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Foreword: Current Trends in Disaster Law and Policy

Daniel A. Farber and Lisa Grow

We are honored to have the opportunity to introduce the *Cambridge Handbook on Disaster Law and Policy*. The range and depth of the contributions to this volume will make it a standard reference for years to come. We deeply appreciate the invitation of the editors to reflect on current themes in disaster law and policy.

The *Handbook* appears at a time of change for disaster law. Of course, it has never been easy to provide adequate responses to potentially catastrophic events such as earthquakes, heat waves, and tropical cyclones. Today, disaster law faces new challenges, due to shifts in the severity and frequency of disasters, discontent over how decisions are made and whom they benefit, and a lack of clarity over the long-term goals and strategies that disaster law should pursue. The authors who have contributed to this volume each make a contribution to resolving these issues and readying disaster law for a difficult future.

We will focus on three developments that we think are crucial to understanding the point at which disaster law finds itself. All three developments permeate the *Handbook*. First, climate change is dramatically amplifying disaster risks, an effect that is only likely to increase in the future. By linking disaster law and policy to the domain of energy and environmental policy, this development will require a rethinking of current approaches to disaster issues. Second, the governance structure for managing disaster risks is also a key focus of current attention. The threat of climate change is forcing renewed attention to issues such as fragmented governance while at the same time calling further attention to the role of societal inequalities in the disaster sphere. Finally, much of the thinking about disasters now revolves around the concept of resilience. Particularly in the era of climate change, this concept is in need of considerable refinement if it is to play the role that it is now assuming in disaster policy.

I CLIMATE CHANGE, DISASTER RISK, AND RESPONSE CHALLENGES

In 2020, there were a record twenty-two disasters with costs exceeding $1 billion.[1] That's three times the average number of such events in the prior forty years. The average for the past five years is sixteen events, more than double the past average. According to the government:

> The number and cost of weather and climate disasters are increasing in the United States due to a combination of increased exposure (i.e., more assets at risk), vulnerability (i.e., how much

1 This statistic, and the others in this paragraph, are drawn from Adam B. Smith, *2020 U.S. Billion-Dollar Weather and Climate Disasters in Historical Context*, Climate.gov (Jan. 28, 2021), https://www.climate.gv/news-features/blgs/beynd-data/22-us-billin-dllar-weather-and-climate-disasters-histrical#:~:text=The%2cstliest%222%2events%2were,previus%2tp%2D5%2cstliest%2years.

damage a hazard of given intensity – wind speed, or flood depth, for example – causes at a location), and the fact that climate change is increasing the frequency of some types of extremes that lead to billion-dollar disasters.[2]

We can expect climate change to become an increasingly important driver of change.

The evidence that carbon emissions from human activities cause climate change is now too overwhelming to require discussion. Depending on future emissions and climate sensitivity, the world could end up 2–7°C (35.6–44.6°F) warmer within a century.[3] Even 2°C of warming would leave the earth warmer than it has been in millions of years.[4] The effects of climate change have already been felt. According to the US National Oceanic and Atmospheric Administration (NOAA), "the five warmest years in the 1880–2019 record have all occurred since 2015, while nine of the 10 warmest years have occurred since 2005."[5] With rare exceptions, recent years rank at the top of the list of the warmest global temperatures,[6] and 2020 tied for the warmest year on record.[7]

The most dramatic effects of climate change involve extreme events rather than averages.[8] Studies have shown that "global warming had already influenced the magnitude and probability of unprecedented events at large fractions of the globe, including >80% for hot events and >50% for wet events."[9] A 2020 study showed that these previous estimates were probably too low, meaning that even the relatively modest degree of global warming to date has sharply heightened disaster risks.[10]

The scientific evidence is clear that climate change will accentuate disaster risks, putting even more stress on disaster response systems.[11] The list of climate-related disasters is a long one, including flooding, "heat waves, droughts, crop failures, wildfires, and outbreaks of illness."[12] A recent report of the Intergovernmental Panel on Climate Change (IPCC) lists climate-related risks including deaths in low-lying coastal zones and small islands, extreme weather events causing disruption of critical infrastructure and services, deaths from heat waves, and breakdown in food systems due to drought or flooding.[13] Indeed, the IPCC reported, "for many kinds of disruption, from crop failure caused by drought to sickness and death from heat waves, the main risks are in the extremes, with changes in average conditions representing a climate with altered timing, intensity, and types of extremes."[14]

As the IPCC points out, the effects will be especially grave for groups that are already badly disadvantaged. Climate-related risks impact "poor people's lives directly through impacts on

2 *Id.*
3 David Archer & Stefan Rahmstorf, The Climate Crisis: An Introductory Guide to Climate Change 129 (2010).
4 *Id.* at 225.
5 Rebecca Lindsey & LuAnn Dahlman, *Climate Change: Global Temperature*, Climate.gov (Mar. 15, 2021), https://www.climate.gv/news-features/understanding-climate/climate-change-glbal-temperature.
6 Archer & Rahmstorf, *supra* note 3, at 43.
7 Nat'l Aeronautical & Space Admin., 2020 Tied for Warmest Year on Record, NASA Analysis Shows (Jan. 14, 2021), https://www.nasa.gv/press-release/22-tied-fr-warmest-year-n-recrd-nasa-analysis-shws.
8 Models incorporating the effects of greenhouse gases account well for changes in extremes. Sonia Senevaratne & Neville Nicholls, *Changes in Climate Extremes and Their Impacts on the Natural Physical Environment*, *in* IPCC, Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation 126 (C. B. Field et al. eds., 2012).
9 Noah S. Diffenbaugh, *Verification of Extreme Event Attribution: Using Out-of-Sample Observations to Assess Changes in Probabilities of Unprecedented Events*, 6 Sci. Advances (Mar. 18, 2020), DOI: 10.1126/sciadv.aay2368.
10 *Id.*
11 *Id.*
12 Robert Verchick, *Adapting to Climate Change While Planning for Disasters: Footholds, Rope Lines, and the Iowa Floods*, 2011 BYU L. Rev. 2203, 2207 n.2.
13 IPCC, *Summary for Policymakers*, *in* Climate Change 2014: Impacts, Adaptation, and Vulnerability 13 (C. B. Field et al. eds., 2014), https://www.ipcc.ch/reprt/ar5/wg2/.
14 IPCC, *Technical Summary*, *in* Climate Change 2014: Impacts, Adaptation, and Vulnerability 35, 93 (C. B. Field et al. eds., 2014).

livelihoods, reductions in crop yields, or destruction of homes and indirectly through, for example, increased food prices and food insecurity."[15] The effects can be long-term: "urban and rural transient poor who face multiple deprivations can slide into chronic poverty as a result of extreme events, or a series of events, when unable to rebuild their eroded assets."[16] Disasters also cause disproportionate harm to poorer countries. As seen in places like Myanmar, Nepal, and Haiti following hurricanes or earthquakes, "a territory with poor infrastructure, a deprived population, compromised building safety, and an under-resourced health service will undoubtedly suffer more profoundly from the catastrophic consequences of a disaster."[17]

The ability of scientists to connect specific extreme weather events to climate change has gotten stronger.[18] A 2018 overview found that three-quarters of the published papers that year examining the attribution of extreme events found that climate change had increased the event's likelihood or intensity.[19] For instance, a study of two heatwaves in South Asia in 2018 found that climate change made those heatwaves at least eight (and possibly as much as a thousand) times as likely as they would have been.[20]

Two severe weather-related disasters early in this century stand out. In 2003, Europe had the hottest summer in at least 500 years.[21] In Geneva, the weather was similar to a normal summer in Rio de Janeiro.[22] Temperatures in Portugal were over 40°C (104°F) for many days, while London had its first recorded temperatures over 38°C (100.4°F) in history.[23] The prolonged heat was catastrophic. Estimates of the total number of deaths range from 30,000 to 50,000.[24] In Paris alone, there were 1,200 deaths more than normal,[25] and there were over 14,000 in France as a whole.[26] The heat wave also impacted agriculture and caused numerous forest fires, destroying over 640,000 hectares (2471 square miles) of forest.[27] Scientists concluded that "past human influence has more than doubled the risk of European mean summer temperatures as hot as 2003" and that "the likelihood of such events [is] projected to increase 100-fold over the next four decades."[28]

Another historic heat wave hit Russia in 2010. From the middle of July into August, there were uninterrupted days of temperatures above 30°C (86°F), sometimes reaching 35°C (95°F) for about a week at a time, with correspondingly hot nights.[29] The heat wave was considered a once-in-a-thousand-year event based on the historical record.[30] The World Meteorological

15 *Id.* at 51.
16 *Id.*
17 Therese O'Donnell & Craig Allan, *Identifying Solidarity: The ILC Project on the Protection of Persons in Disasters and Human Rights*, 49 Geo. Wash. Int'l L. Rev. 53, 54 (2016).
18 *See* Michael Burger, Jessica Wentz, & Radley Horton, *The Law and Science of Climate Change Attribution*, 45 Colum. J. Envtl. L. 57, 61(2020).
19 *Id.* at 101.
20 *Id.* at 103–04.
21 Janet Larsen, *Setting the Record Straight: More than 52,000 Europeans Died from Heat in Summer 2003*, Earth Pol'y Inst. (July 28, 2006), http://www.earth-plicy.rg/index.php?/plan_b_updates/26/update56.
22 U.N. Environment Programme (UNEP), *Impacts of Summer 2003 Heat Wave in Europe*, 29 Env. Alert Bull. (June–Sept. 2003).
23 *See* Larsen, *supra* note 21.
24 *Id.*
25 Emamanuelle Cadot, Victor Rodwin, & Alfred Spira, *In the Heat of the Summer: Lessons from the Heat Waves in Paris*, 84 J. Urban Health 466 (2007).
26 *Id.* at 467.
27 UNEP, *supra* note 22.
28 Peter A. Stott, D. A. Stone, & M. R. Allen, *Human Contribution to the European Heatwave of 2003*, 432 Nature 610, 613 (2004).
29 Austl. Meteorological & Oceanographic Soc'y, *The Great Russian Heatwave of 2010*, 33 (Aug. 10, 2010), http://www.ams.rg.au/news/id/83.
30 *Id.*

Organization estimates the death toll at over 55,000.[31] One study found that the likelihood of such a heat wave had increased by a factor of five due to global warming.[32] Another study found that the heat wave was related to anomalies in atmospheric flow that seem unrelated to climate change, while a third study found that given the flow anomalies, global warming increased the likelihood that the heat wave would be as strong as it was by a factor of three.[33]

Climate change impacts disaster planning in several ways. Disasters are becoming the new normal. A world in which there are likely to be five or six truly large disasters in a country in a given year is very different from one in which we expect twenty. Risk mitigation becomes a higher priority investment. Expenditures on response will also need to ramp up, requiring increased staffing and resources for agencies such as the Federal Emergency Management Agency (FEMA) in the United States.

Another clear implication is that we cannot rely on historical data to assess future risks. Unfortunately, planning for extreme events remains wedded to a backward-facing view of risks.[34] That needs to change. That future will not be like the past, and continuing to assume otherwise is a recipe for massive failure.

Unfortunately, our inability to continue relying on the historical record also introduces additional uncertainty into risk assessment. Modeling future risks poses uncertainties, due both to the limits of modeling techniques (especially over smaller geographic areas) and the unknown future trajectory of greenhouse gas emissions. Scenario planning is one way of responding to this risk. Use of multiple scenarios can allow decisionmakers to identify solutions that will be effective over a broad range of scenarios, or failing that, to focus on the tradeoffs they will be making between cost and the potential for harm under different scenarios. The RAND corporation has developed a computerized form of this process which allows decision-makers to search for robust solutions over a very large number of scenarios, too many for an unassisted person to envision and consider.[35] Policymakers are more comfortable being able to rely on firm estimates of risk, but this is a luxury that we can no longer afford.

As the number of large-scale disasters increases, we will also be much more likely to see frequent clustering of disasters – that is, multiple disasters occurring simultaneously or close together. Climate change and the increasing population in vulnerable areas all but guarantee that the likelihood of massive harm stemming from natural disasters will increase drastically in the years to come. This will necessarily increase the probability of two or more disasters occurring in close succession.

A simple numerical example illustrates this effect. If we double the chance of a single event, we quadruple the chances of two in a row. For illustrative purposes, suppose that there is a one in twenty chance that a major disaster will occur somewhere in the United States during a specific period. The chance of two such disasters occurring during that time period is one in four hundred. If the chance of a single event doubles, the chance of two such events becomes one in a hundred. Thus, doubling the chance of a major disaster quadruples the chances of experiencing two in the same time period. Similar reasoning shows that the chances of experiencing three

31 World Meteorological Organization (WMO), The Global Climate 2001–2010: A Decade of Climate Extremes 33 (2013), http://library.wmo.int/pmb_ged/wmo_1103_en.pdf.
32 Nathaniel L. Bindoff et al., *Detection and Attribution of Climate Change: From Global to Regional*, *in* Climate Change 2013: The Physical Science Basis, Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change 867, 914–16 (T. F. Stocker et al. eds., 2013).
33 *Id*.
34 Diffenbaugh, *supra* note 9, at 7.
35 These techniques, along with other ways of coping with uncertainties that cannot be quantified, are discussed in Daniel A. Farber, *Uncertainty*, 99 Geo. L.J. 901, 933 (2011).

such disasters increase by a factor of eight.[36] So as events become more likely, clustering starts happening a lot more often than it used to even for unrelated occurrences.

We have already begun to see some notable event clustering. In 2017, Hurricane Harvey dumped up to 60 inches (1.5 meters) of rain on some parts of Houston. By historical standards, this was a 500-year flood. Houston also had what were supposed to be 500-year floods in 2015 and 2016.[37] If the risk of flooding had remained as low as once in 500 years, the odds of having such floods three years in a row would have been miniscule even if we took as a given that 2017 was one such year.[38] On the other hand, the chances of this kind of clustering would be much higher if climate change has made such floods 100-year events.[39]

Disasters can cluster not only geographically but temporally, with multiple disasters happening at the same time but in different places. We also saw a few years ago how overstretched FEMA was when the United States was hit in rapid succession by Hurricanes Harvey, Irma, and Maria. We also saw a cluster of unrelated events in 2020, where the United States experienced hurricanes on the Gulf Coast at the same time as unprecedented fires on the West Coast.

Susan Cutter's chapter in this book emphasizes the role of temporal clustering in increasing vulnerability. As an illustration, she notes that "[t]he rapid succession of events making landfall in close spatial (100 miles or 160 kilometers) and temporal (5 weeks) proximity especially in western Louisiana precludes any significant recovery time, let alone enough time and resources to prepare and respond to the next event." Similarly, she says, "[t]his same rapid succession of events proved equally devastating for Nicaragua in November 2020, which experienced two Category 4 Hurricanes, Eta and Iota, within a two-week window, making landfall about 15 miles (24 kilometers) apart."

We are likely to see more and more of those clustered events. This trend has important implications for institutions that deal with disaster response. FEMA will need a lot more capacity to handle those clusters. States will also need more capacity given the increased chance that other states may themselves be hit by severe disasters and unable to lend assistance. In other words, surge capacity will become an ever-more important consideration in funding and maintaining disaster-response agencies. The need for greater capacity and resources will carry over into the disaster-recovery phase.

Although we often tend to focus on the direct physical impacts of natural disasters, we also need to pay more attention to disaster cascades, in which a natural event causes interlinking systems to fail. Such cascading failures become more likely as events become more extreme,

36 This analysis assumes that disasters are not correlated, but it seems likely that a major hurricane will occur under conditions that indicate a major hurricane season, so that the odds of a repetition are probably enhanced.

37 Dara Lind, *The "500-Year" Flood, Explained: Why Houston Was so Underprepared for Hurricane Harvey: It's the City's Third "500-Year" Flood in the Past Three Years*, Vox (Aug. 28, 2017), https://www.vx.cm/science-and-health/217/8/28/16211392/1-5-year-fld-meaning.

38 We begin with a 1/500 chance of such an event occurring in any given year. We wouldn't be looking to see if there were three events in a row if one of them had not already happened – say 2017. For that reason, we should take 2017 as a given. Now we want to know, given that the event occurred in 2017, the odds of a run of three. The odds of two 500-year events happening in any two specific years are 1/500 × 1/500, or 1/25,000. However, there are three configurations giving a three-year run including 2017, depending on whether 2017 is the first, second, or third year. That gives us 3 × 1/25,000 or 0.012 percent for a cluster of three events, given that we know that one of them happened. In other words, knowing that 2017 had a 500-year flood, the odds are about one out of 8000 that it would be part of a three-year cluster.

39 In this scenario, the odds of a cluster of three, given that 2017 had such a flood, goes up by a factor of 25 to 0.3 percent, which is small but less incredible. Any way you slice it, Houston's cluster of three floods looks extremely unlikely for 500-year floods but significantly more likely if such events are now 100-year floods. The odds of a "trifecta" (three formerly 500-year floods in a row) remain small in any one location, but in a large country, it becomes more likely that such a trifecta will happen somewhere during any given time period.

since more systems are likely to be impacted. For instance, extreme weather can cause the electrical grid to fail, causing other systems to fail. An example of this took place as a result of Hurricane María, a Category 4 storm that hit Puerto Rico in 2017.[40] María was "the strongest hurricane to hit Puerto Rico in more than 80 years."[41] A Harvard study estimated that there were over 4,500 deaths, only a few of whom were killed by the direct physical impact of the storm.[42] Many more deaths were due to systems failures, such as the effects of impaired transportation or electricity supply on medical care. The drinking water system failed, along with the cellular network.[43] Recovery was slow and uneven. Six months after the hurricane struck, over 95 percent of Puerto Ricans had power, but more than 50,000 still did not.[44]

Susan Cutter's chapter in this book highlights the issue of disaster cascades. As an example, she points to the wildfire to mudslide cycle in California. Another example involves Hurricane Harvey, where intense rainfall produced flood waters that disabled the refrigeration system in a polymer manufacturing facility, resulting in the fire and the release of toxic fumes.

The potential for interdependent systems to cause disaster cascades was also vividly illustrated by events during exceptionally cold winter weather in Texas in early 2021. The cold weather impacted the natural gas system because producers and pipelines had not weatherized against the cold, cutting off important supplies of gas. The failure of that system in turn caused shutdowns in generators that relied on natural gas, and other generators shut down because they were not weatherized.[45] The failure of these generators caused blackouts. Lack of electricity also increased the number of failures in the water supply system, which had also been directly impacted by the severe cold.[46]

Future disaster planning will increasingly need to take into account the possibility of cascading failures propagating through interlinking systems. Planning often takes place on a system-by-system basis – for instance, the natural gas industry in Texas is regulated by a different agency than the electricity system.[47] As we will discuss in the next section, the risk of cascading failures requires coordinated strategies and forging those strategies, in turn, may require new decision-making structures.

As we have seen, climate change will require changes in disaster planning and response. Because we will no longer be able to rely on the historical record to determine future risks, new

40 Chris Huber, *Hurricane Maria: Facts, FAQs, and How to Help*, World Vision, https://www.wrldvisin.rg/disaster-relief-news-stries/hurricane-maria-facts (last updated Aug. 1, 2018).

41 *Id.* (*citing* Danica Coto, *Maria Destroys Homes, Triggers Flooding in Puerto Rico*, AP (Sept. 21, 2017), https://apnews.cm/5f2213e2f42e4916efeda88de511/Hurricane-Maria-hits-Puert-Ric,-heavy-flding-reprted.

42 Nishant Kishore et al., *Mortality in Puerto Rico After Hurricane Maria*, 379 N. Engl. J. Med. 162 (2018), https://www.nejm.org/doi/full/10.1056/NEJMsa1803972.

43 *Hurricane Maria Update*, FEMA (Oct. 19, 2017), https://www.fema.gov/press-release/20210318/hurricane-maria-update.

44 Trevor Houser & Peter Marsters, *The World's Second Largest Blackout*, Rhodium Grp. (Apr. 12, 2018), https://rhg.cm/research/puert-ric-hurricane-maria-wrlds-secnd-largest-blackut/.

45 On the causes of the blackouts, *see* Elec. Reliability Council of Texas (ERCOT), February 2021 Extreme Cold Weather Event: Preliminary Report on Causes of Generator Outages and Derates (Apr. 6, 2021), http://www.erct.cm/cntent/wcm/lists/226521/51878_ERCOT_Letter_re_Preliminary_Reprt_n_Outage_Causes.pdf; Catherine Morehouse, *ERCOT Narrowly Avoided "Much More Devastating" Impacts as Nearly Half of Generation Went Offline: CEO*, Utility Dive (Feb. 25, 2021), https://www.utilitydive.com/news/ercot-narrowly-avoided-much-more-devastating-impacts-as-nearly-half-of-ge/595701/.

46 Reese Oxner, *Texans Now Face a Water Crisis After Enduring Days Without Power*, Tex. Trib. (Feb. 19, 2021), https://www.texastribune.rg/221/2/19/texas-water-pwer-utages/.

47 Electricity is regulated by the Public Utility Commission, whereas natural gas is regulated by the Texas Railroad Commission. *See* Erin Douglas, *Oil and Gas Interests Left to "Self-Regulate" in Aftermath of Winter Storm as Texas Politicians Pile on to ERCOT*, Tex. Trib. (Mar. 5, 2021), https://www.texastribune.rg/221/3/5/texas-il-gas-pwer-utages-erct-railrad-cmmissin/.

decision-making techniques will be needed to cope with the uncertainties surrounding risk estimates. Disaster response agencies will need to be larger and have more substantial surge capacity to respond to the increased magnitude of disaster risks and the higher probability of disaster clustering. More severe disasters will also highlight the problem of cascading disasters, which will require coordinated planning across agencies that have previously been siloed. Climate change may also require us to be realistic about our capacity to forestall certain types of disasters.

Broader governance challenges will also need to be faced. Fragmented governance may become increasingly problematic due to more intense disaster risks. Much more needs to be done to integrate climate and disaster governance. Moreover, the disproportionate impact of climate change on disadvantaged groups also increases the need for their participation in planning. Yet the same factors that make disadvantaged groups more vulnerable to climate change also reduce their opportunities to be heard in disaster planning and management. Furthermore, in mitigating disaster risks, there may be difficult trade-offs between near-term and long-term risk reduction. And even the much ballyhooed goal of risk management – resilience – poses puzzles and requires much additional thinking and clarification. We turn to these issues in the next two sections.

II GOVERNANCE CHALLENGES

As climate change intensifies the severity of disaster risks, it also places increased stress on the governance system for risk mitigation and response. The governance system dealing with disasters has always had its flaws. Those flaws will become increasingly problematic over coming years. In this section, we will focus on four challenges for the governance systems: fragmentation of authority, disconnects between disaster response and climate agencies, failure to come to grips with social inequality in the disaster context, and difficult temporal trade-offs.

A *Coordinating across Fragmented Authority*

We begin with the issue of fragmentation. As disaster risks become larger, they are more likely to transcend the boundaries and capacities of individual jurisdictions and cross the lines of authority between different agencies. The need for cross-jurisdictional and cross-agency responses will be amplified by increased disaster clustering and by the threat of disaster cascades, which impact areas beyond the physical disaster footprint. Although some efforts have already been made to deal with this problem, much more needs to be done.

To take one example, geographic fragmentation of authority is a pressing problem in terms of wildfires. Climate change has already caused a significant increase in the scale of wildfires in the American West, heightening the need for interjurisdictional planning. Fires can extend across federal, state-owned, and private lands. They can also stretch across many units of local government. Risk planning and mitigation must be correspondingly broad. In an effort to cope with the fragmentation of authority among local governments, the US government has established a "national cohesive strategy" under which communities that create wildfire-protection plans are eligible for federal funding. Stephen Miller's chapter is focused on the state of Idaho. Initially, individual counties prepared these plans, but the state has now encouraged preparation of plans across multiple scales, starting with neighborhoods.[48] Wildfire risk mitigation is also hampered

48 Miller also highlights an issue that is particularly important in rural Idaho but salient elsewhere: governance functions may be performed by informal institutions rather than by government officials, requiring special efforts to engage community actors outside of government. In addition, rural governments may lack capacity to engage in

by geographic fragmentation at the federal level because impacts stretch across lands controlled by different federal agencies. The conflicting mandates of the various land-management agencies hamper coordinated risk-mitigation efforts by the agencies that control different parcels of land.[49]

Fragmentation not only increases coordination problems when disasters require a coordinated response but can also lead communities to adopt measures that may substantially increase the risk to neighboring communities. A levee on one side of a stream can divert flood waters to the other side, potentially leading to an "arms race" in which jurisdictions on each side compete to have the highest levee. Often, this type of externality can only be resolved by empowering a higher level of government to take over the planning effort. Competition for resources during the disaster response can also have destructive consequences. During the US response to Covid-19, the Trump administration's failure to coordinate the distribution of medical supplies led to intense competition between states. More entrepreneurial or wealthier jurisdictions were able to garner a larger share of supplies that might have been better used elsewhere. Meanwhile, the time and energy of high-level state officials were consumed by bidding wars rather than being used more constructively to coordinate state public health efforts.[50]

Like wildfires, flood mitigation and response can also be hampered by geographic fragmentation. The Great Bay Area in China, with a population of 64 million and a GDP of $1.3 billion, could not be further removed from rural Idaho geographically, economically, or demographically, but both areas face these geographic fragmentation issues. The leading disaster risk is flood rather than fire in this low-lying delta area. As Maria Francesch-Huidobro describes in her chapter, there is no regional emergency response mechanism. Thus, the Greater Bay Area seems ill-prepared to deal with the intensification of climate risks due to climate change.

Lack of communication and coordination between government agencies can also be problematic. Some of the issues about coordination between different government agencies are fleshed out in Chinkie Peliño-Golle's and Florence Chio Baula's chapter about flood-risk management in Davao City, a rapidly growing city in the southern Philippines. Geologists from the Mines and GeoSciences Bureau assessed certain hills as inherently unstable. Despite repeated landslides, which the city was well aware of, the national Department of Public Works and Highways proceeded with road construction without consulting the city (or apparently the geological service of its own government).

The need for interagency coordination is also crucial to disaster response. For example, the response to Hurricane Harvey included the Texas National Guard, the US Coast Guard, the US Department of Energy, the Department of Health and Human Services, and others.[51]

Disaster cascades increase the need for greater linkages across both geographic and agency jurisdictions. The 2021 Texas blackouts, which were described earlier, illustrate the problem. One factor that made the Texas electricity system vulnerable was its unique status within the contiguous United States as the only power system disconnected from the national grid. That physical disconnect made it impossible for Texas to draw on the regional grid to meet its needs.

the kinds of planning required to manage wildfire risks, a problem that is not unique to Idaho. Both issues regarding the effectiveness of local government may be operative in a range of settings, including some developing countries.

49 Lauren Wishnie, *Fire and Federalism*, 17 N.Y.U. Envtl. L.J. 1006 (2008).

50 Annie Linskey, Josh Dawsey, & Isaac Stanley-Becker, *As Feds Play "Backup," States Take Unorthodox Steps to Compete in Cutthroat Global Market for Coronavirus Supplies*, Wash. Post (Apr. 11, 2020), https://www.washingtonpost.com/politics/as-feds-play-backup-states-take-unorthodox-steps-to-compete-in-cutthroat-global-market-for-coronavirus-supplies/2020/04/11/609b5d84-7a70-11ea-a130-df573469f094_story.html.

51 *Agencies Respond to Hurricane Harvey*, Arthur D. Simon Ctr. for Interagency Coop. (Aug. 28, 2017), https://thesimnscenter.rg/agencies-respnd-t-hurricane-harvey/.

Within Texas, regulatory jurisdiction was also divided, with one agency in charge of natural gas and another agency in charge of electricity. A major factor in causing the blackouts, however, was the failure of much of the natural gas supply for generators. Among the reasons for failure of the natural gas supply, in turn, was that some supplies were put offline because the suppliers' electricity failed. Thus, the two energy systems proved to be tightly integrated, but this integration was not reflected in agency structure. It was only when faced with a rare deviation from normal weather patterns that the cost of fragmented authority became obvious. Climate change will make such previously rare extreme events more common, resulting in more cascades and making fragmentation of authority a more pressing issue. This is one of many reasons why disaster law needs to be more closely integrated with climate adaptation policies.

In considering forms of coordination across jurisdictions, it is important to keep in mind not only the need for efficiency but also possible impacts on inequality. Depending on circumstances, decentralization can sometimes counter the unequal distribution of political power and sometimes aggravate it. Where local communities have some degree of control over risk mitigation and post-disaster restoration, they may be able to protect their interests in ways they could not in a more centralized system. In other circumstances, central authorities may be more attentive to the plight of disadvantaged communities than state governments, which may be dominated by other groups.

Sometimes both processes can be present, as when decentralizing power from the state level empowers communities while at the same time shifting more authority to the national level. For instance, in the United States, Indian tribes were disadvantaged by the need to go through state governments in order to get disaster-related funding.[52] Legislation enacted in 2013 shifted power away from states by allowing tribes to go directly to the federal government for a disaster or emergency declaration.[53] Thus, reducing the power of the states both increased the federal government's ability to attend to tribal interests and strengthened the power of the tribes to define their own responses to disasters.

B *Integrating and Mainstreaming Climate Policy*

Given that the most important impacts of climate change may involve extreme weather events, disaster agencies will need to take climate science into account in their planning to an increasing extent, especially in terms of infrastructure projects that will have to remain effective over extended periods of time. On the other hand, an important part of climate adaptation policy will involve improved disaster risk mitigation and response. These interconnections will require policy coherence extending across agencies, yet creating this degree of coherence may not be easy given current institutional silos. Fragmentation between agencies specifically focused on climate change and agencies involved in disaster-risk management and response will thus pose an increasingly serious problem.

Many jurisdictions have yet to link disaster planning and climate adaptation. For instance, Francesch-Huidobro reports that in the Greater Bay Area, some cities such as Hong Kong and Guangzhou give very low priority to climate adaptation, and they treat flood risks outside of their adaptation efforts. In the United States, linking climate change to mitigation of flood risks has been highly controversial, with the Trump administration staunchly resisting such a link.

52 Heidi K. Adams, *Sovereignty, Safety, and Security: Tribal Governments Under the Stafford and Homeland Security Acts*, 1 Am. Indian L.J. 127 (2012).

53 *Tribal Affairs*, FEMA, https://www.fema.gv/abut/rganizatin/tribes#:~:text=On%2January%229%2C%2213%2C%2President,declaratin%2independent%2f%2a%2state (last updated Jan. 19, 2021).

Other jurisdictions have been more open to making this connection. Tokyo's adaptation plan contains a broad portfolio of adaptation measures. The city forecasts major increases in torrential rain events, accompanied by more landslides; dramatic increases in the number of extremely hot, humid days; greater coastal flooding due to increased wave action; more intense (though fewer) typhoons; and sea level rise. The proposed responses include measures such as expanding reservoirs and stormwater capacity to deal with increased rainfall, promoting urban greening, and creating "cool spots" and low-heat pavement to deal with heat waves.[54]

At the global level, it is only recently that international disaster law has begun to take account of climate change. Attention to climate change surfaced in the *Sendai Framework*, which provides guidance on disaster risk reduction through 2030. In contrast to previous international agreements, climate change is referenced frequently in the *Sendai Framework*, beginning with the statement in the Preamble that many disasters are "exacerbated by climate change." Notably, the section on "Lessons Learned" includes a recognition that "[a]ddressing climate change as one of the drivers of disaster risk, while respecting the mandate of the United Nations Framework Convention on Climate Change, represents an opportunity to reduce disaster risk in a meaningful and coherent manner throughout the interrelated intergovernmental processes."[55]

International climate negotiations under the UN Framework Convention on Climate Change have also begun to come to grips with the disaster issue.[56] Climate change adaptation, including mitigation of climate-related risks like flooding, has begun to play a larger role in negotiations. In addition, the negotiations are just beginning to come to grips with the problem of assisting disaster victims. The Paris Agreement endorses the Warsaw mechanism for loss and damage as an extension of the annual climate negotiation process. The Warsaw mechanism was created in 2013 to pursue "implementation of approaches to address loss and damage associated with the adverse effects of climate change . . . in a comprehensive, integrated and coherent manner."[57] It has been described as an effort to do what can be done to help vulnerable people who are already feeling the negative consequences of climate change.[58]

How the loss and damage provisions will evolve remains an open question.[59] It has been said that, although the Warsaw mechanism "has often been described as a political victory for

54 For more about adaptation planning in Japan, see Daniel A. Farber, Yuichiro Tsuji & Shiyuan Jing, *Thinking Globally, Acting Locally: Lessons from the U.S., Japan, and China*, 82 Ohio St. L.J. 953 (2021).

55 Footnote 8 in the *Sendai Framework* defers to the UNFCC process with regard to climate-related issues, saying that "[t]he climate change issues mentioned in this Framework remain within the mandate of the United Nations Framework Convention on Climate Change under the competences of the Parties to the Convention." Article IV contains a request that other international bodies, specifically including the Conference of the Parties to the UNFCCC, "support developing countries, at their request, in the implementation of the present Framework, in coordination with other relevant frameworks." UNISDR, Sendai Framework for Disaster Risk Reduction 2015–2030 (2015), https://www.preventinweb.net/files/43291_sendaiframewrkfrdrren.pdf [hereinafter Sendai Framework].

56 The Rio+20 Declaration also recognized the need to address the link between climate change and disaster risks. The Declaration called for strategies to "integrate disaster risk reduction and climate change adaptation considerations into public and private investment, decision-making and the planning of humanitarian and development actions." Paragraph 190 of the Declaration also "emphasize[s] that adaptation to climate change represents an immediate and urgent global priority. RIO+20, The Future We Want (2012), https://sustainabledevelopment.un.org/content/documents/733FutureWeWant.pdf.

57 *Warsaw International Mechanism for Loss and Damage Associated with Climate Change Impacts (WIM)*, UNFCCC, https://unfccc.int/tpics/adaptatin-and-resilience/wrkstreams/lss-and-damage-ld/warsaw-internatinal-mechanism-fr-lss-and-damage-assciated-with-climate-change-impacts-wim.

58 Koko Warner, *Significance of the Warsaw International Mechanism*, UN Univ. (Sept. 11, 2013), https://ehs.unu.edu/news/news/significance-of-the-warsaw-international-mechanism.html.

59 Veera Pekkarinen, Patrick Toussaint, & Harro van Asselt, *Loss and Damage After Paris: Moving Beyond Rhetoric*, 2019 Carbon & Climate L. Rev. 31. In terms of the Paris Agreement, at the insistence of developed countries and in particular the United States, "Liability and compensation were explicitly excluded from the Paris Agreement by

developing countries, its operation to date reflects the low priority that loss and damage has been given within the climate regime."[60] Developed countries have been reluctant to discuss disaster losses caused by climate for fear of being held financially responsible. Development of an insurance-based system may be one promising approach, given the potential for such insurance to "provide security against the loss of assets, livelihoods and lives in the post disaster period, ensure reliable post disaster relief, provide certainty for weather affected public and private investments, ease disaster related poverty and spur economic development at individual, community, regional and global levels."[61]

Despite these indications of progress, international disaster law and climate law still live in two different worlds that are only now starting to intersect. Disaster agencies like the Red Cross and Red Crescent work in one world, climate negotiators in another. Deepening the connections between these different institutions may not be easy but will become increasingly urgent as climate change accelerates, along with the severity of disaster risks.

Climate policy and disaster law can also intersect in another way. Rather than simply attempting to restore and harden existing infrastructure, infrastructure can be transformed in ways that reduce disaster risks and help mitigate climate change. At the same time, post-disaster recovery can also address issues of inequality. Puerto Rico's recovery from Hurricane María is a case in point. Prior to Hurricane María, Puerto Rico's grid was already in trouble. It was almost completely dependent on imported fossil fuels, and the precarious financial state of the government-owned utility had resulted in massive layoffs and neglect of even basic routine maintenance. Power was generated on one side of the island while the load was located on the other, requiring long power lines to go through the mountainous interior. The system collapsed during the storm. The utility proposed a rebuilding plan that emphasized use of natural gas, but the plan was rejected in favor of an alternative that placed the emphasis on solar power and energy storage.[62] After the storm, Puerto Rico also adopted targets of 40 percent renewables by 2025, 60 percent by 2040, and 100 percent by 2050. The state-owned utility is also mandated to phase out coal-fired generation by 2028.[63]

The dilapidated state of Puerto Rico's grid prior to Hurricane María cannot be separated from the poverty and overall neglect visited on the island. Although Puerto Ricans are US citizens, the island is not a US state. The Puerto Rican government has some degree of autonomy, but the island is politically subordinate and economically dependent on the federal government. Per capita income is well below that of Mississippi, the poorest of the US states. Creating a reliable, disaster-resistant, and low-carbon grid will simultaneously transform the grid, decrease carbon emissions, and address inequality.

Integrating climate considerations into disaster-risk management is easier said than done. It will have to overcome considerable institutional inertia and will be sure to encounter resistance. Climate modeling may indicate the need for more robust protection, creating political difficulties for advocates of infrastructure projects. It may also indicate that larger areas are at risk from floods or fires, harming property values and leading to increased insurance costs and possible

paragraph 51 of Decision 1/CP.21, under which the COP '[a]grees that Article 8 of the Agreement does not involve or provide a basis for any liability or compensation.'" *Id.* at 34.

60 *Id.* at 38.

61 *Id.* at 42.

62 Robert Walton, *Puerto Rico Regulators Set Island on a 5-Year Course to Procure Renewables, Storage*, Utility Dive (Aug. 26, 2020), https://www.utilitydive.cm/news/puert-ric-regulatrs-set-island-n-a-5-year-curse-t-prcure-renewables/584132/.

63 *Puerto Rico Territory Energy Profile*, U.S. Energy Info. Admin., https://www.eia.gv/state/print.php?sid=RQ (last updated Nov. 19, 2020).

restrictions on use. Communities that fear such outcomes may attempt to block consideration of climate change in order to forestall them.

C *Addressing Disaster Inequality*

We turn next to the issue of disaster inequality. It is now a commonplace of disaster and climate scholarship that the effects of both individual disasters, in particular, and climate change, more generally, will be felt most acutely by those who are already marginalized and vulnerable. Black, Indigenous and people of color (BIPOC) and lower-income individuals and communities, people with disabilities or chronic health problems, sexual minorities, religious minorities, children and older adults, households headed by women, residents of rural areas, and many other groups bear disproportionate burdens from climate change both during and after disasters.

Indeed, the vast majority of contributions to this *Handbook* recognize the disproportionate impact of climate change-induced (and other) disasters on vulnerable communities and individuals. Both Rob Verchick and Shelley Welton highlight the need for our energy infrastructure to better serve the needs of the vulnerable, who suffer most when power is unreliable or unavailable. Ann M. Eisenberg's chapter notes the particular vulnerability of rural communities, whose residents are often are poorer, older, and less healthy than those in many urban and suburban communities. Dawid Sześciło's chapter on mitigating urban heat island effect likewise highlights the increased risk to older, sicker, and poorer individuals.

The compressed and cascading disasters that climate change portends underscore the impossibility of addressing disaster's disproportionate effects on the vulnerable through climate and disaster policy alone. The problems of structural racism and wealth inequality that are primary drivers of disaster vulnerability in the United States and so many other places require long-term, sustained commitment to reform, rather than merely addressing their myriad manifestations during and after disasters. Mari Matsuda's poignant chapter highlights the inextricable link between the vulnerability on display during and after disasters such as Hurricane Katrina and the everyday vulnerability of ordinary times, exemplified by the neglect of New Orleans' failing public school infrastructure long before Katrina struck. We cannot eliminate the "disaster underclass"[64] without addressing pressing problems such as intergenerational poverty that risk a permanent underclass.

And, yet, on an international level, the Warsaw Mechanism (discussed above) may provide some preliminary scaffolding for addressing some of these challenges through the lens of climate justice. So, too, at home we must ensure that climate and disaster policy and disaster events that expose inequity become catalysts for more fundamental change. Cinnamon Carlarne's chapter vividly illustrates this point as it explores how the Covid-19 pandemic has centered "questions about vulnerability, inclusivity, and equity" and calls for translating that heightened awareness into action to mitigate the disproportionate effects of climate change on the most vulnerable among us.

Unfortunately, as currently constituted, too much climate policy and policy at every stage of the disaster management cycle – from mitigation to response to recovery – not only reflects but entrenches existing inequities.[65] Planning for disaster response, for example, has often failed to

64 Robert R. M. Verchick, *Disaster Justice: The Geography of Human Capability*, 23 Duke Envtl. L. & Pol'y F. 23, 25 (2012).

65 Brigham Daniels, Michalyn Steele, & Lisa Grow, *Just Environmentalism*, 37 Yale L. & Pol'y Rev. 1 (2018) (describing how some climate change policies, such as gasoline taxes or broader energy taxes, can be regressive and disproportionately impact lower-income individuals and people of color); Lisa Grow et al., *Disaster Vulnerability*

consider the evacuation needs of lower-income residents who lack private transportation; the evacuation, shelter, and communication needs of those with disabilities; and the particular concerns of other vulnerable people like LGBTQ+ individuals and undocumented people.[66] All of these failures mean that vulnerable people are more likely to suffer serious harm during a disaster event and its immediate aftermath.

At the disaster recovery and mitigation phases, recent research has highlighted that property buy-out programs that use public money to acquire properties with high (and ever increasing) flood risk tend to favor wealthier, white communities.[67] Likewise, Susan Cutter's chapter notes that the wildfire risk-reduction programs in California exhibit a similar bias, with "post-fire federal aid, such as fuel treatment … more likely to occur in wealthier white communities than less wealthy communities of color." These disparities mean not only that wealthier whiter communities receive increased aid that allows quicker, better recovery from past disasters, but also that these wealthier whiter communities are in a better position to weather the next disaster; consequently, these disaster policies both magnify existing inequities and ensure that these disparities will grow and compound over time, for individuals, households, and communities.

Internationally, discrimination in post-disaster response and recovery aid often manifests as discrimination based on ethnicity, as with the discrimination against minority groups like the Karen people after Cyclone Nargis in Myanmar in 2008.[68] Discrimination against women and girls is also far too common in international disaster response and recovery, as was well documented in many areas after the devastating 2004 Indian Ocean Tsunami.

Remedying this tendency of disaster policy to entrench and exacerbate inequity will require constant attention to disaster vulnerability in the design and implementation of programs and constant tracking and auditing of the on-the-ground effects of these policies. Transparent, timely, accessible data are no panacea, but data can help researchers and policymakers identify troubling patterns, measure and monitor progress, and ultimately root out problematic policies. As the chapter by Alka Sapat, Arjola Balilaj, and Ann-Margaret Esnard demonstrates, attention to the "social construction" of disaster survivors and people displaced by climate change – particularly the construction of some groups as particularly "undeserving" of compassion and aid – will also be important to countering the tendency of existing disaster and climate policy to increase, rather than mitigate, inequity. Additionally, given greater voice to vulnerable groups in climate change and disaster planning is critical to helping identify and mitigate the effect of planning decisions on these stakeholder groups.

D *Managing Short-Term versus Long-Term Risks*

Another challenge for climate governance and disaster mitigation is managing the trade-off between short-term and long-term risks. Unfortunately, many measures that may help limit short-term disaster risk – such as building sea walls and levees – can actually increase long-term risk.

There are many reasons for this potential trade-off between short- and long-term mitigation strategies. Perhaps most importantly, disaster mitigation strategies such as shore-line armoring

(BYU Law Research Paper No. 21-12, Mar. 19, 2021), https://papers.ssrn.cm/sol3/papers.cfm?abstract_id=3807674 (detailing how policies at every stage of disaster-management disadvantage vulnerable people and deepen inequity).

66 *See, e.g.*, Daniel A. Farber et al., Disaster Law & Policy 264–69 (3d ed. 2015).

67 Rebecca Hersher, *Sweeping Study Raises Questions About Who Benefits from Buyouts of Flood-Prone Homes*, NPR (Oct. 9, 2019), https://www.npr.org/2019/10/09/767920427/sweeping-study-raises-questions-about-who-benefits-from-buyouts-of-flood-prone-h.

68 Farber, *supra* note 66, at 457–59.

measures (including even more natural approaches like beach renourishment) can induce additional development in hazardous areas by providing a false sense of that security – an illusion of safety – to prospective residents and investors. Both implementing development standards (like zoning restrictions in flood zones) and expanding access to insurance (particularly subsidized insurance) can have similar effects. Planning Professor Raymond Burby refers to this development-inducement effect as the "safe development paradox."[69] Thus, short-term mitigation measures may substantially increase both the population, infrastructure, and other assets at risk in the longer term.

Additionally, short-term mitigation measures may simply be incompatible with longer-term strategies or may actually increase long-term risk. Intensive investment in elevating infrastructure near coasts or waterways, for example, makes strategic retreat less likely, even if wholesale retreat or more limited restoration of green space might be the preferable solution. Sometimes short-term measures like building levees may actually increase risk over the long-term by creating the risk of catastrophic failure; building seawalls for short-term protection may also accelerate erosion in nearby areas without coastal armoring. Short-term measures may also divert political will, public pressure, and financial resources away from longer-term solutions.

The risk that short-term mitigation measures will undermine long-term risk mitigation is exacerbated by the short political horizons of most politicians. Politicians are more likely to invest in short-term measures that have more obvious payoffs before the next election than those that have bigger payoffs over a longer time-horizon.

Both scholars and policymakers are increasingly pointing to resilience planning as a way to move beyond the short-sighted decision-making that politics often produces and as a framework for choosing among competing risk-management strategies. Unfortunately, as the next section demonstrates, many resilience initiatives provide insufficient guidance and clarity for defining the goals of resilience projects and thus for resolving these types of underlying tensions and conflicts.

III RESILIENCE

As evidenced by the many chapters in this *Handbook* that address resilience, resilience has become a primary framework for risk management; indeed, resilience is quickly overtaking sustainability as the paradigm – or at least the buzzword – of choice for community planning and development. Importantly, resiliency is becoming the *lingua franca* of a number of historically distinct disciplines, including disaster mitigation, city planning, international development and – most recently – climate change adaptation. All of these disciplines today, to some extent or another, enshrine "the resilient city" or "resilient communities" as a primary, if not the primary, goal.

One explanation for the ascendancy of the resilience paradigm is that many disparate disciplines from psychology to engineering to ecology already embrace some concept of resilience. Those varied roots mean that resilience has broad, interdisciplinary appeal that makes it an attractive rallying cry, uniting scholars and policymakers from a variety of backgrounds. Those same broad roots also mean, however, that resilience can be a chameleon term that means quite different things to different people. Many resilience definitions speak to the ability of a system to continue to perform its essential functions in the face of disturbances or shocks, but that simple

69 Raymond J. Burby, *Hurricane Katrina and the Paradoxes of Government Disaster Policy: Bringing About Wise Governmental Decisions for Hazardous Areas*, 604 Annals Am. Acad. Pol. & Soc. Sci. 171 (2006).

definition belies the wide variation in both details and fundamentals. Shelley Welton's chapter, for instance, highlights the very technical definition of resilience that typically holds sway in the realm of energy policy, which she contrasts with the broader notions of resilience she observes in disaster scholarship that give more attention to questions of community vulnerability, power, and voice.

In many respects, then, as an organizing principle for policy and action, resiliency suffers from some of the same flaws as its predecessor, sustainability: it is malleable, lacking in fixed content, and sufficiently vague that everyone can subscribe to it without having to confront and compromise on many fundamental, contested questions. So understood, it is less a common language that facilitates discussion of difficult policy issues than a linguistic sleight-of-hand that elides or short-circuits those discussions. Nevertheless, if these ambiguities and tensions within resilience can be identified and addressed, focusing on resilience has great promise for breaking down siloes and bringing experts from various fields together to focus on the critical problems posed by climate change and increasing disaster risk.

While there are many ambiguities and tensions between different definitions of resilience, the most important differences revolve around the extent to which preserving – or quickly returning to – the pre-disturbance (pre-disaster) state of things is the primary goal. Put differently, how much do differing conceptions of resilience seek to preserve the status quo and how much do they embrace change – either adaptation (more incremental change) or transformation (more fundamental change)?[70]

Some conceptions of resilience have a clear status quo bias: that the goal is for the system to return, as quickly as possible, to the way things were before the shock or disturbance. This status-quo bias is unsurprising because much of the resilience thinking that has come to the fore in disaster and climate change policy grew up in the ecological context, where the emphasis was on ecosystem preservation – and thus on avoiding major shifts into new, and presumably less desirable, states or regimes. The baseline for resilience was the ecosystem's natural state, minimizing human disturbance, so it was natural to assume that baseline was inherently good and preferable to other possible states. While these ecological conceptions of resilience quickly came to embrace notions of incremental change or adaptation as a way to ensure that the system, confronted with shocks, could continue to perform its essential functions, more fundamental change or "transformation" was typically considered only as a last resort when resilience – maintaining the current regime – was impossible or when the system had already been so significantly disturbed and degraded that it was in an obviously undesirable state. Even in the latter case, the end goal of any transformation – the system's "desirable state" – was usually quite easy to define: restoring, to the greatest extent possible, the state that existed before humans degraded the ecosystem.

70 These different approaches to change within a resilience framework – fostering stability/return to the status quo, gradual adaptation, and more radical transformation – are sometimes termed persistence, transition, and transformation. *See* Sara Meerow, Joshua P. Newell, & Melissa Stults, *Defining Urban Resilience: A Review*, 147 Landscape & Urb. Plan. 38, 44 (Mar. 2016) (noting that the "literature indicates three mechanisms or pathways to a resilient state: persistence, transition, and transformation" where persistence means "resist[ing] disturbance" and "try[ing] to maintain the status quo," while transition indicates "incrementally adapt[ing]," and transformation refers to "more radically transform[ing]"). Other scholars use the term resilience to refer only to solutions that stabilize the status quo. For example, while recognizing the complexity of differing resilience narratives, Mark Pelling conceptualizes climate change adaptation through a "resilience-transition-transformation-framework," in which resilience means stability, transition means "incremental social change and the exercising of existing rights," and transformation means "new rights claims and changes in political regimes." *See* Mark Pelling, Adaptation to Climate Change: From Resilience to Transformation (2011), https://urbanplanes.com/wp-content/uploads/2018/09/Adaptation20to20Climate20Change20From20Resilience20to20Transformation.pdf.

Many of these conceptions of resilience thus assumed both that the status quo baseline for resilience was desirable and, concomitantly, that resilience itself – making that status quo resilient to shocks and disturbances – was inherently desirable. While these assumptions often made sense in the ecological context and exceptions like degraded ecosystems were easy to identify, the same is less true when resilience is applied to complex socio-ecological systems like cities.

Yet many policymakers, think tanks, and scholars have embraced the goals of "urban resilience," "community resilience," or "disaster resilience" without careful attention to questions of what aspects of a system we are making resilient and why. This implicit assumption that the current state of things should be entrenched and perpetuated can be problematic both because it fails to identify and root out injustices and flaws of the current system and because it fails to consider how short-term resilience measures may make transformation that is necessary in the longer term more difficult.

Considered through the lens of disaster mitigation, the shortcomings of this unconsidered approach to resilience are particularly troubling because one of the few potential silver linings of disasters is their ability to lay bare fundamental problems with the pre-disaster state of the world and to open up and illuminate opportunities for fundamental change at a time when systems and infrastructure need to be rebuilt and thus might be reimagined more easily than in normal times. Myopic resilience measures can thwart these rare opportunities for systemic change.

Moreover, if policymakers assume – and convince the public to assume – that resilience is inherently and uncontroversially positive, that assumption can hide the need for robust community participation and input in the design and implementation of resilience strategies. This potential is particularly problematic because disasters open the door not only to positive transformative change but also to change that disadvantages and even excludes vulnerable populations – like the attempt by San Francisco's elders after the 1906 earthquake to permanently eject Chinatown's Chinese residents so the city could reclaim that valuable property for white residents.

In short, easy agreement on the goal of "resilience" does not answer normative questions about which aspects of existing cities and communities we want to make "resilient," how communities should decide when "transformation" rather than simple resilience should be the goal, and what forms their transformed communities should take.

A few examples illustrate some of the potential pitfalls of working to make the status quo resilient without first addressing these important normative questions. If resilience is defined as the ability of a system to continue to perform its core functions in the face of shocks or disturbances, it is important to identify what those core functions are and which ones particular resilience measures are intentionally or inadvertently making more resilient. Richard Rothstein's book, *The Color of Law*,[71] and Isabel Wilkerson's book, *Caste*,[72] both make the case that a core function of the US legal system from housing law to banking law to immigration law has been to perpetuate and protect white supremacy – or in Wilkerson's words, a caste system, in which Black Americans occupy the lowest rung. While no one could argue that perpetuating racial subordination or a racial caste system is an appropriate function or value of our communities, many resiliency measures will nonetheless perpetuate and promote systemic racism by preserving the social, legal, and economic status quo.

71 Richard Rothstein, The Color of Law: A Forgotten History of How Our Government Segregated America (2017).
72 Isabel Wilkerson, Caste: The Origins of Our Discontent (2020).

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Other resiliency measures may go even further in promoting systemic racism and deepening inequality by providing additional resources for the advantaged and politically powerful to mitigate their own disaster risks while denying that same aid to less politically powerful, lower income and BIPOC communities. Thus, for example, while flooding buy-out programs and wildfire fuel-management programs may both make communities more resilient to climate-change risks, they may also entrench racial wealth gaps and systemic racism if the aid goes primarily to richer, whiter communities, as the studies (mentioned above) suggest it does.

The more flawed the existing system, the more space we should make for the possibility of deeper, transformative change, and when it comes to racial equity our systems are deeply, deeply flawed. As Shelley Welton notes in her chapter, it is this potential for resilience measures to entrench and exacerbate the deeply rooted inequities of the status quo that has caused at least one scholar to reject resilience rhetoric and to call instead for "anti-resilience,"[73] to underscore the need to reject the oppression of the status quo.

There are other problems with privileging existing systems, as well. Even if we have high level agreement that a particular societal function should be made more resilient – like keeping the lights on – resilience strategies that double down on current systems and mechanisms for achieving these goals may exacerbate long-term harm by, for example, perpetuating underlying drivers of climate change. Moreover, they can both delay and make longer term greening (transformation) of our energy supply more difficult and expensive. Consider, for example, Shelley Welton's description in her chapter of the Department of Energy's proposal, during the Trump Administration, to pursue energy supply resilience by "privilege[ing] coal and nuclear power as the most resilient energy sources on the justification that they can best store their fuel on-site." This narrow focus on one potential aspect of resilience (on-site storage) to entrench coal-fired plants without attention to the broader picture of how coal-based energy generation contributes to underlying climate risks and is otherwise exposed to a variety of climate-induced disaster risks illustrates the wide range of short-sighted policy decisions that can fit within the "resilience" tent when baselines are inadequately examined and the relationship between stability and change is inadequately explored.

The examples in the prior section about trade-offs between short-term and long-term risks are also relevant here. Measures like hardening infrastructure or armoring shorelines arguably increase short-term resilience, but they can also induce more investment in risky areas, decreasing a community's resilience over the longer term and potentially delaying – and increasing the cost and pain of – the adaptive or transformative change that may ultimately be necessary to deal with serious climate-change risks such as sea-level rise.

Fortunately, the debate about what we want resilience initiatives to accomplish is garnering increasing public attention. In popular vernacular, this debate is often framed as whether resilience should mean the ability to "bounce back" – to get back to "normal" after a disaster or other shock – or whether resilience should also or even predominantly mean the ability to "bounce forward" to a "new normal" that is in some way preferable to the pre-disaster state of things. Still, many of these debates are occurring at a relatively high level, without much attention to specifics. The United Nations 2015 *Sendai Framework for Disaster Risk Reduction* encompasses a commitment to "Build Back Better,"[74] but that phrase has since been employed by politicians and institutions like the World Bank in a variety of ways that encompass everything

73 *See* Shalanda H. Baker, *Anti-Resilience: A Roadmap for Transformational Justice Within the Energy System*, 54 Harv. C.R.-C.L. L. Rev. 1, 6 (2019).
74 Sendai Framework, *supra* note 55, at 21.

from greening the economy[75] to "stronger, faster, and more inclusive post-disaster reconstruction."[76]

Of course, what we need is not necessarily global agreement on what systems should be made resilient (and how) but a framework for resilience that ensures that policymakers and stakeholders are asking the right questions when undertaking resilience initiatives in specific contexts and communities. The definition proposed by Meerow et al., after an extensive literature review (and cited by Asli Ceylan Oner and Haluk Özener in their chapter about urban transformation), is a useful starting point for this undertaking. They define urban resilience as "the ability of an urban system – and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales – to maintain or rapidly return to *desired* functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity."[77] This definition is useful because it requires identifying which functions of a current system are desirable and which, thus, should be made resilient, and because it suggests some role for both incremental, adaptive change and more fundamental transformation.

Additionally, as Meerow et al. also suggest, resilience initiatives should also focus on fundamental questions that can help promote a more careful and structured inquiry into what true resilience should look like in a particular community. Some of these questions focus us specifically on questions of what should be preserved or transformed in the current system: What aspects, functions, goals, and values of the current system are we seeking to make resilient and why? Conversely, what aspects, functions, goals, and values of the current system are undesirable and should be incrementally changed or transformed? Do proposed resilience strategies perpetuate or deepen existing inequities or create new ones? Do they make desirable transformation more difficult? Does making a particular aspect of this system more resilient hurt the resilience of other aspects or systems or communities?

A related set of questions forces us to think about the time horizons for resiliency measures and to ask whether changing conditions, many of them brought on by climate change, mean that some of the things we value in the current system cannot be preserved in their current form over the long term and, if so, whether it is better to accept the inevitability of transformative change sooner rather than later. For what period of time will this measure ensure resiliency? Will short-term resilience strategies that delay the inevitable make longer-term transformation more expensive and difficult? Is the short-term gain worth that long-term trade-off?

Efforts to preserve the Mississippi River Delta provide an example. The Delta is threatened not only by sea level rise but by subsidence. The Delta is naturally replenished by sediments from floods by the river, but human engineering has blocked the river from escaping from its channel. In order to restore the sediments, a new program recreates the natural conditions by diverting water and sediment over low-lying areas. By restoring these areas, the state could protect marshlands and offer flood buffers for cities like New Orleans. The initial funding for this multibillion-dollar effort is being provided by money received by the state in compensation for the impacts of the BP Deepwater Horizon oil spill on coastal areas. Although over the long term this effort could be doomed to failure because of climate change, it may nevertheless provide the

75 *See, e.g.*, Erica Eller, *The Policy Slogan "Build Back Better" Has an Interesting Backstory*, MEDIUM (Oct. 23, 2020), https://medium.com/climate-conscious/the-policy-slogan-build-back-better-has-an-interesting-backstory-c41731e8282.

76 STEPHANE HALLEGATTE, JUN RENTSCHLER & BRIAN WALSH, BUILDING BACK BETTER: ACHIEVING RESILIENCE THROUGH STRONGER, FASTER, AND MORE INCLUSIVE POST-DISASTER RECONSTRUCTION (2018), https://www.gfdrr.org/sites/default/files/publication/Building%20Back%20Better.pdf.

77 Meerow et al., *supra* note 70, at 39 (emphasis added).

time for vulnerable cities further inland like New Orleans to adapt to climate change. On the other hand, it may diminish the perceived urgency of larger steps to preserve New Orleans.

Can we find long-term strategies that can preserve some of what will otherwise be lost, even if what survives takes a quite different form than at present? Pernille Denise Frederiksen and Marianne Rasmussen Lindegaard's chapter on Danish heritage sites threatened by coastal erosion demonstrates both how difficult and how critical these conversations will be. In a world in which "climate-related damage to cultural heritage will mean that large parts of our material and monumental cultural heritage are lost or submerged" how do we think about preserving our cultural heritage when that physical link to the past is lost? How can the knowledge and connection to the place be preserved when the place itself cannot be preserved, at least not in its original form? Should sites be fully excavated – dismantled and documented now – before they are more damaged? Should some parts of them be relocated even though critical context will be lost? These questions are fundamental ones about the transmission of culture, heritage, and values – ones that cannot be answered by specialists and experts alone.

And, indeed, for some communities, these heart-breaking questions are not just about preserving the memory of past culture but about how they can maintain at least an essential core of their current culture if sea-level rise and other climate-induced disaster risks require whole communities to relocate. How can community knowledge, culture, and connection be preserved and nurtured in the face of these most fundamental disruptions?

Once the scope, importance, and deeply contested nature of all of the preceding questions becomes clear so, too, will the need for procedure and procedural justice. Who should answer the substantive questions about what aspects of current systems we should try to make resilient and which should be fundamentally transformed? How can we structure decision-making processes to ensure a seat at the table and true input and influence for those who will be most affected by proposed measures, including minority groups and low-income residents who have often been denied an effective voice in these conversations?

In both resilience thinking and practice, there is increasing recognition that stakeholder engagement is a critical element of resiliency.[78] The importance of a more participatory approach to developing resilient systems is highlighted by a number of the chapters in this book, including Ping Yu Fan and Kwok Pan Chun's call for a more public engagement in addressing water security and resilience in the Guangdong-Hong Kong-Macao Greater Bay Area and Shelley Welton's call for "energy democracy" that would give communities more voice in energy decision-making and the kinds of strategies pursued in the name of a more resilient energy supply.

Answering these questions also requires determining the right scale (or scales) for decision-making and for structuring layered, coordinated approaches that allow local input and voice but also necessary coordination and consideration of the negative externalities (in the form of increased risk) that some resilience measures (such as coastal armoring and levees) can have on neighboring communities.

IV CONCLUSION

The increasing effects of climate change are intensifying many of the disaster risks the chapters in this book confront. As disaster events are compressed in time and space by the growing

78 *See, e.g.*, *Principle Six: Broaden Participation*, GRAID: At Stockholm Resilience Centre, http://applyingresilience.org/en/principle-6/.

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potential for both disaster clusters and disaster cascades, current governance challenges will also intensify, heightening both the need for – and the difficulty of – coordinating across fragmented authority, integrating and mainstreaming climate policy, addressing disaster inequality, and managing short-term versus long-term risks. Resilience planning can be an important framework for addressing some of these challenges, but only if resilience initiatives focus more clearly on important questions about what we are making more resilient and why, who will benefit from specific resilience measures, the timeframes in which those benefits will be realized, and whether resilience measures that preserve the status quo today merely impede more transformative change that is desirable or necessary in the longer term.

We should not underestimate the difficulty of making the institutional changes needed to address these governance challenges. Institutions can have tremendous inertia that makes change difficult even when there is general agreement on its desirability. The difficulty of change is compounded when it requires shifting the current allocation of resources and power. Perhaps by increasing the urgency of changing current institutions, climate change can help energize efforts at institutional reform. As scholars, our primary role is to clarify the issues at stake and potential solutions. The authors of this volume, as well as the editors, deserve great credit for their efforts to map out the current problems and possible futures for disaster law.

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