses the issue of bringing these ideas into action. The strategies it proposes include using peer learning networks and large international meetings (UN HABITAT’s World Urban Forum in June 2006 and events associated with Habitat +30 – a celebration of the 30<sup>th</sup> Anniversary of Habitat 1976, and others) to raise and amplify messages about the issues.

## **Part One: The Nature and Importance of Community Resilience**

### **What is meant by community resilience?**

In popular terms resiliency is the capacity of a community to survive, adapt and bounce back from a crisis or disaster. The idea comes from an attribute of ecological systems described by Holling and applied to human systems such as cities and communities.

*Resilience is the ability of a system to adapt and adjust to changing internal or external processes (Gunderson and Holling, 2001). The emphasis is not on reaching or maintaining a certain end point or terminal condition, but on staying in the game.<sup>8</sup> From an ecological perspective, changes that exceed the evolutionary, physiological, or migratory capacities of crucial components of ecosystems are potentially catastrophic*

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<sup>8</sup> Pickett, S.T.A., Cadenasso, M.L. and J.M. Grove (2004), *Resilient Cities: Meaning, Models, and Metaphor for Integrating the Ecological, Socio-Economic, and Planning Realms*. Landscape and Urban Planning 69: 369-384



(Pickett and Ostfield, 1995). ...{this} suggests that there may be parallel limits in the social, economic, engineering, or aesthetic realms that are also crucial to the function and implementation of urban design.<sup>9</sup>

Resilience goes beyond the primal human response to survive. Three aspects of resilience are involved in responses to disasters. Physical resilience refers to the ability of a city or community to rebuild its physical structure. Emotional resilience refers to the ability of individuals, families and communities to cope and heal from trauma. Cultural resilience signifies the perseverance of cultural practices and norms through events of great cultural trauma (i.e. the ability of customs, traditions, languages or religions to survive and evolve).<sup>10</sup>

Resilience can be conceptualized along four dimensions – technical (physical systems), organizational, social and economic. Technical and organizational are most pertinent to critical systems such as power, water, hospitals, etc. Social and economic are most relevant to the community as a whole.<sup>11</sup> Four properties of resilience are commonly identified – robustness (strength to withstand certain level of stress), rapidity (responding in a timely manner to contain loss and avoid disruption), redundancy (the extent to which elements, systems etc are substitutable), and resourcefulness (the capacity to identify problems, establish priorities and mobilize resources). Robustness and rapidity are desired ends and redundancy and resourcefulness are means to those ends.<sup>12</sup>

To put this in a context, one needs to understand the concept of vulnerability, and what we mean by crises or catastrophes (disasters).<sup>13</sup> In *Living with Risk*, the UN's International Strategy for Disaster Reduction (ISDR) defines the following concepts which provide a useful background:

**Vulnerability** is a condition that places a community at risk of crisis and/or disaster in the face of change or extreme events. Vulnerability may further be defined as a set of conditions and processes resulting from physical, social, economic, and environmental factors, which increase the susceptibility of a community to the impact of hazards.

**Capacities** are the positive factors that increase the ability of people and the society they live in, to cope effectively with hazards and can reduce their susceptibility (ISDR, 2003).

A **crisis** is a sustained condition of social hardship, economic loss and inability to achieve developmental aspirations, often arising from a community's vulnerability to change. In

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<sup>9</sup> Ibid.

<sup>10</sup> Vale, L.J. and T.J. Campanella (eds) (2005). *The Resilient City: How Modern Cities Recover from Disaster*. Oxford, UK : Oxford University Press.

<sup>11</sup> Bruneau M. et al, (2003) 'A Framework to Quantitatively Assess and Enhance the Seismic Resilience of Communities'. *Earthquake Spectra* 19(733).

<sup>12</sup> Chang, S.E. and M. Shinozuka, (2004) 'Measuring Improvements in the Disaster Resilience of Communities'. *Earthquake Spectra* 20(739).

<sup>13</sup> ICLEI, (2002) "*Resilient Cities and Communities: A Partnership Program to Implement a Local Action 21 Strategy...*" Toronto: ICLEI-Local Governments for Sustainability.

the context of this paper it refers to hazards that are known and are characterized by a slow or longer-term time frame.

A **disaster** is the occurrence of extreme human losses, social hardships and economic costs arising from a community's vulnerability to sudden and/or extreme events. This is often accompanied by a disruption in the ability of the society or community to function. The extent of a 'disaster', that is, the *human impacts* of extreme events and dramatic change, often is determined by the inherent preparedness, or 'resilience', of local communities in the face of such events. Put differently, disaster impacts are determined by vulnerabilities that can be understood, managed and reduced in a pro-active fashion before 'disaster' occurs. In this paper we refer to **catastrophes** and disasters as synonyms.

**Resilience** is the opposite of vulnerability. It is the capacity of a community to respond creatively, preventatively and pro-actively to change or extreme events, thus avoiding crisis or disaster. Resilience may in some cases mean the ability to resist change that could negatively impact on human livelihoods. At the community level this may be reflected in the ability of the community to reorganize its social system and increase its capacity for learning and adaptation (ISDR, 2002).<sup>14</sup>

**Sustainability** is the ability of a community to meet the needs of current and future generations for economic, social, environmental and cultural well-being. According to ICLEI – Local Governments for Sustainability, sustainability is a function of risk and resilience. It may be defined as the ability of a system to function whilst subject to change and risk. Thus sustainability = resilience/risk. It is noted that communities cannot become sustainable unless they are able to manage risks.<sup>15</sup>

As will be elaborated in the next section, the concept of city resurgence is similar to the concept of resilience at the human-caused crises end of the spectrum and urban security is a subset of the disaster literature.

As noted in Appendix A, definitions of resilience have largely come from concepts of ecology or ecological economics. They have been applied most frequently to the literature on disasters. ICLEI – Local Governments for Sustainability has identified a lack of communication between the disaster professionals and the sustainability professionals. The Walisser, Mueller and McLean paper and their Disaster Risk Matrix raises the possibility that there may be an even larger group who share common interests and are not now talking to one another.

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<sup>14</sup> A new concept being discussed is that of community restoration. This idea suggests that it is not enough to consider a community's ability to rebound – one should look beyond that to consider its ability to restore the environment, community, economy, etc. This concept is not explored in this report.

<sup>15</sup> ICLEI, (2002) "*Resilient Communities and Cities: A Partnership Program to Implement a Local Action 21 Strategy...*" Toronto: ICLEI -Local Governments for Sustainability.

## Why is Community Resilience Important?

The answer to this question must be considered with regard to the economic, environmental and social consequences of resilience (or the lack thereof).

### Economic

From an economic perspective the arguments are quite clear. Statistics about the projected costs of long term crises such as climate change, loss of biodiversity, pest infestations, mine closures etc. are often subject to debate, but the weight and the direction of the evidence is not disputed – these long-term crises have enormous economic consequences.

There is an abundance of agreed upon data about the costs of natural disasters.

As of March 9, 2005, the figures for the impact of the South Asian Tsunami as reported by the International Red Cross are: 286,000 dead, more than 2.4 million affected and 7800 missing. The Asian Development Bank Media Center's Impact Summary Reports total to more than 8 billion dollars US in damage in Thailand, India, Maldives, Sri Lanka and Indonesia.<sup>16</sup>

On a broader scale, before the recent tsunami, the economic and social costs of disasters have been increasing for decades, with significant, long-term developmental consequences. In the 1990s, the economic costs of natural disasters were 14 times greater than in the decade of the 1950s.<sup>17</sup> This trend is expected to continue. Swiss Re reports for example, that “worldwide economic losses due to natural disasters appear to be doubling every ten years and next decade will reach \$150 billion dollars”.<sup>18</sup> Before the tsunami, the average costs of extreme weather events were forecast to increase from US\$40 billion per annum in 2000 to US\$100 billion per annum over this century due to predicted increases in surface temperatures.<sup>19</sup>

The developmental consequences of such trends are severe and challenge the basic assumptions of the development assistance community, in particular efforts to attain the Millennium Development Goals or sustainable development.<sup>20</sup> About one-quarter of the economic losses from natural disasters during the 1990s were in the developing world. But here the human and thus the developmental costs are much higher. Nearly 97% of natural disaster-related deaths each year occur in developing countries<sup>21</sup> where human vulnerability to secondary effects—disease, homelessness, and loss of livelihood—also is greatest. As a result, an increasing proportion of international

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<sup>16</sup> ADB online: [www.adb.org](http://www.adb.org).

<sup>17</sup> Munich Reinsurance Company (2000). *Topics: Natural Disasters. Annual Review of Natural Disasters 2000*. Munich: Munich Reinsurance Company.

<sup>18</sup> Swiss Re power point presentation to UNDP Footprint Neutral Program, 2005.

<sup>19</sup> Munich Reinsurance Company (1999). *Topics 2000*. Munich: Munich Reinsurance Company.

<sup>20</sup> See Freeman et al, *Catastrophes and Development: Integrating Natural Catastrophes into Development Planning (Draft)*. Washington DC: The World Bank.

<sup>21</sup> UNDP/ERD (2001). *Disaster Profiles of the Least Developed Countries* (May 2001) New York: UNDP.

development assistance is being allocated to disaster response and reconstruction, rather than to pro-active investments for sustainable development. For example, from 1995-2000 the Inter-American Development Bank's average annual disaster spending was ten times greater than the average of the preceding 15 years.<sup>22</sup>

The above figures reflect solely the costs of sudden and extreme natural disasters. Today, the most severe disasters, with the longest lasting developmental affects, are the result of a combination of natural events and human-induced crisis.<sup>23</sup> One must factor in the likely greater costs of human-induced catastrophes caused by war and conflict, soil erosion, engineering of rivers, industrial accidents and the depletion of water supplies. Nor do the above include health related shocks such as Acquired Immune Deficiency Syndrome (AIDS) or Severe Acute Respiratory Syndrome (SARS). One might also add the costs of commodity price fixing, or the rising costs of health care, or as some would argue - global militarism which diverts money from development priorities.

### Social-cultural

The social and cultural consequences of crises and disasters are likewise significant. Social capital – that is a community's accumulated trust and good will and the accompanying social institutions that allow it to work cooperatively to anticipate and resolve problems is a major factor in its ability to rebound when faced with crises or catastrophes. Although this topic has not been explored in this paper, it is an area rich in relevance, and worthy of consideration in the next stage of elaborating the Matrix.

### Environmental

On the environmental front as pointed out in several recent books – Jane Jacobs, *Dark Age Ahead*<sup>24</sup>; Jared Diamond's, *Collapse*<sup>25</sup>; and Ronald Wright's *A Short History of Progress*<sup>26</sup>, the changes to our natural environment are cumulative and complex in their interaction. Diamond has a five point framework of factors that contribute to societal collapse. They include: environmental damage, climate change, hostile neighbours, and friendly trade partners, along with the society's response to its environmental problems. The latter he asserts is always significant. History teaches us that complex changes in the natural environment are likely to result in sudden and massive consequences, not in slow and linear processes. In reading these thoughtful reviews of the history of humankind's reactions to change, one gets a sense of great urgency. We ignore these threats at our own grave peril.

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<sup>22</sup> Clarke, Caroline (2000). *Facing the Challenge of Natural Disasters in Latin America and the Caribbean: An IDB Action Plan*. <http://www.iadb.org/sds/doc/env-KKeipiE.pdf>. Washington D.C.: Inter-American Development Bank.

<sup>23</sup> Abramovitz, J. (2001) *Unnatural Disasters*. Worldwatch Paper 158. Washington, DC: Worldwatch Institute.

<sup>24</sup> Jacobs, J. (2004) *Dark Age Ahead*. Toronto: Random House Canada.

<sup>25</sup> Diamond, J. (2005) *Collapse*. New York: Viking.

<sup>26</sup> Wright, R. (2004). *A Short History of Progress*. Toronto: House of Anansi Press.

While the costs of catastrophic events are enormous and growing in both developing and developed countries, the need for investment in sustainable development in communities in both worlds is also huge and growing. The results of many longer-term crises are predictable and therefore preventable. It makes sense to invest in prevention, mitigation and adaptation strategies now, rather than pay a much heavier price later in the catastrophic loss of lives and property. To do so requires not just an understanding of what prevention measures or mitigation measures could be used, but more importantly how to communicate this to the public and decision makers and develop the political will and infrastructure to deliver on the ideas.

### **A Useful Conceptual Framework: The Disaster Risk Matrix**

In reviewing the literature related to the Disaster Risk Matrix (Box 1), it is apparent that, just as there are four quadrants to the matrix, so too there seem to be four or more clusters of professional thought and practice. On the catastrophe end of the continuum, the disaster group is perhaps the strongest and most easily identifiable. There is considerable research about natural disasters; the phases of disaster response and recovery; prevention and mitigation; and compendiums of best practice. On the human-caused side, the conflict/security groups have similar knowledge and approaches focused on policing, riots, wars and terrorism. As will be noted in the following section, the conceptual frameworks and the lessons learned for these two quadrants share a great deal in common. It appears that regardless of whether the catastrophe was caused by nature or humans, the process of recovery and the implications for community resilience are similar. The groups focussed on the long-term crises end of the continuum, however, tend to limit their focus to more specific issues– on the natural threat side examining climate change, environmental threats such as pest infestations, loss of biodiversity, soil desertification, and on the human factors side responding to HIV AIDS, demographic shifts, rural to urban migration, mine or industry closures, technological changes, etc. They do not seem to generalize their findings beyond their specific issue to the same extent as do the disaster groups, yet in reviewing their lessons there seems to be much that they could learn from one another.

The review of the frameworks in use suggests that there is significant overlap and implies that the use of the Matrix may indeed enable a dialogue to identify a ‘community of practice’ among different professionals and communities. Specifically, they have the following in common:

- all of the approaches centre around managing change and risk;
- the solutions for each tend to be similar – affecting systems, planning, buildings and infrastructure;
- the mind-set and assumptions are similar – seeing the relationships between natural and human interactions, and using a systems approach;
- the lessons point to the value of an adaptive management framework;
- they require collaboration across sectors, disciplines and jurisdictions;
- they are focused beyond survival on sustainability; and
- they require preparedness and prevention.

It seems that a more comprehensive conceptual framework is needed, one within which policy makers, decision makers, practitioners and communities can see their own issues reflected. The term *community resilience* has the potential to provide an umbrella that integrates related concepts. The major books, studies and conferences in this field in the past few years point to a large group of cities and towns that have been identified as resilient or resurgent<sup>27</sup>. There are several examples of successful cases addressing each of the four quadrants and studies identifying lessons from them. Overriding all of these issues and, perhaps the only approach to date that seems to take all of these threats into account, is very long-term planning for sustainability. This is exemplified by the 100 year planning process of cities<sup>PLUS</sup><sup>28</sup> and its legacy – the +30 Network of cities and communities engaged on integrated planning for long-term sustainability, both of which are referred to later in this paper.

## **Lessons Learned Related to the Disaster Risk Matrix**

### **Crises**

There is less consistency in the literature regarding the best practices or lessons learned with regard to crises with longer term timeframes than those related to disasters. The three books referred to earlier, *The Dark Age Ahead*, *Collapse*, and *A Short History of Progress*, use extensive current and historical cases to show how humans affected and/or responded to environmental and climatic change, changing economic, technological or social conditions. Their messages are consistent – we have not been very good at predicting and responding effectively. In the distant past this did not matter as much because the consequences of error affected single societies. Today, the impact of decisions may affect the entire planet and all its living beings. In this context, resilience takes on a more encompassing meaning, greater urgency and requires new ways of thinking.

### **Crises with Human Causes**

To examine community resilience regarding longer term crises with human causes we began with the research conducted in Canada in response to the Community Resiliency, Transition and Recovery Project in January 2003.<sup>29</sup> Led by British Columbia and assisted by the Intergovernmental Committee on Urban and Regional Research (ICURR), the project analyzed 16 case studies where communities experienced a severe and, in most cases immediate, downturn in their local economy resulting from an industry closure.

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<sup>27</sup> For more information the reader is referred to the appended bibliography.

<sup>28</sup> cities<sup>PLUS</sup> is the 100 year plan for Greater Vancouver developed by a team consisting of the Sheltair Group, the Greater Vancouver Regional District, the Liu Institute for Global issues at UBC and the International Centre for Sustainable Cities. See [www.citiesplus.ca](http://www.citiesplus.ca).

<sup>29</sup> Walisser, Mueller and McLean op cite.

The lessons learned from those communities, as reported in *The Resilient City* are summed up as follows:

*Researchers believe that four lessons form the core of the Canadian experience:*

- 1. Anticipating and planning for industry closure should be a normal event in the life cycle of a resource industry, instead of waiting until a closure event occurs and acting only in response to it.*
- 2. Restructuring resource-based communities after an industry closure requires collaborative efforts between all stakeholders.*
- 3. Recovery is best facilitated by implementing a wide range of actions, including: planning economic diversification strategies; providing industry incentives; maintaining public services during a period of adjustment; stabilizing municipal finances, administration and service delivery; providing worker support; and maintaining community morale.*
- 4. The potential for community sustainability is maximized by providing an appropriate level of time-limited financial support to resource-based communities in transition and by working together to develop a coordinated strategy for managing local revenues and expenditures while spreading investments over time.<sup>30</sup>*

Independently of the above study, in July 2002, Teck Cominco, the World Bank and the City of Kimberley in British Columbia, hosted the ‘Sullivan Round Table’, an international gathering of experts and community representatives to examine the legacy of the closure of the Sullivan Mine after nearly 100 years of mining activity. While the Sullivan Mine served as the focal point, participants brought other case examples to bear. The objective was to explore the best practices to promote community sustainability throughout all stages of the mine life cycle. Common elements emerged including: “the need to facilitate community consultation at all stages of mining activity; corporate stewardship, transparency and accountability; building partnerships; and building capacity within communities.” The report<sup>31</sup> provides a wealth of information about best practices see Box 2.

Although the lessons from the Sullivan Round Table are more specific than those highlighted by Walisser, Mueller and McLean, the conclusions and the stories of Kimberley and other mining towns are very similar to the narrative of Tumbler Ridge as told by Walisser et al. It seems that there is a consistent body of knowledge accumulating about improving community resilience in small single-resource dependent communities.<sup>32</sup>

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<sup>30</sup> Walisser, Mueller and McLean. *The Resilient City*. op cite.

<sup>31</sup> Teck Cominco (2002). *The Sullivan Round Table: Lessons in Sustainability*, Vancouver BC: Teck Cominco.

<sup>32</sup> It should be noted that this review has not considered the work on rural agricultural communities, nor First Nations communities. Lessons from both would help round out this analysis.

**Box 2. Lessons Learned from the Sullivan Round Table:**

1. Implementing requires leadership and commitment from the top down to the grassroots level.
2. Best practices can have bottom line benefits.
3. Community expectations must be managed throughout the whole process to reduce risk and establish co-operation, trust and mutual respect.
4. Sustainability requires a framework of relationships. "Failing to include government in the process does not improve relations and cannot be sustained over the long-term."
5. Be flexible and adaptable to change.
6. Development needs to be integrated with government policies and programs. "Avoid and limit factors that create dependencies of local authorities and communities... Leadership and accountability for local economic development and sustainability planning should be centred in appropriate governance bodies."
7. Attitude and culture impact success. "Nurture a corporate culture of co-operation, respect differences in values and ensure community priorities are incorporated into process."
8. Elements of the process are transferable, particularly in the engagement process and partnership models.
9. Be strategic about engagement. "Develop a strategy for engagement so that public consultation provides the opportunity for interested parties to engage, educate and build understanding and trust."
10. Work at building and earning trust; be open and transparent.
11. Develop stakeholder relationships that build capacity.
12. Develop individual action plans for the development. "Plans should define success, including measurable objectives and targets that can become key performance indicators used for periodic reporting on success."
13. Best practices integrate principles of sustainability and provide for effective dissemination of information, and assure proper attention to mitigation, control, record keeping and public consultation.

What about the resilience of large cities faced with problems of decline? A conference hosted at the London School of Economics in 2004 addressed the issues of Resurgent Cities. A resurgent city was defined as "a city that having reached city status undergoes a loss of people and jobs, a deterioration of its environment and a weakening, if not collapse of its institutions ... followed by a period of growth. That is, it rebounds from or overcomes the conditions that had weakened it and made it less desirable as a place to live and invest, thereby returning to a more positive trajectory."<sup>33</sup> Beauregard's (2004) operational definition of resurgent cities - "two decades of population loss followed by at least one decade of population gain" - led him to examine four large American cities, Boston, Oakland, San Francisco and Seattle and conclude as follows.

*"These resurgent large metropolitan areas were able to mobilize ideas and resources to accomplish a number of goals:*

- *Manage adaptation to a changing economic logic that requires constant adjustment in what cities produce and how they position themselves within regional, national or global commodity chains.*

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<sup>33</sup> Beauregard R.A. (2004) *The Resilience of U.S. Cities: Decline and Resurgence in the 20<sup>th</sup> Century*. London, UK: London School of Economics.



- *Keep the city attractive to the middle class, both middle class households already living there and middle class households that might move into the metropolitan region.*
- *Absorb immigrants into the housing and labour market of the city, including providing the conditions for immigrant entrepreneurship.*
- *Maintain a local government that can support development investment and pay attention to the needs of a range of neighbourhoods and groups within the city.”<sup>34</sup>*

## **Crises Related to Nature**

The most powerful crises in this category relate to environmental changes (climate change, loss of biodiversity, desertification, global warming, species encroachment). They are slow moving changes that, if not mitigated or adapted to, will have severe results. The case identified for discussion of this quadrant is more encompassing than the previous examples.

The example, called cities<sup>PLUS</sup> was a planning project undertaken by a partnership of private, public, academic and civil sectors to develop a 100 year plan for the Greater Vancouver region. It was the Canadian entry in a competition sponsored by the International Gas Union (IGU) from 2001 to 2003 that involved nine cities around the world.<sup>35</sup> The objective was to develop staged 100 year plans that would lead to urban sustainability. The competition was inspired by the need to encourage cities to plan for transition from fossil fuel energy sources to clean and renewable energy sources. Participating cities came from Japan, Canada, Russia, Germany, India, Argentina, China and the USA/Mexico. The Canadian entry, cities<sup>PLUS</sup> – *Cities Planning for Long-term Urban Sustainability*, won the Grand Prize, and cities from India, Tokyo and the USA/Mexico were also given special recognition.

cities<sup>PLUS</sup> grew from small beginnings into a collaborative exercise involving governments, the private sector, academia and civil society. The Greater Vancouver Region sought the advice and input of eleven other cities and towns in Canada. The long term focus encouraged new forms of brainstorming, sharing of tools and ideas and collaborative planning. The resulting learning led to valuable new insights about long-term planning methods and processes, the impacts of issues such as climate change, and the ultimate importance of community resilience. The results were incorporated in immediate decisions facing the Greater Vancouver Regional District (GVRD) as part of its Sustainable Region Initiative.

*The results of the experience were compelling. The international design teams – whether from developed or developing countries, from academia, the private or public sectors – used different methods, yet came to similar conclusions. Fundamental changes in all urban infrastructure and resource consumption patterns are needed for cities to become sustainable. To continue with ‘business as usual’ is to pose catastrophic harm to our natural and urban systems. Even anticipating massive technological changes and conversion to green fuels, a ‘business as usual’ scenario is unsustainable much beyond 30*

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<sup>34</sup> Ibid.

<sup>35</sup> See www. <http://igu.org/WGC2003/index.html>.

years. Rather than reacting with despair, the planners took inspiration from the challenge of completing a 100-year plan in the face of such negative alternatives.<sup>36</sup>

*In all countries, the need to focus well beyond the normal planning horizon led the participants to think outside of their usual boundaries, and to focus on integrated solutions to economic, social and environmental shocks or changes. This long-term, integrated perspective created an open, collaborative dynamic, unlike typical attempts to communicate about important environmental issues such as global warming and greenhouse gas emissions, which are often characterized by debate and acrimony and seldom lead to change. The use of forecasting and backcasting tools within the long-term framework allowed stakeholders, academics and community residents to consider the impacts of various changes in a relatively neutral context. The result was profound change in how the issues were approached.*

As expressed in cities<sup>PLUS</sup>, liveability, sustainability and resiliency are three intertwined elements – a triple helix - of a new DNA for cities and communities. Resiliency requires:

- a design that is adaptable, robust, fail-safe, modular, and redundant;
- a process that identifies threats, mitigates vulnerabilities and plans for contingencies; and,
- a culture that practices response and recovery, learns from experience and expects the unexpected.

In addition to this conclusion about resilience, what were the lessons learned? The first group of lessons were substantive and relate to sustainability per se:

- Given that one cannot predict with any certainty what particular crises or catastrophes might be faced over the course of 100 years, it becomes necessary to practice adaptive management.
- The urban system must be approached as one integrated system. Changes in any one part of the system, affects the system as a whole.
- The city is intricately linked with the bioregion and the interaction between human activity and ecological systems must be taken into account.
- Looking forward at least 100 years brings home the meaning of sustainability and forces a new way of planning, one involving forecasting, backcasting and considering the consequences of different scenarios.

The second set of lessons refers to the process of planning and implementing such plans:

- Multi-stakeholder participation was essential to the success of the project. Each discipline and sector had something to contribute – without which the problems could not be adequately addressed.
- There was a need for greater ownership by the formal structure governing the region (the GVRD). The plan had been developed with the GVRD but not by the GVRD and

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<sup>36</sup> See Overview of PLUS 30 Network: <http://www.plus30network.ca>.

hence its conclusions were not “owned” by the formal body. This resulted in a slower than expected take up of the insights by the operating units in the region.

- Facilitation of dialogue between disciplines, sectors and roles was needed. Design charrettes were a highly effective tool to bridge those gaps.
- The value of a deadline and a friendly spirit of competition helped bring the planning project to a conclusion. The recognition of winning gave the results a much higher credibility locally than might otherwise have been the case.

## **Disasters**

In the Disaster Risk Matrix, disasters represent the extreme of the continuum – catastrophes. Whether caused by nature or humans, catastrophes share a great deal in common. A US National Science Foundation study<sup>37</sup> proposed and tested a model of recovery activity that classified the recovery process in four stages: rescue, restoration, rebuilding and remembrance. More specifically the stages include:

- 1) Emergency responses (efforts to cope with the injured, loss of life, presence of debris. It is a period when normal social and economic activities cease or are drastically changed).
- 2) Restoration of the restorable (entails the reestablishment of the major urban services, utilities and transport, the return of refugees and substantial clearing of the rubble);
- 3) Reconstruction of the destroyed for functional replacement (replacement reconstruction period), rebuilding of the capital stock to pre-disaster levels and replacement of the population; and
- 4) Reconstruction for commemoration, betterment and development.

## **Disasters with Human Causes**

Vale and Campanella’s recent book, *The Resilient City, How Modern Cities Recover from Disaster* (2005) examines 13 case studies, 11 of which are cases related to human made catastrophes (largely war and terrorism). Although their conclusions do not distinguish between the causes of the catastrophe, their work adds a different quality to the discussion of resiliency. Their book is organized around three different interrelated themes: the narratives of resilience; the symbolic dimensions of disaster and recovery; and the politics of reconstruction.

As identified in Box 3, the authors draw lessons that are somewhat different from and yet complementary to those identified by the practitioners in the Asia Workshops.

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<sup>37</sup> See Vale and Campanella (2005) op cite.

**Box 3. Lessons from *The Resilient City, How Modern Cities Recover from Disaster*:**

1. Narratives of resilience are a political necessity. “Even the most horrific acts of destruction have been interpreted as opportunities for progressive reform, and the process whereby this narrative is assembled often happens very quickly”.
2. Disasters reveal the resilience of governments. “In the aftermath of disaster the very legitimacy of government is at stake. The sudden disruption of disaster causes governments to exercise power quite directly, revealing an often disquieting repertoire of techniques they can and will use when confronted with emergencies.”
3. Narratives of resilience are always contested. “Key figures in the dominant culture claim (or are accorded) authorship, while marginalized groups or people are generally ignored in the narrative construction process.”
4. Local resilience is linked to national renewal. “Recovery becomes linked to questions of national prestige and to the need to re-establish standing in the community of nations”.
5. Resilience is underwritten by outsiders. “Increasingly the resilience of cities depends on political and financial influences exercised from well outside the city limits.”
6. Urban rebuilding symbolizes human resilience. “Urban reconstruction is a highly visible enterprise that conveys an almost heroic sense of renewal and well-being. The demands ...provide productive distraction from loss and suffering and may help survivors to overcome trauma induced depression.”
7. Remembrance drives resilience. “At least in the case of terrorist attacks, the memorializing impulse seems to demand more prompt and urgent attention”.
8. Resilience benefits from the inertia of prior investment. “In most cases even substantial devastation of urban areas has not led to visionary new city plans aimed at correcting long-endured deficiencies or limiting the risk of future destruction in the event of a reoccurrence.”
9. Resilience exploits the power of place. “A city is hard to kill, in part because of its strategic geographic location, its concentrated, persisting stock of physical capital, and even more because of the memories, motives and skills of its inhabitants”
10. Resilience casts opportunism as opportunity. “There is a fine line between capitalizing on an unexpected traumatic disruption...as an opportunity to pursue some much-needed upgrading of infrastructure and facilities and the more dubious practice of using devastation as a cover for more opportunistic agendas yielding less obvious public benefits.”
11. Resilience, like disaster is site specific. “All disasters, not only earthquakes have epi-centres. Those who are victimized...experience resilience differently, based on their distance from the epi-centre.”
12. Resilience entails more than rebuilding. “The process of rebuilding is a necessary but by itself, insufficient condition for enabling recovery and resilience.”

### **Disasters Related to Nature**

ISDR and numerous others have published extensively about recovery from natural disasters. One of the better compendiums of lessons learned comes from the Asian Disaster Preparedness Centre’s 2002 regional workshop on Best Practices in Disaster Mitigation. These lessons are grounded in the UN approach to disasters and were derived from a large number of professionals and community participants from the region. The Asian Regional Workshop identified the following as necessary for effective disaster mitigation:

- Community leadership and political will.
- Participation and empowerment.

- Developing awareness and understanding of risk and risk reduction measures (e.g. safer building construction).
- Integration of disaster risk management into development practices.
- Mitigation and preparedness as elements of vulnerability reduction.
- A total risk management approach.

The key issues identified during the conference were: anticipate the future; institutionalize; recognize disaster management as a core function of government; assure coordination and assign responsibilities; address the challenge of decentralization and devolution (finances, capacities); integrate disaster management in all levels of society (public awareness and social marketing); integrate quality control and measure effectiveness; build sustainability; and develop political will.

### **Summary – Is There an Emerging Community of Practice?**

In summary, crises and disasters, whether caused by humans or nature, impose significant threats to sustainability. Both have the power to affect the environment, economy and society. While some disasters, such as tsunamis and extreme weather are beyond our control, our preparations and responses are not, and we have much more control of how we choose to deal with known crises. To successfully plan, prevent, mitigate and recover from disaster and crises is to be resilient.

Lessons from all four quadrants of the Disaster Risk Matrix do seem to share several common ideas, although it appears that the cause or nature of the hazard is not as significant as the timeframe/urgency. That is, resilience related to a wide variety of catastrophes whether caused by nature or humans has a common set of lessons and approaches. Those related to long term-crisis are less generalized and remain known to a smaller group of issue-related specialists. Again, it appears that the cause of the pending crises is not as important as the perception of its urgency (or lack thereof). UN HABITAT attempted to define a set of Principles related to sustainable relief and reconstruction (see Box 4), some of which could also apply to longer-term crises.

#### **Box 4. UN HABITAT's Principles**

Sustainable relief and reconstruction require:

1. Establishment of permanent links between emergency relief and reconstruction and the transitional phase of development;
2. Development of the capacities of local governments, as necessary, to operate as active partners in the process;
3. Prioritization of the building and engaging of capacities of all actors at all levels from the earliest stages and throughout the process from relief and reconstruction to recovery and development;
4. Utilization of participatory planning and inclusive decision-making models ensuring the involvement of all actors, women in particular, in all planning and implementation activities;
5. Development of productive economic activities during the earliest stages of recovery to assist in the consolidation of peace and security;

6. Facilitation of the security of affected populations as a critical precondition of any humanitarian or development activities;
7. Development of broad-based and long-term reconstruction and shelter strategies from the earliest stages in order to ensure more effective use of emergency resources;
8. Ensuring the protection of land and property rights of affected populations and development of longer-term solutions for land and property dispute resolution to reduce the potential for conflict;
9. Incorporating vulnerability reduction and disaster management into existing national and local development and poverty reduction plans;
10. Redirecting the focus to disaster risk reduction and mitigation rather than preparedness and response-related strategies in the human settlements context;
11. Operating within a human rights framework, particularly in terms of land rights and security of tenure and the equal rights of women;
12. The creation of strategic partnerships and alliances at all levels within the continuum from relief and reconstruction to development.

As the result of discussions held at the second session of the World Urban Forum (Barcelona, Spain, September 2004), the proposed principles were all agreed upon, with the following additional lessons learned:

13. Decentralization of responsibility for prevention of and recovery from crises in human settlements is essential to ensure appropriate, balanced and sustainable vulnerability and risk reduction;
14. Building a culture of prevention entails a cross-sectoral, multidimensional approach integrating participatory analysis of risk, implementation of programs and development of policy and legal frameworks with all stakeholders, including civil society, the private sector and local, national and international government, in a comprehensive process that takes gender into account;
15. Effective peace building requires due attention to clear and understandable legal and regulatory frameworks, effective and impartial land and property administration, a functional interface between local government and its citizens in a dialogue that builds trust and commitment (with capacity-building where essential), a common vision and coordination of international actors;
16. Understanding that crises, and conflicts, in particular, virtually always create displacement, implementation of sustainable strategies integrating rights-based approaches to shelter, tenure, and protection of the most vulnerable, are required in the earliest stages.

The table below attempts to summarize the major lessons and show their similarities.

<b>Table 1: Common Lessons</b>	
<b>Natural and Human Made Crises</b>	<b>Natural and Human Made Disasters</b>
<ul style="list-style-type: none"> <li>• Anticipate and plan for outcomes from the earliest possible time (i.e. mine closures, climate change, pest infestations, desertification)</li> <li>• Leadership and ownership are key</li> <li>• A vision of change is necessary</li> <li>• Local governments involvement essential</li> <li>• Adaptive management is needed</li> <li>• Treat community as one system</li> </ul>	<ul style="list-style-type: none"> <li>• 4 phases : rescue, restoration, rebuilding and remembrance</li> <li>• Integrated approach needed</li> <li>• Total community (including women and marginal groups) participation and empowerment necessary – as partners not victims</li> <li>• Prevention and mitigation need to be embedded in reconstruction and future planning</li> </ul>

<ul style="list-style-type: none"> <li>• Build Social Capital (trust)</li> <li>• Involve all the stakeholders – process is key</li> <li>• Transparency and timely information needed</li> <li>• Increase community and economic diversity (incorporate immigrants)</li> <li>• Develop or maintain a middle group (class)</li> <li>• Use a wide range of economic and social incentives and measures</li> <li>• Transition financing measures are needed to assist in the move to economic diversity</li> </ul>	<ul style="list-style-type: none"> <li>• Narratives of hope and opportunity are necessary</li> <li>• Inertia often prevents the introduction of new ideas that might be better suited to prevention, adaptation or mitigation</li> </ul>
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Some specific lessons identified in cities<sup>PLUS</sup>, the 100 year planning approach to long-term urban sustainability, highlight aspects of risk that are not addressed by the approaches summarized above. These include the importance of: a timeframe that goes beyond 40 to 50 years; treating communities and their bio-regions as one system; and an adaptive management framework.

This, albeit somewhat limited, review of the literature and practice suggests that there is a common set of principles emerging in both the long-term sustainability field and the disaster field. Yet everyone notes that not enough is being done to address the issues of disaster preparedness or of preparing for long-term crises like climate change. The problem seems to be not so much a lack of knowledge about what should be done, but rather a problem of knowing what should be done and not acting upon that knowledge. This is in turn leading to a debilitating credibility gap between the known risks and the superficiality of the responses to those risks. In order to understand the barriers to action it is important to better understand human behavior with regard to risk and to distinguish between human behavior during and after traumatic events like disasters and in the face of threatening events like longer-term crises.

### **Risk Perception and Human Behavior**

In order to explain the difficulty of moving people to action on events that threaten us in the future, it is important to consider what is known about human behavior and risk perception. First one must understand that the perception of risks by laypeople and by scientists differs substantially, ultimately affecting decisions about policies or practices. Efforts are often made by scientists to give comparative risk data to the public. Statements such as “the annual risk from living near a nuclear power plant is equivalent to the risk of riding an extra three miles in an automobile” ignore the differences in perceived risk from the two threats. Risk means more to lay people than just the ‘expected number of fatalities’ used by scientists to define acceptable levels of risk. A broader understanding of perceptions of risk is essential to communicating and managing risk.

In one of the seminal articles on risk perception, Paul Slovic<sup>38</sup> reported on the perception of risk of 81 human hazards using two factors (see Table 2). Factor 1, labeled “dread risk” on its high end is defined by perceived lack of control and catastrophic potential. Nuclear power, radioactive waste, nuclear weapons, uranium mining, and nerve gas accidents are examples of hazards with high ‘dread risk’. Factor 2, labeled “unknown risk” is defined at its high end by hazards judged to be unobservable, and delayed in their manifestation of harm. Chemical technologies and DNA technology score particularly highly on this factor.

<b>Table 2: Risk Perception</b>	
<b>Low Dread Risk</b>	<b>High Dread Risk</b>
Controllable Not dread Not global catastrophic Consequences not fatal Equitable Individual Low risk to future generations Easily reduced Risk decreasing Voluntary	Uncontrollable Dread Global catastrophic Consequences fatal Not equitable Catastrophic High risk to future generations Not easily reduced Risk increasing Involuntary
<b>Low Unknown Risk</b>	<b>High Unknown Risk</b>
Observable Known to those exposed Effect immediate Old risk Known to science	Not observable Unknown to those exposed Effect delayed New risk Risks unknown to science

Lay people’s risk perceptions and attitudes are closely related to the position of the hazard, particularly on the factor of dread risk. The higher a hazard’s score on this factor, the more likely it is that people want to see the risk reduced and the more they want to see it regulated by governments. Experts’ perceptions, on the other hand, are much more closely related to expected annual mortality related to the risk. This helps explain the increasing gap between the views of experts and of the public. Attempts to ‘educate’ the public and bring their perceptions in line with those of industry experts seem unlikely to succeed particularly with regard to dread events – which by their nature are uncommon.

It is useful to examine perceptions of risk as they relate to long-term crises. Climate change for example, would qualify as an unknown risk that should be high on the dread factor. Mine closures or the impact of pest infestations on the other hand are more likely to be perceived as controllable and not globally catastrophic and should rank on the low end of the scale. Given that climate change would rank high on both the dread and unknown factors why has there not been a far greater public outcry to intervene? In part the answer may rest on its lack of a “signal event” and people’s natural reaction to news of impending death.

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<sup>38</sup> Slovic P. (1987). Perception of Risk. *Science*, vol. 236 (280).



The role played by events such as accidents, sabotage or the discovery of pollution as symbols or signals is often overlooked. The impact of some events goes well beyond the direct harm to victims or damage to property and may in extreme cases extend past industry boundaries affecting companies, governments, and agencies whose business was minimally related to the initial event. Despite the fact that not a single person died, and few if any latent cancer fatalities are expected, the accident at Three Mile Island in 1979, for example, devastated the utility that owned and operated the plant, resulted in enormous costs to the nuclear industry and society through stricter regulation, reduced the operation of reactors world wide and led to a hostile view of other complex technologies. Psychometric analyses of similar events such as Bhopal, the Challenger accident, and Chernobyl suggest that some events have “signal potential”. An accident that takes many lives may produce little social disturbance (other than to those directly involved) if it occurs as part of a familiar and well-understood system (such as a train wreck). However, a small accident in an unfamiliar system may have immense social consequences if it is perceived as a harbinger of further and possibly catastrophic consequences. Various independent researchers have noted that the highest signal events are those closer to the dread risks (i.e. the biggest fear of structural failure in an automobile is of a fuel tank explosion on impact or similarly of an accident involving a train carrying hazardous chemicals).

Climate change has not had a dramatic signal event. Although the changes are observable, there has been little attempt to make the connection between climate change and events such as fires, droughts, floods and extreme weather. These are still perceived as natural hazards that are on the ‘known’ and ‘not-dread’ ends of the spectrum. Complex relationships are difficult to communicate.

There is another important factor in understanding the reaction of most people to threats such as climate change. If one considers the research of Kubler Ross in her book *On Death and Dying*,<sup>39</sup> when faced with news of their own impending death, most people go through several stages: denial and isolation, anger, bargaining, depression, acceptance and finally hope. On a larger scale, Diamond, Jacobs and Wright document the denial of whole societies in the face of strong evidence of impending disasters. The fact is that people do not want to hear about death or threats, although once they occur we have an immense curiosity to know the details. Thus it should be no surprise that the first psychological response to a dread and unknown threat is denial. This is less of a problem for known and controllable events like mine closures, although overcoming denial is very often necessary in these circumstances as well. It might be productive to continue to apply Kubla Ross’s insights, and identify appropriate interventions that would help facilitate movement through the process of reconciling life threatening events.

Psychologically, the dilemma is twofold. On the one hand, in order to address issues such as climate change we must not only increase the perceived threat, the threat must also be brought home in personal terms. It must be perceived to affect ‘me’ or ‘my family’ or ‘my future family’. People do not change unless they have to and they will only work on a problem they perceive as real. On the other hand you do not want the threat to be so

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<sup>39</sup> Kubler-Ross, E. (1997) *On Death and Dying*, New York: Touchstone.

large as to be debilitating. The social marketing research on smoking, for example, shows that emphasizing a sense of choice rather than increasing the scary messages about death has a much more positive influence on whether a person actually quits smoking. It is necessary to communicate the implications of climate change in such a way that it is perceived as a real and important threat, of an urgent nature and yet one that can be acted upon. Just as too small a threat can be ignored, so too large a threat leads to denial.

Furthermore, people do not usually change based on information alone. Contrary to the popular notion that you can change people's behavior or attitudes by education, the weight of the evidence suggest that changing structures has more influence on behaviors than does attempts to change attitudes or knowledge.<sup>40</sup> A very important influence on changing behavior is emotional engagement. We humans are emotional animals, not just cognitive ones. We can be motivated to change by fear or love. We are conditioned to respond to a sense of threat or very high levels of stress – by flight or fight (male responses) or tending and befriending (female responses).<sup>41</sup> A third influence on changing behavior is participation in dramatic events with other people. We are social animals and our nature is to perceive the world as our friends and neighbors do. Events such as disasters bring the sense of community to the fore, allowing previously disparate groups to find common unity in adversity. There is often an openness after traumatic events to embrace new concepts or rethink relationships. The challenge is to overcome the inertia of the familiar and embrace innovation.

Vale and Campanella focus on the importance of hope, perceiving disaster as an opportunity and building positive narratives about the events. Catastrophic events, however, can also result in toxic narratives or an exaggeration of the risks involved, and lead to over reactions such as expending funds on lesser risks that are well known or publicized than on more important ones that are lesser known.

Thus within the field of sustainability one must consider how to address the exaggeration of risk that leads to expenditures or emotional stress not warranted by scientific evidence (over reacting) and those involving the denial of risk leading to a lack of preparedness, prevention or adaptation strategies for risks that are perceived as long-term and within ones control (under reacting).

For those people working within the sustainability framework at the long-term crisis end of the continuum, the problem is usually one of overcoming the denial of risk or the perception of risks as low. The question is how to align public perceptions (or at least those of politicians and other decision makers) with realistic predictions of the long-term catastrophic consequences of changes that manifest themselves slowly. For those working within the disaster community at the catastrophic end of the continuum, the problem is often the reverse - how to overcome hopelessness and helplessness and move people from being victims to agents of change. How to prevent the exaggeration of events from driving policies and practices and expenditures to 'build a Maginot Line

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<sup>40</sup> Watson, G. (1972). *Social Psychology: Issues and Insights*, USA: Lippincott.

<sup>41</sup> Azar, B. (2000). *A New Stress Paradigm for Women*, PsychNet, 2000, American Psychological Association, USA.

against the enemy they thought was there'. The sustainability community needs help to communicate the urgency and importance of their crises, whereas the disaster group needs help to put the disaster in a context of hope and normalcy.

## **Conclusion**

Part One of this paper attempted to explore the concept of a continuum of risks that face cities and communities and includes long-term crises and catastrophic disasters. The Disaster Risk Matrix was elaborated to bring forward lessons learned related to crises and disasters from the perspectives of whether they were caused by humans or nature. Although the methodology and approaches reviewed are from widely different sources and professional groups (the disaster community and the development/sustainability community), and often are couched in different language, there does seem to be a body of principles and practice that are held in common. Additional factors identified in cities<sup>PLUS</sup> - the importance of a long-term timeframe, a systems approach and adaptive management, add to these lessons. Given a convergence of approaches, the paper then explored another relevant set of concepts missing from most of the literature on crises and disasters, namely the question of risk perception, the need to understand human responses in the face of threats and the factors that motivate change in human behavior. These additional concepts need to be incorporated into strategies related to strengthening community resilience.

In order to affect change you need the right guiding ideas, the right infrastructure and the right tools and technologies<sup>42</sup>. In the field of Community Resilience the guiding ideas focus on all aspects of risk. The Disaster Risk Matrix provides a flexible framework within which ideas, case studies, demonstration projects, best practices and lessons can be formulated. As identified above, a focus on the future that goes beyond the normal planning horizon, a systems approach and adaptive management, coupled with consideration of how people perceive risk and change their behavior are concepts that need to be added to the lessons learned from analyses of crises and disasters.

This review also identified that the institutional responsibility for developing and implementing risk management strategies and plans rests in numerous departments and agencies. The infrastructure to implement those ideas is notably handicapped. Responsibilities cross sectors, disciplines, geographic boundaries, jurisdictions and cultures. There are few integrating institutions or effectively communicating networks and the issue is only top of mind for decision makers when an emergency is already underway.

While the review identified a vast array of useful tools and technologies available to those who wish to more effectively identify, manage or communicate about risks, most remain unknown or underutilized outside of their fields of origin.

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<sup>42</sup> Seymoar, N. K. (2004). *Why Sustainable Development has Failed to Live Up to its Potential*. Vancouver BC: International Centre for Sustainable Cities.

Given the right circumstances, a relatively strong focused effort could make a meaningful contribution to strengthening community resiliency in Canada and internationally. The challenge that faces us is to broaden the guiding ideas, build a better institutional infrastructure using effective multi-stakeholder participatory processes and disseminate promising tools and technologies more widely. To do so could have enormous payoff – creating more resilient communities at home and abroad, and demonstrating Canada’s intellectual and practical leadership.

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## Appendix A: Other Definitions of Resilience

The Oxford dictionary defines resilience as 1) the act of rebounding or springing back and 2) elasticity. In a metaphorical sense it has been used to refer to systems that undergo stress and have the ability to recover. Timmerman (1981) connected resilience with climate change and defined it as a measure of a system's capacity to absorb and recover from the occurrence of a hazardous event.

Dovers and Handmer (1992) distinguish between reactive and proactive resilience. A community relying on reactive resilience approaches the future by strengthening present systems and making them more resistant to change, whereas one that is proactive accepts the inevitability of change and tries to create a system capable of adapting to new conditions and imperatives. A third type of resilience described by Dovers and Handmer (1996) is characterized by openness and adaptation and is more likely to deal with underlying causes of environmental problems and reduces vulnerability by having a large degree of flexibility.

Adger (2000) defines resilience as: the ability of human communities to withstand external shocks or perturbations to their infrastructure, such as environmental variability or social, economic or political upheaval, and to recover from such perturbations. Social resilience is measured through proxies of institutional change, and economic structure, property rights, access to resources and demographic change.

According to Klein *et al.*, "...the most important development over the past thirty years is the increasing recognition across disciplines that human and ecological systems are interlinked and that their resilience relates to the functioning and interactions of the systems rather than to the stability of their components or the ability to maintain or return to some equilibrium state".<sup>43</sup>

The Resilience Alliance<sup>44</sup> is a network of scientists that consistently refers to social-ecological systems and defines their resilience by considering 3 distinct dimensions (Carpenter *et al.*, 2002):

- The amount of disturbance a system can absorb and still remain within the same state or domain of attraction.
- The degree to which the system is capable of self organization.
- The degree to which the system can build and increase the capacity for learning and adaptation.<sup>45</sup>

Resiliency remains at a conceptual level. According to Klein *et al.*, "The challenge remains to transform the concept of resilience into an operational tool for policy and management purposes: a challenge that thirty years of academic debate does not seem to have solved.

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<sup>44</sup> See Resilience Alliance: [http://www.resalliance.org/ev\\_en.php](http://www.resalliance.org/ev_en.php).

<sup>45</sup> Klein R.T.J, Nicholls R.J., and F. Thomalla. (2003). *The Resilience of Coastal Megacities to Weather-Related Hazards: A Review*.

## Appendix B: Additional Resources on Community Resilience

Akinci, F. (2004). The Aftermath of Disaster in Urban Areas: An Evaluation of the 1999 Earthquake in Turkey. *Cities* 21:6, 527-536.

*Alliance for Resilient Communities* [Website]. Accessed April 20, 2005 at: <http://www.alliance-arc.com/>.

Alliance for Resilient Communities (ARC) is a group of professional peacebuilders (psychologists, social scientists and other specialists) dedicated to supporting individuals, communities & societies transitioning into peaceful coexistence. ARC provides psychosocial interventions and conflict transformation services in situations where disasters and violence have left communities vulnerable to traumatic stress. Our goal is to bring out the strengths within these communities in order to build and enhance community resilience.

Bethke, L., Good, J. and P. Thompson (1997). *Building Capacities for Risk Reduction*. United Nations Disaster Management Training Programme. Accessed April 20, 2005 at: <http://www.undmtp.org/english/riskreduction/riskreduction.pdf>

Body-Gendrot, S. (2004). Why Don't We Rebel More Often? The Unanswered Questions. In, *Leverhulme International Symposium 2004: The Resurgent City, London, 19-21 April 2004*. Accessed online February 15, 2005 at: <http://www.lse.ac.uk/collections/resurgentCity/> .

Briceno, S. (2004). Building Disaster-resilient Communities: The Road to the Second World Conference on Disaster Reduction, January 2005, Kobe, Hyogo, Japan. *Natural Resources Forum*, 28:3, 234-236.

Burby, R.J., Deyle, R.E., Godschalk, D.R. and R.B. Olshansky (2000). Creating Hazard Resilient Communities Through Land-Use Planning. *Natural Hazards Review* 1:2, 99 -106.

Coaffee, J. (2004). Rings of Steel, Rings of Concrete and Rings of Confidence: Designing out Terrorism in Central London pre and post September 11. *International Journal of Urban and Regional Research* 28:1, 201-211.

El-Masri, S. and G. Tipple (2002). Natural Disaster, Mitigation and Sustainability: The Case of Developing Countries. *International Planning Studies*, 7:2, 157-175.

Fiksel, J. (2003). Designing Resilient, Sustainable Systems. *Environmental Science and Technology*, 37: 5330-5339.



Folke, C. et.al. (2002). *Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations*. Scientific background paper on resilience for the process of the World Summit on Sustainable Development on behalf of The Environmental Advisory Council to the Swedish Government. Sweden: Ministry of the Environment. Accessed April 20, 2005 at: <<http://www.unisdr.org/eng/risk-reduction/wssd/resilience-sd.pdf>>.

Godschalk, D. R. (2003). Urban Hazard Mitigation: Creating Resilient Cities. *Natural Hazards Review* 4:3, 136 -143.

Hamza, M. and R. Zetter (1998). Structural Adjustment, Urban Systems, and Disaster Vulnerability in Developing Countries. *Cities* 15:4, 291-299.

Harrigan, J. and P. Martin (2002). Terrorism and the Resilience of Cities. *FRBNY Economic Policy Review*, November 2002: 97-116.

Henstra, D., Kovacs, P., McBean, G. and R. Sweeting (2004). *Background Paper on Disaster Resilient Cities*. Prepared for Infrastructure Canada by the Institute for Catastrophic Loss Reduction. Accessed April 20, 2005 at: <<http://www.dmr.org/resources/Henstra.et.al-Background%20paper%20on%20disaster%20resilient%20cities.pdf>>.

*International Strategy for Disaster Reduction* [Website]. Accessed April 20, 2005 at: <http://www.unisdr.org/wcdr/intergover/official-doc/L-docs/Final-report-conference.pdf>.

The ISDR aims at building disaster resilient communities by promoting increased awareness of the importance of disaster reduction as an integral component of sustainable development, with the goal of reducing human, social, economic and environmental losses due to natural hazards and related technological and environmental disasters.

International Decade for Natural Disaster Reduction (1996). *Cities at Risk: Making Cities Safer...Before Disaster Strikes*. Accessed April 20, 2005 at: <[http://www.crid.or.cr/crid/CD\\_Asentamientos\\_Humanos/pdf/eng/doc8327/doc8327.htm](http://www.crid.or.cr/crid/CD_Asentamientos_Humanos/pdf/eng/doc8327/doc8327.htm)>.

International Federation of Red Cross and Red Crescent Societies. *World Disasters Report 2004: Chapter Summaries*. Accessed April 20, 2005 at: <<http://www.ifrc.org/publicat/wdr2004>>.

Kovacs, P. and H. Kunreuther (2001). *Managing Catastrophic Risk: Lessons from Canada*. ICLR Research Paper Series No. 13. Accessed April 20, 2005 at: <<http://www.iclr.org/pdf/managing%20catastrophic%20risk%20-%20march%202001.pdf>>.

Kreimer, Alcira et al. Eds. (2003). *Building Safer Cities: The Future of Disaster Risk*. Disaster Risk Management Series No. 3. Washington, DC: World Bank.

*Leverhulme International Symposium 2004: The Resurgent City, London, April 19-21, 2004* [Website]. London, UK: London School of Economics. Accessed February 23, 2005 at: <<http://www.lse.ac.uk/collections/resurgentCity/>>.

This Leverhulme-funded international symposium aims to engender a new debate about:

- the implications of the much heralded resurgence of cities in advanced societies, and
- what is actually required to realise this goal on a sustained basis, in different kinds of places.

Its starting point is the widespread consensus across academic and policy communities that globalisation, more intense quality-based competition and the rise of the knowledge economy are restoring the economic role of face-to-face contact - and thus of cities, as offering the richest possibilities for such interaction. Behind this consensus, different views about the key characteristics of successfully resurgent cities, point to real tensions in the ways that cities may develop, and many unanswered questions about how such resurgence is to be achieved in practice. The focus of this meeting is on addressing these unanswered questions through interaction between researchers and practitioners from different disciplines and perspectives. The aim is to build the basis for more productive co-operative work on these issues across the academic and policy communities, rather than to achieve instant fixes for either the intellectual or practical problems.

Massachusetts Institute of Technology (2005). *The Resilient City* [Website]. Accessed April 20, 2005 at: <<http://web.mit.edu/dusp/resilientcity/main.html>>.

MIT's Resilient City project was conceived in response to the terrorist attacks that destroyed New York's World Trade Center on September 11, 2001. Intended as both a scholarly and therapeutic exercise, the colloquium will examine critically how cities in the past have endured traumatic episodes, and prevailed to establish new order out of chaos and devastation. In this series of public lectures, we will attempt to understand the economic, artistic, political, social and cultural forces that have enabled cities to rebuild and recover, and in the process develop a framework for understanding both the commonalities and differences inherent in post-traumatic urbanism. To do so we will investigate a diverse selection of examples of urban trauma, recovery, and remembrance from around the world.

McBean, G. and D. Henstra (2003). *Climate Change, Natural Hazards and Cities*. Institute for Catastrophic Loss Reduction (ICLR) Research Paper Series No. 31 for Natural Resources Canada.

Mitchell, J.K., Ed. (1999). *Crucibles of Hazard: Mega-cities and Disasters in Transition*. Tokyo, Japan: United Nations University Press.

Mitchell, J.K. (1999). Megacities and Natural Disasters: A Comparative Analysis. *GeoJournal*, 49:2, 137-142.

Moffat, S. (2002). *Planning in the Face of Increasing Uncertainty: Resiliency as a Foundation for Long Term Urban Planning, A citiesPLUS Discussion Paper*. Vancouver, BC: The Sheltair Group.

Natural Hazards Research and Applications Information Center (2003). *Beyond September 11: An Account of Post-Disaster Research*. Boulder, Colorado: Institute of Behavioral Science, Natural Hazards Research and Applications Centre.

Norris, F.H. (2002). Disasters in Urban Context. *Journal of Urban Health* 79:3, 308-314.

Paton, D. and D. Johnston (2001). Disasters and Communities: Vulnerability, Resilience and Preparedness. *Disaster Prevention and Management: An International Journal*, 10:4, 270-277.

Pelling, M. (2003). *The Vulnerability of Cities: Natural Disasters and Social Resilience*. London, UK: Earthscan Publications Ltd.

Pelling, M. and J. Uitto (2001). Small Island Developing States: Natural Disaster Vulnerability and Global Change. *Environmental Hazards*, 3:49-62.

Petak, W.J. (2002). Earthquake Resilience Through Mitigation: A System Approach. In, *Second Annual IIASA-DPRI Meeting: INTEGRATED DISASTER RISK MANAGEMENT: Megacity Vulnerability and Resilience IIASA, A-2361 Laxenburg, Austria 29 - 31 July 2002*. Accessed April 20, 2005 at: <http://www.iiasa.ac.at/Research/RMS/dpri2002/proceedings.html?sb=4#Earthquake>.

Petak, W.J. (2003). *Earthquake Mitigation Implementation: A Sociotechnical Approach*. EERI Distinguished Lecture 2003. Accessed April 20, 2005 at: <http://www.nd.edu/~eeriund/Speakers/Petak%20abstract.pdf>.

*Research Alliance for Disaster Resilient Cities* [Website]. Accessed April 20, 2005 at: <http://www.radr-cities.ca/index.htm>.

RADR-Cities is an interdisciplinary research network dedicated to improving the disaster resilience of Canada's cities. Through a shared vision and coordinated research priorities, RADR-Cities seeks to develop a greater understanding of the

impacts of severe weather, earthquakes and other disasters on Canada's cities and identify ways to reduce urban vulnerability to hazards. In Canada, there are pockets of exceptional knowledge and research excellence on severe weather, earthquakes and other hazardous events, but they largely operate in absence of a shared vision and opportunities for technology transfer. Furthermore, in a field that is highly interdisciplinary, much of the research is conducted along disciplinary lines. Building on the strengths of the Institute for Catastrophic Loss Reduction (a provincial- and industry-funded centre of excellence), RADR-Cities focuses research of natural, engineering, social and health scientists on cities, their lifelines (transportation, water, sewage, electrical power systems), their people and socioeconomic activities in the context of vulnerability to hazards.

*Resilience Alliance* [Website]. Accessed April 20, 2005 at:  
<[http://www.resalliance.org/ev\\_en.php](http://www.resalliance.org/ev_en.php)>.

Resilience Alliance is a multidisciplinary research group that explores the dynamics of complex adaptive systems in order to discover foundations for sustainability. Through an international program connecting regional case studies with theory development, the RA strives to provide novel solutions to managing resilience and coping with change, uncertainty, and surprise in complex social-ecological systems.

Sanderson, D. (2000). Cities, Disasters and Livelihoods. *Environment and Urbanization*, 12:2, 93-102.

Sonn, C.C. and A.T. Fisher (1998). Sense of Community: Community Resilient Responses to Oppression and Change. *Journal of Community Psychology*, 26:5, 457-472.

Steen, R. and N.J. Juhl-Nielsen (2001). *A Scandinavian Approach to Create a Safe, Resilient and Sustainable Society*. Norway: Directorate for Civil Defence and Emergency Planning.

United Nations International Strategy for Disaster Reduction (2005). *Final Report of the World Conference on Disaster Reduction, Kobe, Hyogo, Japan, 18-22 January, 2005*. Accessed April 20, 2005 at:  
<<http://www.unisdr.org/wcdr/intergover/official-doc/L-docs/Final-report-conference.pdf>>.

Wisner, B. (2003). Disaster Risk Reduction in Megacities: Making the Most of Human and Social Capital. In, *Building Safer Cities: The Future of Disaster Risk*, Ed. Alcira Kreimer. World Bank Disaster Risk Management Series No. 3, 181 –196.