ABSTRACT

Proposing a Empirical Approach to Risk Management Focusing on Damage-Reduction

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We inhabit a hazardous Earth where the byproducts of natural processes carry the capabilities for causing potential damage at global, regional, national and local scales. The interaction of human activity with natural hazards results in the vulnerability of humankind, which places it at risk of suffering loss of life, structural, economic, political and social damage as well as incalculable human suffering.

This vulnerability has placed humankind in an accelerating cycle of conflict and crisis. Human societies have been for a long time and continue to be in conflict with nature, and must as a result continuously confront various degrees of crisis situations at a number of locations worldwide. The fact that humankind has emerged as a force capable of generating positive feedback to affect, modify, natural systems, may exacerbate this cycle on conflict and crisis.

Datasets maintained by international organizations, such as the United Nations and the International Federation of Red Cross and Red Crescent Societies, as well the private sector offer a wealth of information illustrating what has been stated before. Such data reveal that in the span of ten years natural hazards may cause worldwide damage measured as follows:

Total population affected:	1,800 to 2,600 million
Total people killed:	700,000 to 1,000,000
Total cost of damage:	700,000 million US $ (2009 currency)

This is undoubtedly quite a steep price we pay as a result of our vulnerability. This cost is substantially higher when we add other damage factors such as: (a) the value of services not provided because of loss of government functions, (b) economic losses resulting from businesses shutting down, (c) the human and economic costs associated with displacement of population and economic activity, (d) indirect and consequential damages including physical and mental health problems, and (e) the social cost of adverse human effects such as spousal abuse, family disruption, alcoholism, substance abuse, post-stress syndrome and others.

Relative to the above and if humankind's vulnerability and damage caused by natural hazards and the huge cost to be paid for these impacts are the norm, it is critical to consider the many questions that arise including the following: why is it that with each new disaster we find that many were surprised by the power of nature, that damages are repeated, that warning signals went unheeded, that expert studies and research findings were ignored, and that many want to blame someone else for the disaster, but avoid taking responsibility for any of it?

In the aftermath of a disaster it is also not uncommon to find existing emergency plans that were inadequate for the levels of vulnerability at the impacted region, or that parts of the plan were not actually implemented on a timely or effective basis. Repeated findings in these instances are the almost total

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absence of mitigation measures applied in the construction of buildings and infrastructure, and the belief that having insurance or complying with building codes is all that needs to be done to manage risk in vulnerable regions. In this regard it is important to consider that calls for education on the topics of vulnerability and mitigation, as well as calls for stricter norms and regulations to reduce the potential for damage to the affected communities are also common occurrences.

While there are notable exceptions to what has been described, and examples of effective risk implementation, reflecting variations in levels of capability, resources, research and education among countries, the prevalent context under which risk management is practiced in most cases is as follows: (a) emphasis is on preparedness, but mainly on response; (b) in most cases there is no dedicated budget for response and recovery; (c) opportunities for practicing mitigation are by and large ignored; (d) there are knowledge gaps between science and applications and between regulation and practice; (e) characteristics of vulnerability are not well understood; (f) there are knowledge gaps relative to natural hazards; (g) the causality of damage is not well understood; (h) many sectors of society, especially the private business sector, remain passive observers rather than being active participants in community risk management efforts; (i) by and large existing indexes or scales of hazard intensity or magnitude fail to convey potential impact in terms that are useful and practical to the general public; (i) often governments attack problems by instituting new regulations or additional layers of bureaucracy rather than by using more effective practical tools; (j) the prognosis in many cases is for more frequent and worse disasters as the vulnerability of communities increases in response to growth and to social and population changes.

There are however positive factors that may contribute to a more effective and enhanced practice of risk management. For example, in contrast with this dire scenario advances in technology and research have vastly improved capabilities for tracking, forecasting and even predicting hazard events. Developments in simulation and modeling provide powerful practical tools for assessing the potential for damage at specific communities and regions, and for building scenarios that make an enormous contribution in answering what-ifs and in measuring the effectiveness of mitigation alternatives. Powerful new instrumentation is available enhancing our capability for observations and remote sensing that can be used in assessing vulnerability while also improving our understanding of hazards. Also, many success stories exist around the world demonstrating best practices in emergency management, which merit being copied or adapted on a wider basis.

How do we take advantage of the positives to counteract of delete the negatives? How do we enhance existing models of risk management or develop new ones, which can be implemented in developed, less developed and developing countries? How can we keep pace with the changing face of vulnerability at specific locations and reduce the potential for damage to our ever-changing communities?

It also important to ask: is the current prevalent model for emergency management the best we can do? Or, should we continue with business-as-usual and hope for the best when it comes to the next impact of a natural hazard?

Evidence from some recent disasters provides a strong argument for changing current models for emergency management and against continuing with a business-as-usual approach. Take for example the 2003 heat wave that affected several countries in Europe, causing more than 37,000 deaths, forest fires, loss of agricultural production and wide-spread health problems; or the 2004 magnitude 9.2 Indian Ocean earthquake, which triggered a tsunami that killed more than 230,000 in Indonesia, India and Thailand; or the 2005 impact of hurricane Katrina in the coastal regions of several gulf states in the USA; or the 2008 earthquake in China just prior of the summer Olympic games in that country; or the more recent 2010 earthquakes in Haiti (January 12, 2010) and Chile (February 27, 2010). In each of these cases events revealed flaws and weaknesses in existing emergency plans and risk management models, generating demands for drastic change and improvement of then current approaches in affected countries.

A strong argument can be made for a new simpler model that would strengthen and make more effective the approach for the practice of emergency management. An empirical approach, meaning one which is based on observations, that shows rather than tells practitioners what to do, how to do it as well as why it is necessary to do it, in order to reduce the potential for damage from the impact of natural hazards, could make a significant contribution toward the elimination of flaws and weaknesses mentioned before.

By emphasizing the practical and what has been learned from observations that can actually be applied on the field as well as to the planning process, such an empirical approach could also contribute to a reduction in regulatory and administrative layers that have proven counterproductive in the context of actual hazard events.

Key practical and philosophical components of the proposed empirical approach to emergency management would include, without limitation, the following:

1) Learn and study the signals from nature by using observations of natural hazards and region specific characteristics to develop assessments of vulnerability that are specific to given communities;
2) Use post-event observations of actual hazard impacts to develop community-specific criteria to characterize the impact within the context of actual forces generated by the hazard and the as-built conditions or design criteria of affected buildings or infrastructure;
3) Use observation of hazards as they are generated by nature to improve our knowledge of what damage components are in play and what the causality of damage may be in each case;
4) Use such characterization of impacts to assess the potential for damage at various scales ranging from the regional to the site-specific;
5) Develop scenarios of future impacts over meaningful timelines using such characterization of impact and assessment of potential damages, which could then be used for decision making in risk management;
6) Use observation of actual impacts and scenarios of potential impacts to identify hazard mitigation alternatives, which could be incorporated in the design and construction of new buildings and infrastructure or to retrofit existing facilities to reduce the potential for damage from recurring hazard impacts;
7) Use knowledge gained from these observations to develop design criteria and methodology to radically change current approaches to building design and construction;
8) In planning for eventual hazard impacts view the general population not as potential victims, but as potential survivors who should be empowered to contribute to their own recovery and that of the larger community;
9) Develop programs of continued research and testing to support and buttress various components o risk management plans;
10) Engage various professional sectors of society, especially those engaged in building design, construction, engineering and planning, in this learning-from-observation process so that they may see the benefits of incorporating the concept of hazard mitigation within the daily practice of their respective professions;
11) Share knowledge gained from observations with policy-makers and community planning bodies so that they may translate the same into effective policies in support of risk management objectives;
12) Engage the residents of vulnerable communities specially the young people still in school in using observations as part of a learn-by-doing approach to safer more protected communities;
13) Focus on damage reduction emphasizing reducing the potential for adverse impacts to the full range of human activity and the protection of life;

14) Recognize that vulnerability is dynamic in the sense that it will change in response to changes in the community as well as changes brought about by natural processes, therefore it is critical to understand that the work of risk management can never be fully completed;
15) Recognize that ecosystems and the natural environment should be considered as infrastructure that supports and provides services for human activity.

Achieving this proposed empirical approach for the practice of risk management should be one of the highest priorities of vulnerable communities everywhere. After all urban growth and changes in demographics and population densities appears to be increasing the amount of human activity and population that is at risk of suffering damage from the impact of a natural hazard. On the other hand several hazards are being exacerbated by global change and other natural processes, raising the prospect for perhaps more frequent or more intense impacts from recurring hazards.

The challenge of making this happen falls upon all of us. Sharing these ideas and recommendations at the important forum on risk reduction at the University of Coimbra is an important first step toward that objective.