



A critical review of selected tools for assessing community resilience



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ABSTRACT

The concept of resilience is increasingly used in academic and policy circles. To operationalize this concept and reduce the ambiguities surrounding it, since the turn of the century, various resilience assessment methodologies have been introduced. This paper provides a critical review of 36 selected community resilience assessment tools. These tools have been developed by a variety of entities, including national and local organizations, international donor organizations, and academic researchers. First, an overview of the selected tools is presented. This overview analysis shows that while some commonalities exist, there are also considerable differences between the tools. Next, based on literature review, an analytical framework is developed that identifies six criteria for evaluating performance of resilience assessment tools. These are, namely, addressing multiple dimensions of resilience, accounting for cross-scale relationships, capturing temporal dynamism, addressing uncertainties, employing participatory approaches, and developing action plans. Results show that limited success has been achieved in addressing these criteria. In terms of comprehensiveness, the environmental dimension has received relatively less attention in spite of its significance for building community resilience. Further improvements are needed to account for dynamics over time and across space. More attention to employing iterative processes that involve scenario-based planning is needed to better address challenges associated with uncertainties. Results also show that more attention needs to be paid to stakeholder participation in developing assessment tools. The paper concludes by highlighting several other areas of weakness that need to be addressed and discussing major challenges that still remain.

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1. Introduction

Since 1980, the world has seen an increasing trend in the annual number of climatological, hydrological, and meteorological loss events (MunichRe, 2015). There is now a reasonable consensus that climate change has increased the frequency and intensity of loss events and this trend is expected to continue in the future (Field et al., 2014). Given the increasing concentration of people, activities, and resources in urban areas, this can have severe consequences for management of cities in the long term (Field et al., 2014). In response to concerns about the consequences of increase in frequency and severity of disaster events, over the past four decades, the concept of community resilience has gained increasing prominence in science and policy circles. Diffusion of the concept of community resilience also signifies the recognition of the fact that not all threats can be avoided and there should be mechanisms in place to ensure that disturbances are kept to a minimum (Renschler et al., 2010a). Furthermore, resilience implies learning

lessons from the disruptive event and adopting adaptive and transformative approaches that lead to long-term incremental evolution of the system (Elmqvist, 2014; Matyas and Pelling, 2015; Sharifi and Yamagata, 2016).

As the concept of community resilience has continued to evolve, there has also been increased recognition of the importance of developing methods and instruments for its assessment (Cohen et al., 2016; Cutter, 2016). Community Resilience Assessment (CRA) can be regarded as a recent development in the field of resilience assessment and the last decade has seen a proliferation of works focused on this topic. In addition to growing recognition of the potential adverse impacts of climate change, surge of interest in CRA initiatives can be attributed to rise in the funds available for enhancing resilience, increasing reliance of donor organizations on resilience assessment results for allocating funds (Cutter, 2016; Tyler et al., 2014), and the need to measure progress against the risk reduction targets outlined in international frameworks and protocols (Schipper and Langston, 2015).

Since this study is focused on CRA tools, it is essential to first explain what is meant by the term “community”. Community is a contested notion that has been defined in a variety of ways

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and there is still no single, universally accepted definition for it in the literature (Mulligan et al., 2016). An often used definition is a diverse group of individuals in a shared geographical area, who have common interests, are linked by dynamic socio-economic interactions, and engage in collective action (Alshehri et al., 2014; Frankenberger et al., 2013; MacQueen et al., 2001; Miles, 2015; Twigg, 2009). Defining community boundaries remains an issue of debate. Boundaries can be defined using functional measures such as catchment area of services (Chandra et al., 2011), psychological measures such as residents' perceptions (UNDP, 2014a), and political measures such as administrative boundaries (Frankenberger et al., 2013). Community boundaries can also be blurred. Mulligan et al. (2016) argue that it is difficult to draw community boundaries with certainty and, given the constant changes in the mobility and communication technologies, the community boundaries are likely to change over time. A community can be nested within larger communities (Mulligan et al., 2016). It is also possible that overlaps exist between communities and people belong to more than one community (Mulligan et al., 2016). Elaborating on the meaning of community resilience, Mulligan et al. (2016, 9) continue that community is a "multi-layered" notion. Dynamic interactions occur between communities and they "can operate simultaneously across multiple scales". For the purpose of this study, community is defined as a location-based entity that can be as small as a neighborhood or as large as a county. It is acknowledged that community is not a static entity and dynamic interactions exist across different scales. Assessing resilience of "imagined" and "virtual" communities (Mulligan et al., 2016) is beyond the scope of this paper. It is argued that community should be defined on a "case-by-case basis" (Sherrieb et al., 2010) and different scales (ranging from neighborhood to county) can be used as a suitable units of analysis for resilience assessment (Sherrieb et al., 2010). Adopting such a broad and flexible definition makes it possible to include various relevant tools in this critical review. It should be noted that tools and frameworks examined in this study are mainly focused on communities in the context of urban environments. However, some tools refer to communities beyond the city scale which may be located in rural settings. Therefore, it is decided to use the term community in general and avoid drawing distinction between urban and rural communities. It is also worth noting that tools and frameworks specifically designed for only assessing rural community resilience are not analyzed here and should be analyzed in the future.

Measuring community resilience is recognized as an essential step toward reducing disaster risk and being better prepared to withstand and adapt to a broad array of natural and human-induced disasters (Burton, 2014). Various other benefits can be realized by developing and implementing CRA tools. These tools transform resilience into a more tangible and measurable concept, and help understand what constitutes community resilience by, among other things, investigating different environmental, social, economic, physical, and institutional elements of a community that are related to resilience (see Section 3 for more details on how tools are related to communities). They encourage thinking about future uncertainties, and provide a lens through which complexities of communities as socio-ecological systems can be better understood (Levine, 2014; Sellberg et al., 2015). Conceiving communities as socio-ecological systems implies that ecological factors are coupled with socio-economic factors and multiple feedbacks, across different spatial and temporal scales, link these different factors together (Evans, 2011). Resilience assessment tools can also be used for benchmarking performance (resilience status) of communities against peers and best-practice standards. This can instigate competition among communities and provide a platform for them to share knowledge and learn lessons from one another (Barkham et al., 2014; Arbon et al., 2012).

As ex-ante decision support systems, assessment tools can help planners and decision makers identify vulnerable areas that need to be strengthened and suggest potential leverage points for intervention (Frankenberger et al., 2013). They can also help identifying areas that are lagging behind and need to be prioritized when allocating limited resources (Khazai et al., 2015; Sellberg et al., 2015; Sempier et al., 2010). As ex-post decision support systems, assessment tools can be utilized by organizations/local authorities that have undertaken resilience and disaster risk reduction activities and need to monitor effectiveness and efficiency of their plans and find out whether they have worked and the community is making progress toward becoming more resilient (Khazai et al., 2015; Renschler et al., 2010b).

Conducting assessment and effectively disseminating the results is important for enhancing transparency of the planning process and improving accountability of authorities (Pringle, 2011; Tyler et al., 2014). If developed and implemented in collaboration with different stakeholders, the assessment process can also empower citizens and enhance their role in decision-making process (Cox and Hamlen, 2014). In addition, stakeholder involvement can enhance risk communication to community members and help them understand what resilience means to them and where their community stands in terms of resilience (Khazai et al., 2015; White et al., 2014). Collaboration in the process can also lead to establishment of social networks that are deemed to be essential for enhancing resilience (Frankenberger et al., 2013).

Despite the existence of many CRA tools, few researchers have studied them and they have only focused on providing an overview of the existing tools and their structure. Irajifar et al. (2013) investigated eight selected assessment frameworks and found that they lack specific variables and attributes suitable for measurement purpose at the community level. Monaghan et al. (2014) provided a list of six CRA toolkits and explained the main features of them. Pfefferbaum et al. (2014) studied six different CRA tools and outlined their similarities and differences. Their work shows that existing tools have achieved considerable success in promoting resilience assessment and further research is needed to provide communities with more resilient development pathways. Larkin et al. (2015) provide an overview of resilience assessment efforts undertaken by various agencies across the United States. Their study highlights major characteristics of seven assessment frameworks. The study argues that the frameworks can help communities in identifying their weaknesses. However, more work is needed in terms of specifying guiding standards for use at the local scale (Larkin et al., 2015). To date, the most detailed investigation has been made by Cutter (2016) who provides an overview of 27 assessment tools. She discusses commonalities and differences between these tools in terms of their spatial orientation, main dimensions addressed in each tool, and the approaches they have adopted towards assessment. She argues that existence of multiple solutions to the assessment issue can be explained by the fact that the concept of resilience is interpreted differently depending on the context and assessment proponents have different motivations. She also emphasizes the need for assessment tools that are co-designed and acknowledge social dynamism of communities.

The issue of CRA deserves further consideration. This study aims to broaden the understanding of CRA tools by critically reviewing 36 selected CRA tools. The specific objectives are: (a) to provide a detailed overview of CRA tools; (b) to develop a framework for evaluating the validity of CRA tools in terms of content, construct, and development/implementation process; (c) to examine the selected CRA tools using the evaluation framework; and (d) to discuss various challenges and opportunities for improving performance of CRA tools.

This study is important because CRA is a relatively new and still developing field. CRA can provide a platform for involvement of

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