

Session: Assessing Climate Change and Natural Disaster Impact on Urban Area

Paper Title: Building Resilience in Cities

Authors: Marcus Ip (AECOM), Michael Nolan (AECOM), Thomas SK Tang (AECOM)

Abstract

Cities worldwide are facing challenges of urbanization, population growth and climate change, to name but a few. Cities need to be able to withstand these stresses to survive and at the same time absorb shocks like severe weather, pandemics and social unrest. This ability, together with the added feature of being able to recover rapidly, is known as resilience (UNISDR, 2009). Building resilience therefore is vital for the long term sustainability of cities. We further look at the trends in developing city resilience which includes: measuring resilience; reporting and disclosure; use of tools to develop resilience strategies; and identifying the benefits and opportunities. Case studies in Asia are presented on the use of a resilience scorecard (UNISDR, 2010a) specially developed to help local government agencies understand the impacts faced and the capacity needed to withstand the latter. The use of the scorecard to develop strategies and action plans is also demonstrated.

1. Introduction

Urbanization, population growth and climate change, to name but a few, are challenges faced by cities worldwide nowadays. To survive, cities need to be able to withstand these stresses and at the same time absorb shocks like severe weather, pandemics and social unrest. This ability, together with the added feature of being able to recover rapidly, is known as resilience (UNISDR, 2009). Building resilience therefore is vital for the long term sustainability of cities. In this paper, the development, key features and observations from pilot application of the *Disaster Resilience Scorecard for Cities* (UNISDR, 2010a), which has been formulated on the 'Ten Essentials' framework defined by the United Nations International Strategy for Disaster Risk Reduction (UNISDR) for making cities resilient (UNISDR, 2010b & 2010c), are presented.

2. Background

Disasters can be small, medium or large scale and arise from natural or man-made hazards. Climate change and extreme weather events increase a city's exposure to hazards and risk (IPCC, 2012). Risk is defined as a function of the hazard (e.g. a typhoon, an earthquake, a flood or a fire), the exposure of people or assets to the hazard and the vulnerability of the exposed population or assets (UNISDR, 2012). In other words:

$$\frac{\text{Hazard} \times \text{Vulnerability} \times \text{Exposure}}{\text{Resilience or coping capacities}} = \text{Disaster Risk}$$

Factors of risk for cities include:

- Growing populations that put pressure on land and services
- Diversion of resources from local programmes to suit national needs
- Weak governance

- Lack of engagement with stakeholders
- Inadequate water and energy resource management
- Decline of eco-systems due to human activities
- Ageing infrastructure and unsafe building stock
- Lack of coordinated emergency response services

Hence, addressing disaster risk tends to build resilience in cities. A disaster resilient city is one where populations live in homes and neighbourhoods with organized services and well maintained infrastructure, and has the capacity to manage and organize itself before, during and after a natural hazard event. In general, resilient cities possess common attributes such as inclusive, competent and accountable governments, knowledge of hazards and risks (including exposed populations) and participative and engaged stakeholders from different sectors of the community (UNISDR, 2012).

Building resilience means understanding risks and developing capacity. The *Hyogo Framework for Action* (UN, 2005) was established in 2005 with five priorities for action: building institutional capacity; risk assessment; building awareness; reducing risk; and preparedness. This has served as a frame work for countries and communities to promote local-level disaster risk reduction.

The UNISDR ‘Ten Essentials’ include the critical and interdependent steps local governments may take to make their cities more resilient. Actions under each Essential are part of the overall disaster risk reduction planning process and can influence urban development planning and design.



Figure 2.1 Ten Essentials for Building Resilience

Following the ‘Ten Essentials’, city governments have used a range of tools to assess their levels of resilience and a network of like-minded cities has grown. There are now 2,000 cities, coming from 107 countries, that have joined the *Making Cities Resilient: ‘My City is Getting Ready!’* campaign. Seven countries represent 63% of these cities, namely Austria (280), Lebanon (254), Brazil (253), Italy (130), India (128), the Philippines (113) and South Korea (99) (UNISDR, 2010d).

3. The Disaster Resilience Scorecard for Cities

The *Disaster Resilience Scorecard for Cities* (the Scorecard) was developed by AECOM and IBM for UNISDR and launched in April 2014 (UNISDR, 2010a). Designed to quantifiably measure resilience performance, the Scorecard supports target setting and prioritizes action and is investments-based. One of the many advantages of the Scorecard is that it highlights the connections between the many different aspects of disaster resilience and the responsible parties, while also identifying gaps in plans and provisions. In addition:

- It is intended that the Disaster Resilience Scorecard will be useful for the day-to-day business of the city.
- It is open sourced and will be available for additional for-profit or non-profit activities by any organization.
- It is a tool for cities to demonstrate their attractiveness for inbound economic investment.
- It can be used as a basis for insurers to assess the level of risk to allow them to adjust premiums for the well-prepared or write new policies where none exist today.

The Scorecard has 85 separate assessments, each rated on a 0 to 5 scale per aspect of a city's preparedness for, and ability to recover from, natural hazards. Assessments with higher ratings denote strengths that the city will wish to maintain; those with lower ratings denote weaknesses or areas for improvement where the city will need to invest time and funds to improve. As no city in the world will achieve a maximum score, the purpose is to allow cities to establish a baseline and a set of priorities for moving forward. Some examples of scores are shown in the following section.

4. Case Study

The Scorecard was tested on three Asian cities in the Philippines, India and Vietnam. All of the cities experienced stresses and shocks in the past attributable to natural and man-made disasters. The process involved:

- Kick-off meeting to explain the study scope, data requirement and work plan for carrying out the assignment.
- Circulation of the 10 essentials proforma to city officials and subsequent data collection.
- Introductory meetings with the Mayor, Commissioner, Heads of Departments, Technical Managers and representatives of various government departments, associations, among others.
- Collection of base maps and secondary data, as well as reports prepared under various other urban development programs in the current and past, reports on service delivery, and other relevant documents on healthcare, environment, fire safety, public security and transport facilities.
- Rapid assessment of civic amenities in the corporation identifying line departments and key stakeholders for urban service delivery and development such as public works department, town and country planning department, local chamber of commerce, non-governmental organizations, educational institutions, center of excellence in disaster management , religious organizations, financial institutions, commerce and industry, among others.
- Assessment of infrastructure status of core amenities such as water supply, underground sewerage system, solid waste management, roads, storm water drains, street lighting, slums and other social amenities.

A workshop was conducted using initial scorecard results to guide detailed assessment to fill the gaps in assessment and seek opportunities and action to increase resilience. This would be a preparative exercise for engaging the private sector and the broader public sector to identify the value of resilience and identify opportunities to collaborate to increase resilience. Ultimately this would lead to a blue print for resilience pathway, which brings the scorecard assessment and private public sector collaboration together in a blue print for short-medium term action by city and key stakeholders (UNISDR, 2015). This not only would contribute to strengthen the city’s disaster risk reduction and climate change strategy and action plan but also extend into other resilience strategies. In particular the Rockefeller *100 Resilient Cities* challenge (Rockefeller Foundation, 2013) was identified as an important initiative to participate in.

Figure 4.1 shows some examples of scorecard results and Table 4.1 summarizes some of the key findings.

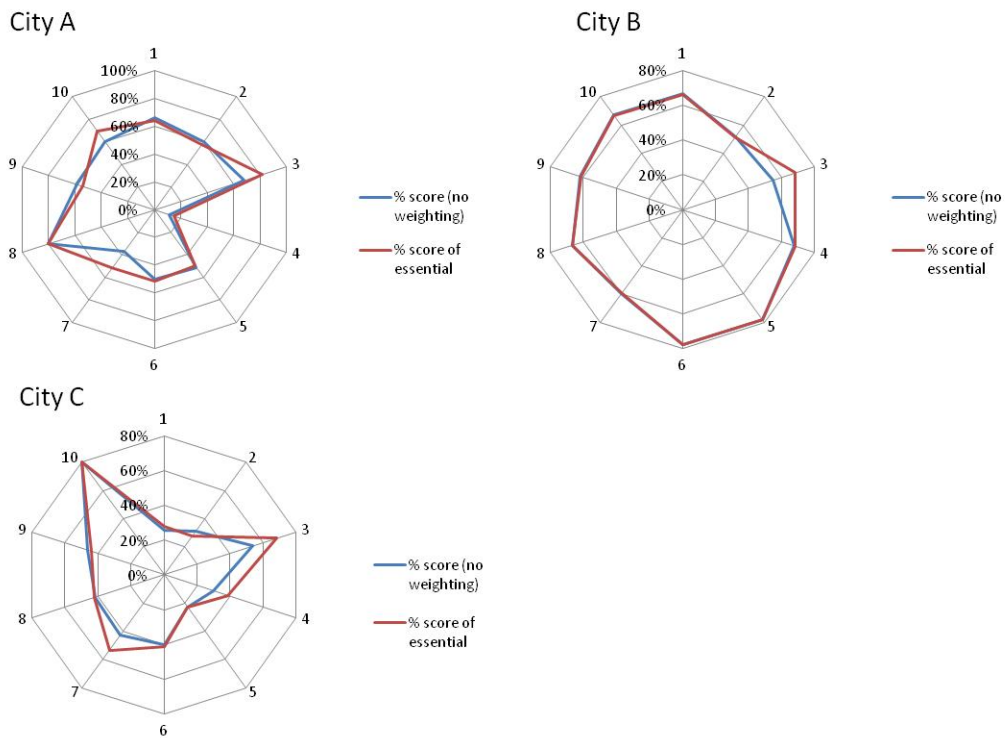


Figure 4.1 Examples of Disaster Resilience Scorecard Results

Essential	City A (Philippines)	City B (India)	City C (Vietnam)
1. Engage, Share Understanding and Coordinate	Need to refine the coordination and collaboration mechanism to include more stakeholders and define roles in pre-, during and post-disaster events	Need expertise on capacity building on urban governance and sharing best practices.	Better synchronization for all sectors especially private sector Role of community groups to be strengthened
2. Create Financing and Incentives	Need to gather more data on financial coverage	Technological support and funding for identified resilience priorities to be provided.	Capital funding provided but operating funds need to be clearly earmarked Financial incentives for capacity building needed
3. Identify and Understand Perils, Probabilities and Impacts	Need to find readily available and accessible risk assessment tool.	Need to analyze and to collect information on climate risk for economic decision making	Different disaster scenarios considered
4. Make Critical Infrastructure Disaster Resilient	Need to identify the critical systems and data for service continuity and enhance back-up systems	The City's infrastructure is currently not strong enough due to lack of public facilities especially for the vulnerable populations.	Investment in critical infrastructure carried out but maintenance issues exist
5. Make Education & Healthcare Infrastructure Disaster Resilient	Adequate emergency healthcare facilities and supplies for worst-case scenario	Need for knowledge and multi specialty centres to facilitate emergency care during disaster. Vulnerable sections of urban poor are worst affected.	Information on healthcare continuity needed
6. Apply Risk-Aware Planning, Land Use and Building Codes	Need to study linkage of economic activities at risk with hazard, land use and zoning	Effective land use zoning in preventing exposure build-up but some illegal building construction.	Not much industrial activity so land use risk minimal Building codes exist
7. Build Public Awareness and Capacity	Need to harmonize all training activities into one holistic program	Lack of public awareness in natural disasters however safety measures are in place.	Limited data on general and stakeholder level of awareness
8. Enhance and Protect Ecosystem Services	Need to consider ecosystem services	Rejuvenation of natural bodies like water needed.	Protection and conservation policies are in place
9. Create Warning Systems and Rehearse Preparedness	Need for further study	Early warning system and Emergency Management Capacity can be improved	Emergency response plans in place
10. Learn and Build Back Better	Need to explore funding options for post-disaster recovery interventions	Need to get expertise to loss of lives and to put in place measures to contain seismic damage.	Financial arrangements between local funds and overseas aid needs to be better coordinated.

Table 4.1 Summary of Scorecard Findings

5. Observations and Way Forward

The Scorecard measures the resilience performance of cities. It supports target setting and prioritizes action and is investments-based. The Scorecard has been tested on three cities in Asia.

The Scorecard is a learning tool for stakeholders to understand elements of resilience aligned with regional and national resilience strategies performance monitoring. In the pilots conducted, the tool is evolving and will in due course be computerized.

The future benefits will be:

- A systematic assessment of resilience to the risks faced by cities
- A basis on which to plan future investments and track progress across all of the many aspects of the required response.
- A basis around which to identify and engage the many organizations (state and local governments, utilities, grass-roots organizations) on which the resilience of the city depends.
- Increased economic investment potential, both from reduced exposure or vulnerability and the clear perception that risk is taken seriously.
- Potentially, reduction in the cost of some insurance cover.
- Establishment of global leadership as a resilient city – both from the visible adoption of good practice in response to a global issue, and from the contribution of the validated scorecard for the benefit of mankind.

References

Intergovernmental Panel on Climate Change (IPCC)(2012), *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation - A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change* https://www.ipcc.ch/pdf/special-reports/srex/SREX_Full_Report.pdf

United Nations General Assembly (UN)(2005), *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*, The World Conference on Disaster Reduction (January 2005), Kobe, Hyogo, Japan
http://www.unisdr.org/files/1037_hyogoframeworkforactionenglish.pdf

United Nations International Strategy for Disaster Risk Reduction (UNISDR)(2009), *UNISDR Terminology*
<http://www.unisdr.org/we/inform/terminology>

UNISDR (2010a), *Disaster Resilience Scorecard for Cities* <http://www.unisdr.org/2014/campaign-cities/Scorecard%20FAQs%20March%2010th%202014.pdf>

UNISDR (2010b), *The 10 Essentials for Making Cities Resilient*
<http://www.unisdr.org/campaign/resilientcities/toolkit/essentials>

UNISDR (2010c), *Making Cities Resilient: 'My City is Getting Ready!'*
<http://www.unisdr.org/campaign/resilientcities/>

UNISDR (2010d), *Making Cities Resilient: 'My City is Getting Ready!'- Participating Local Governments*
<http://www.unisdr.org/campaign/resilientcities/cities>

UNISDR (2012) *How to Make Cities More Resilient - A Handbook for Mayors and Local Government Leaders*. Geneva, Switzerland: United Nations International Strategy for Disaster Reduction
http://www.unisdr.org/files/26462_handbookfinalonlineversion.pdf

UNISDR (2015), *Disaster Risk Reduction Private Sector Partnership: Post 2015 Framework-Private Sector Blueprint Five Private Sector Visions For A Resilient Future*
http://www.unisdr.org/files/42926_090315wcdrrpspublicationfinalonli.pdf

Rockefeller Foundation (2013) *100 Resilient Cities*, <http://www.100resilientcities.org/>