Risk Assessment in Resource Limited Communities – Identifying Best Practice

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ABSTRACT

A triggering event results in disaster due to the severity of impacts and sequential, secondary consequences. These consequences result from factors such as the biophysical, social, political, economic, and structural context of the community experiencing the event. Climate change adds an additional progressive factor that increases the potential severity and frequency of triggering events and the vulnerability of communities experiencing the impact. Projecting future climate change impacts is imperfect, with a high degree of uncertainty. Too often, a lack of resources or a perceived need for precision is cited as a barrier to policy development. It is critical that communities view preparation for climate change exacerbated disasters as both important and feasible. In particular, it is the most resource poor communities that are often disproportionately vulnerable. Policy development relies on comprehensive risk assessment. Strategies for conducting risk and vulnerability assessment in low capacity communities often rely on qualitative assessment and local engagement. Despite the qualitative nature of these processes, a defensible basis for strategy development is produced. Low capacity refers to any number of factors that can inhibit local capability to engage in this process including community size, a lack or peer examples, elevated vulnerable populations, limited staff and municipal resources.

Introduction

Climate change is often perceived as occurring in the future. This can result in political reluctance to allocate resources that could be used to meet current needs. The perception that current needs must be sacrificed to address climate change and disaster impacts is particularly difficult to overcome in low-capacity communities; however, it is often these communities that are disproportionately vulnerable to climate change and disaster triggering events. Reluctance to develop measures to address this vulnerability has the potential to undermine long-term community viability. Disaster management and climate change adaptation must be seen as simply good planning that contributes to both immediate community needs and long-term vibrancy and resilience.

Disasters occur due to a primary, triggering event that causes a series of cascading consequences that unfold over time [1,2]. The cascade effect of disaster impacts continues through time and is bound up with regional relationships that also may be broken or interrupted. Climate change adds additional dynamic components to disaster management. The severity and frequency of

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some disaster triggering events may be affected. In addition, progressive climate change may slowly affect the viability of certain parts of an urban system and its regional relationships that will influence local capacity to cope with and recovery from disaster.

Climate change impacts vary spatially due to either variation in the climate impact itself (e.g. extreme rainfall events) or due to local biophysical or community characteristics. Extrinsic factors result in some populations being disproportionately vulnerable [3]. This is particularly true for minorities, the poor, and other socially marginalized populations [4, 5, 6]. Factors to consider include physical location, structural quality of residence, access to basic lifelines (e.g. communication, power, water), pre-existing knowledge, and occupation. Each of these can increase individual risk to slowly progressing climate change, which can, in turn, increase risk with respect to disaster events. Compounding these individual risks, is that cities or towns with a higher than average population of these vulnerable groups, often have less municipal capacity to evaluate, develop, and implement climate change and disaster management measures.

**Low Capacity Communities**

For the purposes of this discussion, low-capacity communities are defined as those with access to fewer resources and greater demands when addressing the challenges presented by climate change exacerbated disasters. Low-capacity communities embody one or more of the following characteristics.

- **Small to medium in size:** Over half of urban dwellers worldwide reside in cities with less than 500,000 residents [7], but these communities are less likely to have access to refined climate change projections. The IPCC [8] and many state and national governments generate climate change projections; however, these data lack spatial precision. In contrast, large are often able to hire climate scientists to produce downscaled climate models.
- **Staff limitations:** Smaller cities or cities with lower income populations, often have small municipal staffs. This results in limited time to conduct a risk and vulnerability assessment, develop strategies, and implement them.
- **Budget:** In addition to staff, poor communities often lack the fiscal resources needed to hire outside experts or implement strategies.
- **Jurisdictional control:** Climate change impacts cross political boundaries. Small and medium sized communities lack the authority to address expected impacts.
- **Lack of peer examples:** Most cities seen as leaders in development of comprehensive climate change adaptation and disaster management policy are large. The strategies developed in large metropolitan settings do not always transfer well to smaller communities. This lack of proven peer examples can be a challenge to resource poor communities.
- **Vulnerable populations:** As described above, there are a series of individual characteristics (e.g. age, income, race, employment, health status) that increase vulnerability. Communities with a disproportionately high percentage of vulnerable populations face increased climate change and disaster risk.
Keys to Success

Recent studies of communities who have demonstrated success in development and implementation of climate change adaptation strategies shared several common traits, despite differences in biophysical and socioeconomic characteristics. In addition, a suite of common barriers to policy development has also been identified [9,10].

<table>
<thead>
<tr>
<th>Keys to Success</th>
<th>Barriers</th>
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<tr>
<td>• Political leadership</td>
<td>• Inadequate data</td>
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<tr>
<td>• Science collaboration</td>
<td>• Reluctant decision makers</td>
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<td>• Triggering events</td>
<td>• Long time horizons</td>
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<td>• Dedicated funding and staff</td>
<td>• Resource constraints</td>
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<td>• Interdepartmental team</td>
<td>• Regulatory barriers</td>
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<td>• Stakeholder engagement</td>
<td>• Lack of peer examples</td>
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Taking Action

Strategy development relies on a comprehensive risk and vulnerability assessment. This process must begin with identification of a feasible process. Too often, a lack of resources or a perceived need for precision is cited as a barrier to climate change adaptation policy development. It is critical that communities view adaptation as both important and feasible. The steps described below can be pursued as part of a long-term, cost-intensive, and often quantitative process. But the same steps can be completed much more quickly with a small budget, where analysis is primarily qualitative. Regardless of approach, a prioritized set of community needs that serve as a basis for strategy development is produced. The identification of community adaptation and disaster mitigation needs is the focus of this discussion.

The risk and vulnerability assessment process follows four basic steps (Fig. 1). Before proceeding through these steps, there are a few preliminary measures that must be completed.

- **Establish a team**: A comprehensive risk assessment, even if the focus is solely on disaster events, will require an assessment that includes all structures, functions, and populations of a community. Accounting for this diverse set of information requires the assembly of a team [11, 12]. A team comprised of individuals from the community and government can also serve to facilitate integration across departmental boundaries and strengthen community connection.

- **Engage the public**: Effective, ongoing policy development and implementation requires support and input from the affected populations. An engaged community is critical to maintaining momentum over time when faced with budget cuts and/or staff turnover [11, 6].
Exposure
The informational goals for defining the climate change influence on hazard events focus on the extent and speed of change expected as compared to current conditions. A jurisdiction can make these evaluations qualitatively simply ranking responses high, medium, and low.

Sensitivity, Potential Impacts, & Adaptive Capacity
These steps ask three key questions: 1) What aspects of the community will be exposed to the identified disaster triggering events?; 2) Who or what will be affected by this exposure?; and 3) How prepared is the community for these points of exposure? Answering these questions in a systematic manner requires involvement from the team described above. The categorical data produced from these steps can be used to populate decision support tools such as a matrix to establish a prioritized list of community adaptation and disaster management needs.

Demonstrated Success
These steps have been drawn from literature, interviews with adaptation and disaster management experts, and a series of case studies that demonstrate the variety of ways that the steps in risk and vulnerability assessment can be conducted in low-capacity communities. These communities include the following [13]:

• City of Coachella, CA, USA: Committee of local stakeholders was assembled to serves as ambassadors to engage a population reluctant to participate in past planning efforts.
• City of Windsor, Ontario, Canada: Potential impacts were assessed through engagement with staff from every department within the city, resulting in a prioritized list of needs.
• City of Point Hope, AK, USA: Comprehensive risk assessment included regional collaborators, tribal elders consultation, and multiple factors such as mental health.
• City of Chula Visa, CA, USA: Several public forums were hosted by the city to educate and solicit ideas. Citizens participated in identification of impacts and generation of strategies.
• Kamaishi City, Iwate Prefecture, Japan: Education programs through the schools resulted in drastically reducing the loss of life during the March 2011 tsunami. This outcome as given rise to similar programs in the Tohoku region.
References