

**Climate Catastrophe and Resilient Response**

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### **Climate Catastrophe and Resilient Response**

Climate change is beginning to alter weather patterns, causing severe change to the hydration cycle and fluctuating temperatures — both are the key ingredients in a natural disaster. Urban sustainability professionals and world leaders alike often look to response methods that are resilient. This research summary identifies the repeated elements that make disaster resilience responses more successful.

### **The Role of Climate Change in Natural Disasters**

There is no doubt that climate change is impacting our planet — temperatures are rising, industrial agriculture and fossil fuels are altering greenhouse gasses. The natural cycles of the planet are changing as we tiptoe closer to tipping points where we cannot come back. The results of climate change will not present themselves all at once like a dystopian film saga. One of the warning signs that we see on a regular basis — and likely an increasing one — is intensifying weather events. The change in greenhouse gasses is causing more severe weather patterns, which creates more frequent natural disasters.

To discuss the role that climate change has on natural disasters, we must first look to the research that demonstrates that climate change is occurring and that it has a correlation with weather patterns. The Intergovernmental Panel on Climate Change created three statements after reviewing tens of thousands of research studies around the world over the course of 25 years. Their network also includes 2,500 scientists from more than 130 countries. They found that:

1. Climate change is real and is happening now.

2. It is caused primarily by human activities such as the burning fossil fuels and the clearing of forests.
3. It is projected to accelerate and have harmful effects such as rising seas, ocean acidification, species extinction, and more extreme weather events, including intense and longer lasting heat waves, especially during the latter half of this century, unless we act now to slow it down. (Miller et al., 2011)

It might be easy to look for direct causes between certain destructive storms and their causes. After all, if one could find the cause of a particularly destructive hurricane then future ones might be prevented. “There is not sufficient evidence to link any specific extreme weather event to climate change. However, the climate scientist points out that climate change is likely to increase the overall changes of extreme weather events in the coming years,” (Miller et al., 2011, p. 504).

Studies show that climate change will specifically bring more drought and an intensified water cycle which will produce more snow and rainfall. The rise in temperature and precipitation are currently producing more frequent storms and devastating heat waves.

Since 1950, heat waves have become longer, more frequent, and in some cases more intense. Warming increases the kinetic energy in the atmosphere, and as a result this trend is likely to continue in some areas. This could raise the number of heat-related deaths, reduce crop production, and expand deserts. (Miller et al., 2011, p. 520)

A 2014 study led by Wenju Cai, supports that climate change and atmospheric warming are altering weather patterns. The study focused on how warming will likely create more intense El Niño type weather patterns, which are known for their destruction and death. In the 1990s it's estimated that 23,000 people died and damages totaled around \$33 billion from the impacts of El Niño. Also La Niña caused extreme flooding that displaced 200 million people (Miller et al., 2011, p. 521).

Individual storms do not have an origin that can be traced to a particularly pollutant power plant or industrial farm. In fact, there may even be ebbs and flows in the number of severe storms. However, a panel from the World Meteorological Organization projected in 2010 that “atmospheric warming is likely to lead to fewer but stronger hurricanes and typhoons that could cause more damage in coastal areas where urban populations have grown rapidly” (Miller et al., 2011, p. 521). Weather patterns will continue to become more extreme as global warming continues.

### **Disasters and Urban Sustainability**

Natural disasters are a factor that every urban planning and sustainability professional must consider in their work. Climate change and more frequent weather events require urban sustainability professionals to consider more consistent response plans and ways to help communities bounce back from mass disruption quickly.

In recent years, weather disasters have had a greater impact financially and in mortality rates. The number of weather-related disasters to hit the world has increased five-fold over the

past 50 years, according to the World Meteorological Organization (McGrath, 2021). Weather extremities caused losses of \$383 million per day between 2010-2019, which is seven times more than 1970-1979 (McGrath, 2021). According to a review by the BBC of a 2021 report released by the World Meteorological Association, more than 90 percent of the deaths related to weather disasters have occurred in developing countries. “The biggest killers have been droughts, responsible for 650,000 deaths; while at the other end of the scale, extreme temperatures took nearly 56,000 lives,” (McGrath, 2021). The impacts of natural disasters have a longer negative residual effect in lower income and often BIPOC communities. Urban sustainability is centered on helping foster wellness for entire urban ecosystems — including the wellbeing of people in that system.

### **What is Disaster Resilience?**

Resiliency is the ability that a system has to “bounce back” after a disruption. When a system, like an urban city, is harmed or altered it faces two options — to become an entirely new system or to maintain its core identities and become a new version of what was once there. “Disaster resilience is the ability of individuals, communities, organizations and states to adapt to and recover from hazards, shocks or stresses without compromising long-term prospects for development,” (Combaz, 2014). Resilience after a disaster is especially difficult because often there are many aspects that need rebuilt — physical infrastructure, equitable access for those who lived there before, and economic viability.

For a system to “bounce back” there must be a clear definition of what that place is; what are the features that are core aspects of its identity. A resilient system is one that can endure a

disturbance (like a natural disaster) without having its central “self” destroyed. Having a clear picture of this identity is vital to crafting resilient response plans. In order to define those core features everyone in the community must be represented equally. Those who live in a neighborhood should be the ones to define what makes that community unique.

In urban sustainability pedagogy there are several foundations of resilience that take on an ecological focus. The first is elasticity, meaning the capacity of a system to integrate new elements into its existing core identity or function. An invasive species that can exist alongside native plants would be considered resilient in an environmental ecosystem. The second foundation of resilience is diversity. The more diversity within a system the more resilient that system is to disruption. Again, consider an environmental ecosystem and the role of biodiversity as a strength. Different parts and species support the resilience of one another. This diversity of organization is called panarchy. When species are organized in a variety of ways they are not all disrupted at once when there is a large impact or change. Lastly, a foundation of resilience is the proximity to a system’s tipping point; this determines the precarity of an ecosystem.

### **Attributes of Resilient Cities**

The idea of creating resilience is nothing new. However, the research around resilient disaster response methods only spans the last two decades. There are many approaches to resilient response but very little research in place that compares the characteristics of resilience itself in this context. This subsequent research assessment aims to identify the repeated elements that make disaster resilience more successful.

The following is a summary of two pieces of qualitative research that arrive at resilience in different ways. The first is a research summary conducted by the Governance and Social Development Resource Centre (GSDRC) (2014), an academic affiliation with the University of Birmingham and The University of Manchester. The second research summary is The City Resilience Index compiled by The Rockefeller Foundation (2014). Both had the objective of defining what makes a city resilient by identifying which characteristics were found most frequently throughout the research.

The research reviewed by GSDRC — an organization that has expertise in issues of governance, social development, humanitarian response and conflict — assessed the types of resilience methods that are in place amongst government agencies and other humanitarian groups. The GSDRC is a “partnership of research institutes, think-tanks and consultancy organizations” according to their website. The GSDRC created a list of empirical findings containing repeated elements of resiliency in this context. The GSDRC conducted qualitative research to identify the key factors that enable or impede disaster resilience. They reviewed 38 studies, 23 of those being primary and empirical sources for their findings. All of the studies were categorized as primary and empirical, experimental, observational, secondary, systematic review, or other. The research that GSDRC reviewed was a mix of qualitative and quantitative studies.

Overall, GSDRC notes that most of the findings are still rather limited to specific sectors or contexts. The completed evaluations and research date back less than a decade making these studies and their methods difficult to rigorously evaluate. The GSDRC also noted that the

geographic scope of the literature is limited to a Asian Pacific tsunami in 2004, cyclones in South Asia, earthquakes in China, and droughts in the Horn of Africa and Sahel. The GSDRC also found that most of the literature is lacking in issues around equality. “For example, most references are gender-blind, providing no disaggregated data. In part, these limitations reflect the relative infancy of the concept of disaster resilience, and ongoing debates about how to define, measure or operationalise it,” (Combaz, 2014).

The GSDRC found that the following seven attributes were considered key components of resilience:

- Adaptive capacities
- Good governance
- Economic development
- Disaster risk management
- Publically shared information on risk and resilience
- Community through social connections and networks
- Advancing equality through the participation and empowerment of at-risk groups

The City Resilience Index, created by the Rockefeller Group, did a similar assessment of resiliency research and literature. They identified empirical evidence from 150 sources then categorized it through qualitative research. The City Resilience Index also found seven qualities that make a city more likely to be resilient. They note that the seven qualities apply at a city scale and to individual systems. The City Resilience Index hopes “to provide cities with a robust, holistic and accessible basis for assessment so that they are better placed to make investment



decisions and engage in urban planning practices that ensure people living in cities – particularly the poor and vulnerable – survive and thrive no matter what shocks and stresses they encounter,” (City Resilience Index, 2014, p. 21).

This analysis resulted in a list of eight functions that are critical to resilience. The functions propose that a resilient city: delivers basic needs; safeguards human life; protects, maintains and enhances assets; facilitates human relationships and identity; promotes knowledge; defends the rule of law, justice and equity; supports livelihoods; stimulates economic prosperity. (City Resilience Index, 2014, p. 4)

### **Findings and Overlaps**

Both studies identified that diversity, economic development, and governance are important attributes of resilient systems. However, each found different approaches and frameworks for resilient response. The City Resilience Index notes that:

What was missing is a comprehensive, holistic framework that combines the physical aspects of cities with the less tangible aspects associated with human behavior; that is relevant in the context of economic, physical and social disruption; and that applies at the city scale rather than to individual systems within a city... Different groups within the same city had different perspectives on, and priorities for, what makes their city resilient. This highlights the importance of inclusive consultation in resilience planning. Further research is needed to specifically understand the factors that contribute to the resilience of

lower income groups. Our research suggested that their concerns and priorities were very different to those of the government and the private sector. (City Resilience Index, 2014, p. 4)

### **Resiliency Has to Come From the Community Itself**

Perhaps the most important piece of resilience — and the missing feature that was identified in both studies — is the involvement of indigenous populations and longtime residents. The foundational community must be the ones to identify core attributes of an area in order to maintain those pieces after a disruption. A separate study on indigenous knowledge, coping strategies and resilience to floods in Muzarabani, Zimbabwe shows through a qualitative finding that indigenous knowledge is important to reducing the impact of flooding and therefore makes the areas observed more resilient (Mavhura et al., 2013).

In order for a space to not lose its core identity, those who make up that identity must be heard without placing undue pressure on those communities.

There is also concern that, as a concept, disaster resilience has been depoliticised, placing too much responsibility on the individual and wider society rather than on state actors who have the political power to address the underlying causes of vulnerability to disasters. Some experts suggest that shifting to bottom-up disaster resilience risks further burdening women and girls. It has also been suggested that

the discourse of disaster resilience could stigmatize individuals and communities with low levels of resilience. (Combaz, 2014, p. 8)

### **Conclusion**

Disaster resilience is a type of urban sustainability that spans either side of the political aisle. Disasters occur in poor, wealthy, white, and brown neighborhoods alike. Finding common and repeatable aspects of resilient response plans can help numerous communities utilize these methods when a natural disaster occurs. Both studies identified that diversity, economic development, and governance are important attributes of resilient systems. However, each found different approaches and frameworks for resilient response. More research must continue in order to identify and test attributes of resilient methods. Resilient response is a vital tool for urban sustainability professionals to help mitigate the impacts of climate change on neighborhoods that are most at risk, and finding methods that are tested and true is paramount to this work.

### Resources

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