Urban Seismic Risk: Moulding the Caribbean Landscape

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Bordered by the South American, North American, Nazca and Cocos Plates, the Greater Caribbean Region (GCR) represents a mélange of opposing forces which has led to the consistent destruction and construction of terrain. Dotted with trenches, submergence zones, ridges and platforms, the GCR is a repository of historical movements and tremblements de terre which have shaped our present geography. Tectonic plates are not 'in situ'. They represent a dynamic process of moulding and shaping that, although proven to be ruinous, has resulted in the contours to what is intrinsically Caribbean terrain. It is this creative and destructive process that is referred to as seismic activity.

This movement has given breath to mountains and valleys, and yet in the same heartbeat, has also given birth to earthquakes, tsunamis and other physical manifestations of geological processes. The GCR is no stranger to seismic activity; between 2010-2016 countries such as Mexico, Haiti, Colombia, and Guatemala have all been impacted by seismic events measuring greater than 7.0 on the Richter scale. Natural hazards such as earthquakes tend to be short-lived events, lasting several seconds but have the potential to cause substantial destruction in a concentrated area. "These events typically set in motion a complex chain of events that shrinks the nation's ability to produce goods and services and hence disrupts both the local economy and, in severe cases, the national economy (Nicholson & Prescod, 2016)".

The March 20, 2012 Guerrero-Oaxaca earthquake which affected southern Mexico cost an estimated 100 million US dollars in damages, and an assessment of the estimated direct cost of the catastrophic earthquake that struck Haiti on January 12, 2010 was estimated to be between 8-14 billion US dollars (Inter-American Development Bank, 2010). These estimates are useful for placing these events into perspective and informing the international community of the enormity of the challenge that lies ahead in the task of reconstructing post calamitous/catastrophic seismic events. The high costs of immediate adaptation measures, such as relocating vulnerable populations and providing disaster relief, coupled with long timescales of treating with the issues, create significant challenges for regional governments. Also contributing to hampering a nation's ability to effectively manage these events, is the lack of liquidity immediately after a disaster which usually delays

recovery and undermines public investment programs. For this reason, as a form of risk mitigation, more effective financing strategies for pursuing ex ante actions are needed by regional governments.

Seismic stress increases the potential for earthquakes, tsunamis or the event of liquefaction to occur. This is of significance considering the many littoral capitals and cities of the GCR – a consequence of that being a large section of the populace are often situated near to the shoreline. A result of this is greater vulnerability and the increased probability of significant social and economic damages, post seismic event. Earthquake disaster risk in cities has increased mainly due to a high rate of urbanization, faulty land-use planning and construction, inadequate infrastructure and services, and environmental degradation. Given the concentrated structure of the urban environment of island economies, risk management practices – including contriving the boundaries of existing risk, monitoring and thus evaluating potential risks - may benefit in identifying ways to mitigate economic, logistical and social losses.

Historically, within the region, management of disasters has largely been reactive. “Given the significant impact that natural hazards and climate change will have on urban investments, increasing priority is now placed on proactive, adaptive planning to reduce and manage the potential for disasters and climate change. With this recognition, the value of identifying, diagnosing and mapping high risk areas is gaining visibility and importance” (The World Bank, n.d.). Several projects undertaken by regional organisations, institutions and governments such as the University of the West Indies (UWI), Caribbean Catastrophe Risk Insurance Facility (CCRIF), the European Commission and the World Bank, aim to generally improve seismic risk mitigation within the region through the use of seismic risk and hazard mapping and forecasting, installation of monitoring instrumentation and promoting real time risk mitigation methods in an effort to protect structures, infrastructure and aid in decision making and management.

The regional seismic hazard cannot be eliminated; however, the risk can be effectively managed and alleviated. Risk assessment is about risk management. In the urban environment, identifying susceptible infrastructure that if damaged, would have knock-on detrimental effects on the urban population is critical. As a corollary, calculating and financing the damages of such an event can be an onerous task. However, building resilience can be realized through investment in disaster risk reduction strategies and tools geared towards enhancing preparedness through hazard mapping and early warning systems. Integrating disaster risk reduction measures into infrastructure improvements, strengthening governance structures - including the development of institutional mandates for disaster risk management, using the reconstruction process to address urban planning challenges - and establishing predictable contingent financing mechanisms are all processes that can be used to cover the residual risks that cannot be mitigated. On a national level, this also presents the opportunity to invest in financial disaster risk analytics and introduce sophisticated and robust solutions for disaster risk financing and insurance to protect and increase financial resilience in the private sector – as development is not achieved by public sector initiatives alone.

Given these pressing issues, both social and economic, the question becomes whether or not, the Caribbean is doing enough about disaster risk reduction in the context of urban seismic risk. As the risk is inherent, seismic activity is a surety within the region. Are the documented results from risk assessments used to inform and guide future growth and land use patterns of our Caribbean cities? In 2003 the Association of Caribbean States, for the benefit of its Member States, developed a model building code for earthquakes and wind loads. How have this code and the outcome of regional risk assessments allowed Caribbean states to endow themselves with new appropriate building codes or improve existing ones? Risk assessments should not be undertaken as one-off analyses, but as an integral and regular element of the planning process. The results from risk assessments should permit local government to decide where and what disaster risk reduction interventions can be most

effective. In the face of potential further urban growth and sprawl due to the increasing economic development of our major cities, it begs to argue that investments are better suited for increasing resilience versus rebuilding. For the best outcome, however, whilst the Sendai Framework refers to “Building Back Better” as one of its guiding principles, it necessitates that a decision be made on where financial investment is committed and the role that urban seismic risk assessments play as a critical factor in regional disaster preparedness.

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