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Commentary

Conceptualizing Resilience

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Abstract
This commentary provides an overview of the idea of resilience, and acknowledges the challenges of defining and applying the idea in practice. The article summarizes a way of looking at resilience called a "resilience delta", that takes into account both the shock done to a community by a disaster and the capacity of that community to rebound from that shock to return to its prior functionality. I show how different features of the community can create resilience, and consider how the developed and developing world addresses resilience. I also consider the role of focusing events in gaining attention to events and promoting change. I note that, while focusing events are considered by many in the disaster studies field to be major drivers of policy change in the United States disaster policy, most disasters have little effect on the overall doctrine of shared responsibilities between the national and subnational governments.

Keywords
community; disasters; governance; resilience; sustainability

Issue
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Resilience has come into vogue in the disaster research field—and in governance in general—as a shorthand, intuitively comprehensible term to describe the ideal sort of community level response to disasters: that of "bouncing back" or "rebounding" from a shock (Aguirre, 2007; Comfort, 1994; Manyena, 2006). The term resilience, in the disaster research setting, borrows from the concept in ecology, in which we define a resilient ecosystem as one that can absorb a short-term shock to the system, and then can, in a reasonable span of time, return to the state of the ecosystem before the shock.

The problem with terms like "resilience" is that they become uncoupled from their intellectual and technical origins, and simply become catch-all terms or nostrums uttered by politicians, civil servants, and technical experts, with little or no shared understanding of what we mean. Still, the idea of resilience has considerable promise as an organizing principle, because it lends itself to some relatively measurable aspects that we can compare across communities from the local to the global level. And if we can understand the basic components of functionality, we can relate typical efforts to prepare for, respond to, recover from, and mitigate disasters.

A group known as MCEER (formerly the Multidisciplinary Center for Earthquake Engineering Research) at the University at Buffalo provided a simple but powerful conceptualization of resilience it called the resilience delta (see, for example, materials in MCEER, 2016). In a community, we can conceive of its resilience—and that of its individual components—along two dimensions: the size of the shock that the community or system withstands, and the speed at which the community returns to the status quo ante. Figure 1 illustrates this idea. Consider, for example, two communities, both of which are exposed to the same "size" shock (say, the same size earthquake or same degree of wind and water damage from a coastal storm). These are indicated as lines A and B. While both communities recover at the same rate, the

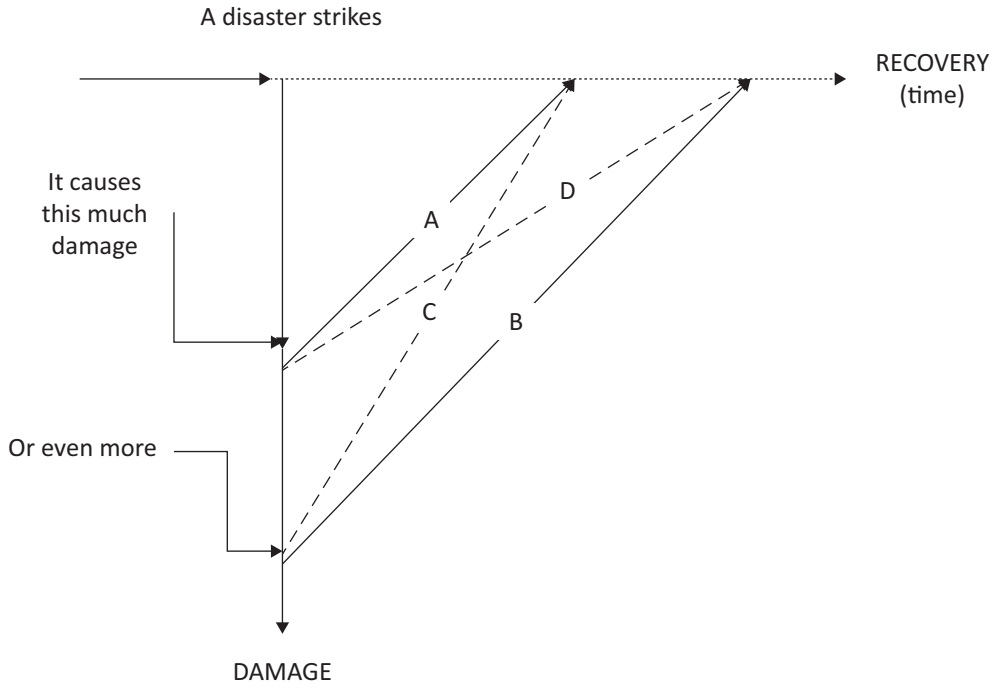

Figure 1. The Resilience Delta.

extent of damage to community B is such that it takes longer for that community to recover, even if their pace of recovery is quicker.

Next, consider two communities that sustain different levels of damage, communities C and D. Community C receives more damage than does community D, yet recovers more quickly because that community has made an investment in the things that communities need to recover quickly from disasters, such as making recovery plans or understanding the role of interdependent infrastructure systems and how they can promote recovery. We can therefore see two dimensions of resilience: efforts to reduce damage, which characterizes communities A and D, and a strategy to speed recovery, as exemplified by community C. We therefore might conceive of making communities more resilient by adopting policies that reduce the amount of damage that a community withstands in the first place, and that put measures in place to allow for rapid recovery of community functions after a shock has occurred; this is exemplified by community A in this diagram.

On this first dimension, communities such as Tulsa, Oklahoma, or Grand Forks, North Dakota, in the United States, have learned that leaving some land open and undeveloped means less property is exposed to flooding when it occurs. Similar measures have been undertaken in coastal communities worldwide, which attempt to, for example, retain natural features along the ocean, such as mangrove forests, that better withstand damage than would engineered disaster mitigation systems. Of course, this resilience delta is an oversimplification; in an actual community, there are multiple resilience deltas that describe the shock to and recovery of multiple systems, including water, power, transportation, education, health care, trade, industry and commerce, to name a few. In many cases, these resilience deltas are interdependent, because infrastructure is interdependent (Barker & Haimes, 2009; Leavitt & Kiefer, 2006).

Additional features of the resilience delta deserve attention. First, we know from the literature on disaster recovery that slow recovery can mean that a community fails to return to its original functionality. Managua, Nicaragua, for example, did not function as well as a city after the 1972 earthquake as it did before the quake, a result of a corrupt national government that stole disaster recovery resources to benefit its leaders (Birkland & Warnement, 2014). But corruption is only an extreme example of how slow efforts to recovery can cause community functionality to, over time, decline. On the other hand, one can conceive of truly resilient disaster recovery as including the ability of a community to rebound and, as is often said, built back better than the community was before. After a series of damaging earthquakes in California from the 1930s to 1990s, public policy in California was designed to improve the resilience of key systems through improvements to building codes in general, and with specific attention paid to schools, hospitals, roads, and utility and other lifeline systems. When "the big one" strikes California, it is likely to do substantial damage, but these efforts will, to some extent, mitigate the worst effects of large earthquakes, thereby improving community resilience (Birkland, 2006).

The policy tools used to improve resilience will vary based on the nature of the community and the resources available to it. But we must not assume that poorer areas of the world are, simply because of poverty, not resilient, nor should we assume that richer communities are necessarily more resilient.

Most jurisdictions use a variety of tools to mitigate disasters and to respond to them when they occur. In the United States, the adoption and use of these tools is primarily focused at the local level, either in local governments (cities, counties, and the like) or the subnational (state) governments. For simplicity's sake, we can broadly categorize such tools as informational, regulatory, and engineering. Informational tools include efforts such as mapping floodplains and inundation zones, informing people of what they can do to mitigate hazards in their homes and communities, or engaging in public information campaigns to inform people how to prepare for disasters by stocking food, water, batteries for radios and lights, and so on. More coercive regulatory measures include building codes and land use planning regulation; stringent building codes have proven their worth in reducing damage from earthquakes, hurricanes, and tornadoes. Land use tools involve prohibiting development in hazardous areas, such as in floodplains or tsunami inundation areas. These tools, however, are often viewed unfavorably by property owners, who would rather have the freedom to use their property as they see fit. Indeed, the pressure to develop land motivates communities to use engineered solutions to mitigate the harms done by disasters. Examples include levees along rivers, hardened shorelines and "beach nourishment" projects, and flood control dams. In some cases, engineered solutions make a community more robustly protected against flooding, but, when such systems fail, as in New Orleans in Hurricane Katrina in 2005, these systems fail catastrophically. The very land they "protect" is thereby made more vulnerable to disaster and the community is less resilient.

It is an article of faith in the literature about the United States that sudden, attention-grabbing "focusing events" drive changes in policy. One might assume that such events—major disasters, in this case—would provide opportunities for policy makers and communities to "learn" from disaster and to improve policy. But this does not happen all the time. In the United States, the focusing event of September 11 led to policy changes its emergency management system that made the country less resilient to natural disasters; these errors were only corrected when Hurricane Katrina demonstrated the fundamental problems with the reorganization of the United States national emergency management based on faulty premises (Birkland, 2004).

Even then, while we can isolate individual examples of "better" policy being enacted after disasters at the sub national level, it is also the case that the fundamental organization of disaster management has not greatly changed in the last forty years in the United States. The major premises of emergency management and hazard mitigation—that state and local governments are primarily responsible for these efforts, with some financial and technical support from the national government—remain in place. This means that, in the United States, disaster mitigation and preparedness is variable from state to state, and from community to community within each state. That said, there is some evidence that states and local governments do learn from other states and localities with similar hazards. For example, Florida has long been considered a leader in hurricane preparedness, while California is a world leader in earthquake preparedness (Birkland, 2006). As communities in Washington state and Oregon have come to appreciate the earthquake hazard, they have begun to take lessons from California to mitigate and prepare for future earthquakes.

Developing countries also can learn from the experience of the developed world. The developing countries may not have the resources to invest in expensive engineered systems to protect against floods and storm surges. But developing countries can learn from, for example, the City of New Orleans. Some scholars believed that New Orleans was characterized by low levels of social capital, and therefore could not count on community solidarity and social capital to recover from the storm. This was not true (Hawkins & Maurer, 2010); New Orleanians could harness local efforts to shape disaster recovery and to parry some of the more impractical ideas of out of town "experts". Similarly, efforts to promote resilience in developing countries will likely be much more successful if they are conceived as bottom-up programs that are developed by local people, with expert assistance as needed, to meet the needs of the community. Well-meaning efforts to impose solutions from outside the community are not likely to successful. After the 2011 Haiti earthquake, most aid came from international non-governmental organizations (INGOs) that have largely provided things that have little to do with building community resilience (Klarreich & Polman, 2012). Haiti has long been dependent on NGO and international development assistance (Booth, 2011; Klarreich & Polman, 2012), even well before the earthquake, and needs are largely assessed without popular participation. This type of recovery is unlikely to succeed either as recovery or as means for promoting resilience.

Of course, it is simple to isolate the problems that governments and communities must address, often with limited time, few resources, and remarkable pressures to promote recovery. This thematic issue will go a long way to helping us to understand how developed and developing countries are similar and differ in their approaches to disaster governance and resilience. We will learn about how this governance may be improved, with attention to collaborative work among multiple stakeholders—from the neighborhood level, to regional and national governments, to NGOs. The goal of such efforts should not be to collaborate for its own sake—rather, these efforts need to assess who should collaborate, and to what end. Potential collaborators whose participation will not serve to improve disaster resilience should be deemphasized in favor of collaborators who have a demonstrated goal and track record in promoting resilience. I hope that the articles contained in this special issue move us toward this goal.

Conflict of Interests

The author declares no conflict of interests.

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