



## Proceedings of the Resilient Cities 2014 congress

### **Session: E4 The risk and resilience scorecard: Benchmark disaster resilience in cities**

#### **A monitoring & evaluation tool to engage local stakeholders**

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#### **Abstract:**

To better understand urban risk in its entirety, stakeholders and researchers need to go beyond natural hazard and exposure assessments. For a more complete view of a community's risk, it is also essential to understand societal characteristics of populations exposed to natural hazard threats and to combine that information with analyses of biophysical vulnerability and physical risk to achieve an integrated and holistic understanding of the risk, impact, and recovery potential of a given (urban) area.

Within this ICLEI workshop we introduced a tool and framework that can be utilized by decision-makers to address the differential susceptibility of populations to the adverse impacts of hazard events in a more holistic manner.

The Risk and Resilience Scorecard is a self-evaluation tool empowering city stakeholders to quantitatively assess risk and resilience parameters based on qualitatively derived information at multiple levels. The scorecard was developed jointly by the Global Earthquake Model (GEM), the Center for Disaster Management and Risk Reduction Technology (CEDIM), and the South Asia Institute (SAI), Department of Geography, Heidelberg University. Within the workshop, the participants identified the following key points:

1. the scorecard helps in identifying potential stakeholders needed to accomplish a comprehensive and participatory resilience investigation,
2. the multi-level approach offers a chance to reduce the complexity of evaluating urban disaster resilience,

3. it can be useful for multiple audiences – from researchers to practitioners – and supplements quantitative approaches with useful qualitative and contextualized information.

### **Keywords:**

Disaster resilience, Resilience Management, Disaster Risk Reduction (DRR), Monitoring and evaluation tool, Multi-level approach, Urban stakeholders, Nepal

## **1. Introduction**

Resilient communities are those that take deliberate action to reduce hazard risks, prepare for, and accelerate recovery in the face of disasters. Making a city disaster resilient means to understand the capacity of communities and decision-makers to actively adapt to, cope with, and transform in view of potential threats. Hence resilience is considered a multi-dimensional concept, visible at multiple levels of the city environment, and highly dynamic. How communities will be affected following a natural and/or manmade disaster may be conceptualized in terms of their resilience, and numerous perspectives have been developed to advance the underpinnings of the concept.

An essential step for developing plans to enhance the resilience of a city's communities is the ability to objectively measure this underlying concept. Measurement is vital not only to evaluate and benchmark the baseline conditions of what makes communities resilient, but also to help communities to understand the factors that lead to adverse impacts and the diminished capacity to respond to an event. Just as successful companies have identified areas of opportunity and benchmarked their performance against industry peers, governments are finding it useful to compare the performance of communities in terms of their resilience. Composite indicators (or indices) are frequently employed by researchers and practitioners as useful tools to accomplish this objective because they convey information that may be utilized as performance measures by reducing complexity.

Although composite indicators are increasingly recognized as useful tools for policy-making and public communication, they are subject to a number of criticisms that apply to measuring resilience. Composite indicators, for instance, may send misleading messages if they are poorly constructed or misinterpreted. In addition, composite indicators may invite overly simplistic conclusions regarding areas of opportunity for resilience enhancement. They may also lead to inappropriate conclusions if dimensions of resilience that are difficult to measure are ignored or overlooked.

Thus, to capture local processes affecting the resilience of communities for resilience enhancement, different types of indicators that are representative of the existing local knowledge, conditions, and

context are needed. These types of indicators cannot be computed from publically available databases and require the design of targeted surveys with a specific audience in mind. It is within this context that we have developed an alternate „scorecard approach” based on a participatory assessment processes. The purpose of the development of the scorecard was to build a tool that can capture the key functional and organizational areas of urban resilience with local government officials as the targeted decision-making body. Building upon the six elements of the HFA and the UNISDR’s 10 Essentials for Making Cities Resilient , the resilience scorecard was developed to address the resilience of key dimensions within a city or community’s functional and operational activities. The following six dimensions that mainstream disaster risk reduction into planning and decision-making processes are encompassed by the approach (see Fig. 1):

- Legal and institutional arrangements
- Social capacity
- Critical services and public infrastructure resiliency
- Emergency preparedness, response and recovery
- Planning, regulation and risk mitigation
- Awareness and advocacy

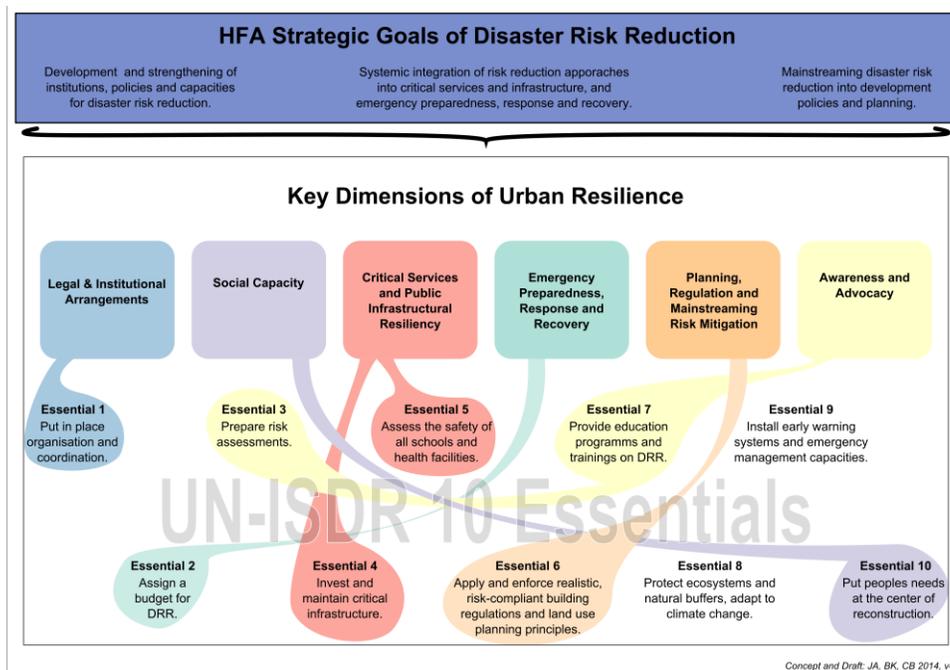


Fig. 1: Six dimensions for mainstreaming urban resilience.

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## **2. The Resilience Design and Management Framework**

The scorecard approach is embedded in a Resilience Design and Management Framework with three distinct features.

**Multi-dimensional:** the complexity of disaster resilience in an urban environment has a specific configuration depending on the local context it is applied to. The framework allows relevant stakeholders to individually “design resilience” by looking very carefully at pre-existing conditions and past trajectories along the proposed six dimensions in a manner that focuses on issues most pertinent to the local context of communities for benchmarking resilience targets. This happens by assessing the strengths and weaknesses in the resilience of communities, identifying relevant sub-systems, and defining implementation priorities through the scorecard.

**Multi-stage:** implies the need to consider the dynamics of resilience throughout a multi-stage management process starting with a pre-assessment to better understand gaps within the above mentioned six dimensions based on respondent’s perceptions of the status of resilience within a given community. The next stage includes detailed assessments of systemic measures to foster scenario-based decision-making. The final stages address implementation of resilience enhancement priorities (e.g. improving the legal institutional framework, enhance inter-agency communication, deploy trained rescue operators...) and monitoring & evaluation of resilience target benchmarks (e.g. recovery time of critical infrastructure bisected, building code compliance on new structures enforced...). The scorecard approach allows to reflexively monitor the resilience development along these stages.

**Multi-scale:** is considered for the development of metrics that are scale invariant to the greatest degree possible. Depending on the scope of the strategic resilience targets, different decision makers from city administration, sub-city community leaders as well as regional representatives; but also different stakeholders from technical experts to civil society members need to be engaged. The framework fosters participation at all scales to successfully operationalize resilience and account for any cross-border interactions.

The pilot implementation of the scorecard was Lalitpur, Nepal. At the pre-assessment stage, the local context was captured using a number of indicators (questions) and targets (answer schemes) of the scorecard. It was anticipated that the approach would provide a “broad brush” evaluation to enable local policy makers and communities to establish priorities for more in-depth analysis, to allocate funds, and to develop emergency and disaster management programs more effectively. The scorecard identified the degree to which communities in Lalitpur were able to build their resilience because they are able to identify gaps and opportunities for resilience enhancement. It is within this context that there are distinct features of the scorecard that allow it to be coupled with mainstreamed risk and resilience assessments like the UNISDR Disaster Resilience Scorecard for Cities . The scorecard goes beyond simplified quantitative resilience measurements, by putting relevant stakeholders at the centre of a full Resilience Design and Management process. It is therefore a tool to start every disaster resilience enhancement project with, providing context and allowing local decision-makers to setup the stage appropriate to their needs.

### **3. The ICLEI RC 2014 Workshop**

During the ICLEI Resilience Cities 2014 congress the Resilience Design and Management Framework and accompanying scorecard approach was introduced to a set of city stakeholders from different cities. The participants learned how the Risk and Resilience Scorecard can be used within the pre-assessment stage of any disaster resilience enhancement project, discussed its relevance and identified gaps and opportunities.

Discussions included how the tool can enable decision-makers to base risk reduction policies on sound information that is contextually specific, by what means a city’s resilience to natural hazards can be benchmarked and traced over time, and how urban resilience to natural hazards can be increased from the bottom-up via the discussion of contextual circumstances affecting risk and resilience. The identification of potential stakeholders for the application of the scorecard at various levels and the potential need to reduce the complexity of resilience measurement were guiding workshop themes. These are discussed in the subsections below.

### 3.1 Who are the potential stakeholders?

While the resilience management process goes beyond the perception phase of resiliency of a city, the scope of the Risk and Resilience Scorecard is to initiate the interaction with the stakeholder. The participants of the ICLEI workshop identified potential users and relevant stakeholders that may be included in the pre-assessment process in the participant's respective cities. One suggestion made by the participants was to make sure to be explicitly hazard specific in identifying stakeholders and to survey existing responsibilities within the city administration. They acknowledged the necessity to go after relevant stakeholders who take their official duties and/or their public service assignment serious and who see DRR as one of their priorities. In addition, participants recommended making use of cost-benefit analysis that might improve decision-making processes. The discussions with participants demonstrated that the following set of stakeholders should be invited to discuss disaster resilience issues for cities: 1) community representatives (councils, indigenous communities, citizens, youth- and elderly groups); 2) the private sector (food and water suppliers, private critical lifeline provider); 3) the public sector (service providers that include water, gas, electricity, public works, medical services); 4) planning authorities and other city officials from various relevant departments; 5) NGO's; and 6) academia.

This vast group of people all represent certain interests and have most likely a heterogeneous understanding of "Resilience". Therefore identifying the right stakeholders helps to foster and/or even initiates communication between multiple levels. Experiences from Lalitpur, Nepal show that such an endeavor helps to stimulate inter-institutional coordination and also allows identification of existing knowledge and communication gaps.

### 3.2 How to reduce complexity?

Every city is a complex environment consisting of many different sub-systems, competing interests, limited resources and a multitude of options to become resilient against natural hazards and disasters. Decision-makers are often confronted with limited knowledge and large uncertainties supporting their tasks. Resilience in cities is complex, and assessment standards

and enhancement initiatives need to be specifically tailored and understood by individuals within the communities they protect.

The participants from the ICLEI workshop provided their expert knowledge on the six dimensions of resilience outlined for the scorecard approach (i.e. Social Capacity, Awareness and Advocacy, Legal and Institutional, Planning and Regulation, Critical Infrastructure and Services, Emergency Preparedness and Response). This was to allow the participants to share their (personal) experiences with the operationalization of the resilience concept for disaster management. The diversity of participants' background offered a great opportunity to reflect on this issue. While most of the participants agreed on the above set of dimensions, it became clear, that (again) a distinct local contextualization needs to take place to uncover "hidden" dimensions, that are critical to the decision making process. Especially if it comes to the multi-level assessment that is imbedded in the scorecard approach, a shared understanding of the resilience concept and a reliable and trusted culture of communication is mandatory. Both requirements are not easily met: often there is an attenuation of formal education between regional, city and sub-city representatives. Moreover, information sharing across and within departments and the general public's participation in decision-making processes varies across different regional contexts.

#### **4. Conclusions**

There continues to be interest from academia, governments, and the disaster risk reduction community in the topic of resilience. The ability to measure resilience is increasingly seen as a key step towards disaster risk reduction. Measuring resilience remains a challenge, however. This is partially because methods used for measuring the concept, including the use of composite indicators, may be inadequate for measuring resilience in complex systems such as within an urban environment. Narrowing this gap was the purpose for the development of the Risk and Resilience Scorecard and the Resilience Management and Design Framework.

Resilience measurement is still in the nascent stage. The scorecard approach described here may be useful in providing a broad "first assessment" of resilience that lends to more detailed analyses for an increased understanding of place-specific factors affecting the resilience of

populations. Although an agreed upon approach for measuring resilience is yet to exist, perspectives from a multitude of disciplines and practitioners such as those participating in the workshop show promising steps forward. Here, an increased understanding of factors that enhance or hinder the resilience of communities provides a step towards fine-tuned mechanisms to reduce natural hazard risk.

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