Introduction: The New Environmental Crisis

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Abstract The genesis of this book was the 50th Anniversary Workshop and Celebration of the Disaster Research Center at the University of Delaware in 2014. In marking that milestone in the history of the center, we wanted a workshop in which participants would reflect on what is known about disaster science—much of which is owed to DRC, to its long lineage of intellectual descendants, and to their scholarly cousins in a variety of fields. We wanted to assess where that knowledge is uncertain, where new or reinforced knowledge is needed, and also to think about the state of practice. For this collection, authors were explicitly encouraged to be provocative; to be iconoclastic; to be speculative; to try as best possible to bring in new ideas or different approaches to familiar themes. In this first chapter, we consider some of today's pressing environmental challenges and the associated research needs, moving from there to introduce the chapters and their overall contributions to this volume.

Keywords Hazard · Disaster · Environmental change

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Introduction

The genesis of this book was the 50th Anniversary Workshop and Celebration of the Disaster Research Center at the University of Delaware in 2014. In marking that milestone in the history of the center, we wanted a workshop in which participants would reflect on what is known about disaster science—much of which is owed to DRC, to its long lineage of intellectual descendants, and to their scholarly cousins in a variety of fields. We wanted also to reflect on where that knowledge is uncertain, where new or reinforced knowledge is needed, and also to think about the state of practice.

This idea was provoked by a sense that we are living in the midst of a "second environmental crisis," an unfolding disaster era as compelling, but not as recognized, as the environmental crisis of the 1960s: a complex of seemingly intractable hazards across the intersections of natural, social, and technical systems. Rapid urbanization, growing populations, global economic adjustments, environmental degradation, decaying infrastructure, climate change, and technological failures of every description create a universal risk milieu whose origins and outcomes are hard to identify and for which ameliorative steps are elusive.

What are the characteristics of this new crisis? Let's compare two eras. The first environmental crisis was formed by pollution incidents and chronic technical hazards (Couch and Kroll-Smith 1985), the awareness of which ignited the ecology/environment movement begun in the 1960s. This movement, implicitly or explicitly, united scientists, advocates, and policy makers in advancing an agenda of social change and regulatory innovation whose purpose was nothing less than remaking the character of human-environment interaction. It was a time of escalating awareness and escalating tension. The prospect of nuclear war was ever-present. Nevil Shute's *On the Beach* (1957) portrayed the end of the world as a few survivors in Australia waited for radioactive fallout to reach them. While less apocalyptically but no less dramatically, path-breaking works like Rachel Carson's *Silent Spring* (1962) alerted people to the slow degradation of biological systems under the influence of chemical pollutants. Environmental quality and public health research across disciplines was matched by public concern to yield a raft of policy and bureaucratic interventions in a very short period of time: the Clean Air Act, the Clean Water Act, and the establishment of the Environmental Protection Agency, to name a few. These years were marked by a significant re-imagination of human impacts on the earth, and of institutional and individual roles and responsibilities.

What about today? While environmental quality has improved in many places in the US and internationally, by most assessments other hazards have intensified. Apart from coastal hazards, tens of millions of US residents occupy areas prone to a variety of hazards, including much of the population of California and the Pacific Northwest (seismic hazards); the Midwest (seismic hazards, riverine flooding, drought, depleting drinking water); the Southwest (depleting drinking water); Texas (flooding, drought, depleting drinking water); and Florida (depleting drinking water, seawater infiltration, land subsidence). Areas of the urbanized northern US are

exposed to snow and cold extremes but for the most part are well-adjusted to these events. Sea level rise has already exacerbated seasonal flooding and portends higher insurance and disaster recovery costs on the entire Eastern Seaboard.

The challenge is as great or greater worldwide, as again people crowd into dangerous places, or make places dangerous through the concentration of industry that itself spins off its own reflexive dangers. Megacities across the globe (Mitchell 1999) have pulled vast numbers of people together in environments of dense vulnerability, straining and surpassing infrastructure in every way. In some places, high concentrations of poverty and ongoing social and political turmoil add a human-induced component to the risk milieu. Some places, such as Haiti, continue to live the legacies of 200 years of colonization or post-colonial political and economic manipulation from within and without, creating a perpetual vulnerability to hazard.

Other places, such as Japan, have deployed prodigious economic and technical resources toward hazard management, yet still prove vulnerable to outsized events such as the 2011 Tohoku earthquake and Fukushima nuclear disaster. Some events, such as the Indian Ocean tsunami, have a global reach, spanning 1/6 of the globe, killing some 200 people in coastal Africa along with over 200,000 closer to the epicenter in Indonesian waters. Many places throughout the world are still waiting for "the big one," whatever that might mean in their local environment. At the same time, a warming climate may shift some hazards further poleward, especially pests, mold, and natural respiratory irritants causing chronic low-level losses to health and property.

Apart from climatic and geophysical hazards, sources of industrial calamity have not just proliferated, but concentrated, prompting a stark warning from Perrow (2007) that this increasing density of, especially, energy and chemical facilities is creating conditions for "the next catastrophe." And as if that weren't enough, deferred maintenance and decaying infrastructure—Minneapolis Bridge Collapse (2007), San Bruno Pipeline Explosion (2010)—presents chronic hidden dangers, yet with a cost for detection and repair that seems to be outside of any serious policy dialogue. Calamities such as the Deepwater Horizon spill (2011) or the Lac-Mégantic, Quebec (2013) train derailment point to ongoing technical dangers from the systems we rely on to provide us energy.

A New Environmental Crisis

The idea that world society had entered a Great Climacteric, a global entrance into a "time of unusual danger," was proposed by Burton and Kates (1986) to denote their sense of gathering and accelerating risks engendered by the Industrial Revolution and wholesale shifts in commerce and habitation. Mitchell (1990: 131) expanded these themes, arguing that hazards "are now recognized as components of a major problematic—a complex web of interactions among peoples, environments, and technologies, characterized by multiple causes and consequences—that calls

forth new types of intellectual and managerial responses." These threats, said Mitchell, were not "separate from society," but arose through basic functions of modern life.

We may have entered yet another environmental crisis, yet the difference is that there is a much smaller, much less organized and visible constituency to apprehend it or to develop effective management institutions. The implicit assumption is that existing agencies like Environmental Protection Agency (EPA), the Federal Emergency Management Agency (FEMA), the International Red Cross and Red Crescent Societies, the United Nations Office for Disaster Risk Reduction (UNISDR), and existing environmental and disaster policies will be enough to meet the crisis (with modifications here and there), but this optimism is challenged by the magnitude, complexity, and cost of events like Hurricane Katrina, the Fukushima disaster(s), and Hurricane Sandy. A key feature of the second environmental crisis is, indeed, a stubborn faith that experts and policy makers can meet intensifying hazards with progressive and practical solutions. Whether this faith is warranted plays out in debates and disputes at every scale of politics around the globe.

Recent events bear out the necessity of new approaches to this unfolding crisis, most recently in Hurricane Sandy. The destructiveness of that event had long since been predicted by scientists in every discipline: that there would be perilous coastal erosion; that there would extensive shoreline flooding; that New York City's subterranean infrastructure would flood; that there would be long term power failures; that hospitals and other critical facilities would be flooded or cut off from their communities. In fact, except in some operational details of providing disaster response services in an urban area, there are few lessons to be learned from that event; rather, the takeaway is in the value of what is already known and the spotlight on the complexity of the challenge. That challenge is how to unravel the vulnerabilities created by human settlement—even, more broadly, the dangers created by human life. Not only are places prone to natural hazards, but the actions of modernity create their own perils, with technical systems prone to failure, susceptible to attack, or insufficient in design against actual rigors of the planet. This reflexive risk (Beck 1992)—the risk of our own technologies and environmental practices—intersects with the planet's own forces and creates a scientific challenge for finding "causes" and a policy problem of finding suitable entry points for mitigation, and yet another scientific challenge for understanding the adoption of hazard adjustments.

Challenges at Every Scale

At the same time that scientists and institutional actors grapple with shifts in hazard and often-varying political interests, there is relatively little guidance available to the everyday person in making the choice on where to live, the main kind of decisions that average citizens will make in managing risk. Some people have few choices in where to live—people with limited resources often have to take whatever

housing they can afford, with few options in terms of quality of construction or safety of location. Floodplains, proximity to technological hazards, unstable slopes and other such locales form part of a predictably risky backdrop. Meanwhile, better-off people, the middle class, are often hard-pressed to make good locational decisions because of the diversity of risks that a prudent person has to navigate in a home purchase. Studies such as by the geographer Risa Palm (1981) have showed the kinds of concerns that potential homeowners have, ranging from home amenity to school quality. Instead, people have to weigh a number of possible risks, and research has been singularly unhelpful in providing guidance for the tradeoffs that a sensible person should make.

The State of Texas in the US provides a concrete example of just such challenges. For one thing, it is a vast state, subjected at one extremity to intense heat and tropical storms, and at the other vulnerable to heavy snowfalls and devastating ice storms that can make roads impassable. Some areas of the state are afflicted with an expansive clay soil that is highly moisture-sensitive. In dry periods the ground will shrink and crack, causing interior damages and potentially necessitating costly repairs. To avoid these conditions, homeowners are advised to water their foundations throughout the summer to keep the ground moist—a terrible use of water in a state that is just recovering from a lengthy drought and which will no doubt see further droughts in the future. These are common, low-level losses which don't rise to the level of a disaster, but which nevertheless impact people with sustained, chronic damages. Moreover, according to a report in the New York Times (Murphy 2010), national losses due to foundation failure are increasing, to about $4 billion per year in 2010, and with oscillations of extreme drought and rainfall, more places are seeing damages that are outside of their experience.

Given the difficulty of navigating these risks, it is not surprising that people generally are not prepared to weigh the various perils to which they are exposed. The Texas example is extreme, but not too extreme: a person deciding to live in that state has to weigh foundation settlement, flooding, ice, dry rot, mold, termites, carpenter ants, tornadoes, and hail as possible natural hazards, not to mention the full panoply of technical hazards that people generate wherever they live, like hydraulic fracturing ("fracking"), or chemical manufacturing.

We have very limited consensus on what places are too dangerous to be inhabited. Certainly we can argue that some places are more dangerous than others, as evidenced by magnitude of losses or repetitive losses, as along beaches, or in the hundred-year floodplain. But beyond that it is more difficult to say what is prudent or imprudent. And moreover, as we have seen from events as diverse as the Dust Bowl to Hurricane Katrina, nobody wants a lot of people moving to *their* apparently safe place. Thus US disaster policy is a kind of fantasy shell game—we want people to move away from danger but are glad that they don't. Even if a lot of the populations could move, either by force or by persuasion, who would it be? Since there is an implicit moral orientation in disaster research, and obviously in policymaking, analysts should be able to state with some precision who is prudent and who is blameworthy.

Complicating the picture is that we need people in dangerous places: 95% of US international trade is carried by ship. Ships need ports. Ports are on the coast. Ports need people. Thus some people are going to have to live there, and these nodes of economic activity will draw commerce and habitation of every description. These aren't choices in any meaningful sense. In the US, East Coast seaport areas are in range of hurricanes. New Orleans sits at the mouth of the Mississippi River and the transport station of the nation's petrochemical empire. On the West Coast, the ports are on the rim of the Ring of Fire, including Los Angeles and Long Beach, the biggest US ports for the handling of container cargoes. None of these places is going to be dismantled, and if everyone who lives in Los Angeles suddenly got appropriately nervous about seismic risks and decided to leave it would provoke a national crisis. Thus it is disingenuous to hector people for their locational choices—and certainly without a firm idea of what is wise and what isn't. All places in the US are prone to some sort of risk—there is no possibility of the "spatial fix" (Harvey 2001) that is the aim of much hazards research. Moreover, a strange blood sport has grown up in the US: blaming people for living in dangerous locations. We saw this clearly after Hurricane Sandy, in which federal assistance for disaster relief and recovery programs was hamstrung by congressional politics. There was sizable posturing especially by Republicans in the southern states who objected to much of the Federal assistance that would be directed to New York and New Jersey.

Research to Policy Challenges

Because of these dilemmas, some of the solutions that have emerged from the research and policy community don't make sense, or cannot be implemented, in the lives of real people. One recent example is the Biggert-Waters Act, which would have modified the US National Flood Insurance Program. This program has provided subsidized flood insurance since the late 1960s for millions of Americans who live in high risk flood zones. It is a system highly dependent on keeping updated floodplain maps in order to accurately assess risk and create reasonable premiums. Over the decades the program chugged along, never making anyone perfectly happy, but reflecting the kind of compromise that is common in the history of American risk management: it is a blended public-private program that leverages government funds and science in the name of private property and business ownership.

Motivated by Hurricane Katrina, the Biggert-Waters legislation would have increased flood insurance premiums on residences and businesses to reflect their actual risk of flooding. It's hard to argue with that justification. Shouldn't people pay for the actual risk they are incurring? While some grandfathering of the provisions would have dulled the immediate impact, over time some people—owners of the so-called "repetitive loss properties"—would have seen their premiums increase. Even the prospect of such increases was interfering with real estate transactions on existing homes. There was substantial political backlash among residents, reflected

through Senators and House members from coastal states, like former Louisiana Senator Mary Landrieu, and the legislation was substantially overhauled. To be sure, there are good reasons for modification of the National Flood Insurance Program. Hurricane Katrina bankrupted it, though the program had run "in the black" prior to then. And Katrina revealed lax enforcement of purchase requirements and other provisions (Knowles 2014). At the same time, the prospect of premiums rising to double or triple or more what policyholders currently pay was not sustainable, and never would be. And arguments about "actuarial risk" fell flat with homeowners whose homes *had never flooded* even, in some cases, in the over 200-year history of the structure. As Knowles (2014) argues, there were many options available to blunt the worst effects of Biggert-Waters; wholesale restructuring was not necessary. However, its inelegant effects hit so many people of different means that its underlying wisdom and indeed justice was lost as collateral damage.

Moreover, peculiar values came into conflict. One feature of modernity that Mitchell (1999) has identified is that of ambiguity: a state of indecision and conflicting choice. Hazards policies can shatter once stable networks and generate conflicts of desirable outcomes. Two examples show this. In India after the 2004 tsunami, initial government mitigation plans called for resettlement of people living near the shoreline. While this might have reduced the tsunami risk, the proposed new locations were vulnerable to monsoon flooding, and distance from the beach would have disrupted social norms in fishing and community activity. As another example, New Castle, Delaware has a well-preserved historic district along the Delaware River. Home prices are high there, but not so high that middle-class people can't live there who are willing to abide by the strict construction and preservation requirements. What are the choices: high insurance premiums that would drive out these residents in favor of the upper-class? Abandon these 200-year-old structures, part of the US cultural and material heritage, because no one should be living there anyway? Neither of these options seems good, and it is the absence of good options that leads to our present conceptual and policy logjam.

State of Knowledge

The hazards community is one of the most uniquely compassionate and supportive communities in academia: there is a high level of nurturing of junior scholars, and a wonderful absence of rancor even though, as is the nature of academia, we're often all competing with each other. Somehow, in spite of that competition, there is a mutual celebration of successes owing to two factors. One is the fundamental ethos of service that is at the root of why people enter this field. And the other is that we work in relatively small areas of our respective disciplines. In a multidisciplinary field like disaster, scholars must branch out from their own academic department or agency setting and read other works and interact with people from diverse settings. This eclecticism has been highly productive of creative empirical studies, and work

that finds its way into practitioner communities—but it has also posed a challenge to theory formation.

In spite of research and policy needs at all scales, from fundamental theories of disaster to the quotidian tasks of disaster management, disaster research progress has slowed in recent years, and to some extent has even turned back on itself. While reconsiderations of past ideas are always valuable, the objective should be progress, not merely a banishment of certain ideas while the actual conditions remain. Disaster scientists find themselves in a theoretic brambles today. As an example, Hewitt's classic 1983 edited volume *Interpretations of Calamity* is credited with the "vulnerability turn" in hazards studies. There, Hewitt and his co-authors demonstrated that hazardous conditions stem more from political, social, and economic marginalization, from imbalances of power that shunted people of lesser means to dangerous locations, or systems of production that undercut more adaptive indigenous hazard management approaches. This argument was meant to counterbalance what they saw as the prevailing paradigm in disaster research, focusing on decisions, risk communication, and institutional methods for discouraging certain land uses. Recently though the vulnerability approach has itself been criticized for inappropriately grafting western frames of social systems onto diverse cultural settings. Some scholars, such as Bankoff et al. (2004) have argued that emphasis on vulnerability hides simultaneous coping strategies. In essence, then, the argument is that the vulnerability approach is disparaging. A similar turn is visible now in antagonism to ideas of resilience. At the 2011 Natural Hazards Workshop at Boulder, in a panel on resilience, one panelist commented something along the lines of "even in Haiti" people were able to find means of coping. An audience member criticized the phrase "even in Haiti," as though we should be at all surprised that people are able to find ways of recovering after a disaster. What the speaker meant was that in Haiti, a place commonly regarded as without capacity, people have developed ways to manage their lives. Yet the audience member thought his line of discussion was disrespectful. This anecdote opens up a much more vexing issue about terminology and research programs in disaster work. The "resilience turn" is now seemingly complete—the term is ubiquitous, and yet its intellectual trajectory from psychology and ecology, through the formation of the UNISDR, reveals a concept that somehow simultaneously enables community-level studies of subsistence farming and studies of interconnected critical infrastructure. At present the field is in discord on these key ideas, yet each contains key ideas about disaster prevention and response.

This Volume

Given these broad challenges, how can we see any way forward? These broad observations lead us to the collection of papers in this book. Naturally they can't solve all the problems, or even all of a single research or policy dilemma. But they have turned attention to some intriguing ideas that can help guide the research trajectory. These tie in to the main areas of challenge that we have identified: what we're studying; what we're managing; who we're doing it with; and how we're studying.

The collection of papers in this volume capture different features of the present challenges that we have identified. If new knowledge of a challenging risk milieu is needed, what should that knowledge look like? How does what we know point us there? The researchers and policymakers have not moved people to action; what options are there in building an interested constituency that can be active participants in creating options for reducing disasters? If there is not a constituency for disaster reduction, why not? What are people seeing in their local settings? Unraveling the interconnections of natural, technical, and social systems that are the basis of hazard (Mitchell 1990), with such interconnections ramifying through the entire space of human experience would, at present, seem an impossible feat of comprehension. Every entry point can be found only by bypassing a different one. Yet for all that, the task is not hopeless. We have seen people moved to action before, on environment and civil rights.

Two chapters bookend the conceptual scope, though we place them together. Thomas Drabek charts the evolution of disaster research from its coalescence as a field of study more than 50 years ago. But his recollections of the trajectory of the field are also his jumping off point for discussing some early successes, and future needs and possibilities. In particular, he argues the emergency management occupation continues to absorb scientific findings, one indicator of ongoing professionalization. Then Wisner takes a different approach. He reminds us to think not just about disaster, and its organizational and institutional features or even about disaster causes, but about the large-scale global systems of economy and politics that generate risks. In his analysis, we hear the echoes of the problematic, the climacteric, a complexity of risk that people live in and manage, often alone, but whose genesis is in the dark matter of institutions whose functioning is hidden by secrecy, patents, property rights. It is diffuse and invisible, a kind of spirit world of power and resources whose rules are guessed at, but not understood. These transactions toward concentrations of wealth and industry soak up resources and good land and destroy safe spaces. Wisner, therefore, argues that we should "wear bifocals" to be able to look at disaster phenomena both near their occurrence and further away at their genesis.

Drabek mentioned the enhanced professional development of emergency managers. Nevertheless, they occupy a strange space in the policy network, in that many of the conditions that lead to disaster are conditions they can't affect, assigned to different offices in government and situated in economic and political space outside their ambit. Moreover, they have the burden of a strange expectation: to make the day after a disaster more open, more participatory, more accessible, and more humane than the day before. As this occupation professionalizes, the "vision" of research will be in their hands, and they may yet be strong exponents for operationalizing the findings of disaster science.

Coetzee and colleagues take their argument in a different direction, in their focus on resilience. Resilience is a key idea in present thinking about disaster, and has incited any number of papers and modifications to government policies across the globe. Resilience scholars believe they have identified a set of characteristics that indicate the capacity to forestall, or to manage, disaster. Some critics have emerged, such as Tierney (2015) and Dombrowsky (2010), who argue that resilience is a

dangerous fad that draws attention away from what is already known about disaster. Coetzee et al. go in a different direction, challenging frames of resilience that ignore the dynamism of the complex systems in which risks are generated and managed. Taking the venerable Pressure and Release (PAR) model as an example, they argue that it sets aside a host of interaction effects with the processes it represents, so that a fuller explication of the model would be more detailed in assessing the relative contributions of positive/negative feedbacks within the system stemming from, say, a particular root cause of disaster, such as political ideologies.

The challenge for disaster is its multivalent character. Chaos theory emerged as a popular idea in disaster in the mid-1990s but it didn't really take hold because, although it was an interesting approach for characterizing the disaster milieu, it offered little guidance for interventions. It was a useful concept; however, for showing where in a disaster evolution might be an opportunity for creativity and adaptation (Comfort 1999), an idea that Coetzee et al. run with in an intriguing way. In an interesting theoretical maneuver, they connect complex adaptive systems, chaos, and resilience. Without giving away the ending, they make a provocative argument.

Disaster Management Challenges

One feature of disaster response—and probably the one that is mentioned most—is coordination. Coordination seems to be the thing that emergency management agencies are supposed to do, like FEMA. It would be hard to find a text that doesn't mention coordination, and it would be hard to find a post-disaster assessment that doesn't emphasize the need for better coordination. These common findings, while certainly true, don't really probe into the causes of those breakdowns, or provide an illustration of how these free-floating kinds of failures can be detected in advance. Moreover, officials already know that they have to coordinate and communicate, so a paper that stresses the need for coordination would hardly be useful. But suppose we reversed the polarity of the inquiry. Instead of considering what officials did wrong, suppose we instead asked why it was that responsible and experienced officials, trying to manage through a difficult and confusing situation, were not able to do the things that they themselves know to be necessary? Perhaps we could move our understanding of coordination further forward, or look at coordination differently. In New York City after 9/11 is that there was a lot of coordination, but that coordination often didn't result in work getting done, or getting done only after much conflict. For example, officials from the New York City Department of Health and Mental Hygiene and the Department of Buildings fell into a heated argument over how to handle the washdown of debris being transported from the site. DOHMH wanted an expeditious system that would clean toxic materials before carrying the debris through the city; DOB wanted a well-designed system that would last into the colder weather. By appearances, they were having trouble coordinating. But that description is deceptive. They *were* coordinating; they just couldn't come to a quick agreement on what was the correct technical approach.

Disaster management systems are in need of overhaul as well. Years ago, following catastrophic wildfires in California, emergency officials, policymakers and scholars worked to establish what would be the forerunner of the incident command system. Though built on what was, at the time, current management theory, disaster management has not been updated with regard to new thinking about organization. In fact, a visit to a museum can be instructive. In London, the Churchill War Rooms are preserved as they were at the end of World War II. There, we can see the physical manifestation of crisis management organization: tables arranged in a square; a line of desks covered with telephones; a planning department organizational chart with vertical boxes. That's what emergency management looks like today, in any emergency operations center. The science for coordination has remained oddly static for the last 75 years.

The main task of the Federal Emergency Management Agency is coordination but FEMA is an institution that is designed for blame. As one of the smallest agencies in the Federal government it was originally designed to try to streamline the diverse organizations that had disaster related responsibilities, and to give a focus in coordinating the many disaster assistance programs throughout the government. But from a different perspective, it is intended for failure. Because the fact is there is very little FEMA can actually do. Instead, it acts as a contractor, requesting that other agencies with people or equipment fulfill disaster-management tasks. But more than that, its efforts are principally toward *public* institutions: hospitals, schools, government buildings, infrastructure. Its maximum payout to individuals is enough only for modest home repairs and replacement of personal items. Individuals are primarily expected to cover their losses with their private insurance, or disaster loans through a different agency (the Small Business Administration), or potentially payments through the Department of Housing and Urban Development. This means that people's interactions with FEMA will inevitably be negative: a bureaucratic organization living on paperwork that doesn't even meet their needs. Worse, as a contractor, FEMA must oversee the work of all of its subcontractors: a management task that is challenging throughout government but whose impacts are often remote. And the organizations that FEMA must work with are vastly larger and more powerful, such as the Department of Defense. Moreover, in the end, the thing that most people need after a disaster—after their main requirements for the basics of food, clothing, and shelter have been met—is housing, and this is a thing that FEMA can barely provide. Trailers and manufactured homes are of course a short-term solution (though their use often persists beyond the short term). But the restoration of the apartments and houses that formed the "normal life" of the population is beyond FEMA's scope, mainly left to the private market. Navigating that market is a brutal process, as seen after Hurricane Sandy. FEMA appears responsible, but has neither responsibility nor power.

Johanu Botha fully embraces the iconoclastic stance that we encouraged of the authors. Why even have a coordinating agency at all? Botha suggests that the value of a central coordinating agency may be overstated, and that importance has never been rigorously tested. Some research, especially Kendra and Wachtendorf (2016), makes a very strong argument for decentralized disaster response operations. We

may have to consider the potential usefulness of coordinating agencies as being different in different phases of the disaster cycle. And it may be too, that coordinating agencies are simply limited in the things that they can coordinate. Not only is disaster response decentralized, but in the US system and elsewhere, much of disaster recovery is left to the free market: that is, to insurance companies, banks, private contractors and others. These things cannot really be coordinated in the way that we understand coordination, as when an organization has, not only the responsibility, but also the power to direct performance.

While much is known, many frustrations remain in our understanding of disaster phenomena, from scales of individual or household response to institutional management of risks. For example, while we know a lot about warnings and evacuations, some people continue to resist warnings and exhortations to evacuate, sometimes with tragic results, as seen in Hurricane Sandy when members of one family did not evacuate and perished when their house was washed away. Fearing looters, they preferred to remain behind. Even though a science of risk communication has developed where the goal is to persuade or hector people into evacuating, yet some will not. Are there better messages yet to be developed, with better combinations of words or timing, or have we perhaps reached a practical limit and must accept that some people will stubbornly try to ride out the risks? If that is the case, might research energies and money be better spent in other directions? Beech and Wallace circle around the standard demographic categories that dominate risk and warning communication theories, which they argue are a tangle of contradictions. Instead, they bring in Douglas's grid/group categories to assert the need for a cultural component to hazard information—that is, culture understood by how tendencies toward individualism, hierarchism, egalitarianism, and fatalism line up in these categories, and their implications for message content.

Emergency management is a borderlands occupation, lying at the edges of the natural, social, engineering, and policy sciences. Emergency managers have to make sense of a base of science from several different spheres and then graft that into policy systems that run at different speeds and in different directions. For many years there has been hope that access to more and better information would assist in decisionmaking. But Patrick Roberts and his colleagues caution against the present fascination with "big data." Indeed, much as been known for many years about disaster risk, but modern society is occasionally swept by optimistic enthusiasm that more information more artfully transformed will solve our problems. Theodroe Roszak, in his classic *The Cult of Information*, (1994) raised a different argument: is it really a lack of information that impedes us from solving our social problems? Today's emergency manager has access to data and analytical tools such as GIS that were undreamed of a quarter-century ago. Instead, Roberts argues that emergency managers should focus more on developing sound decisionmaking processes, in order to better make use of what is known.

The disaster management picture becomes even more complicated in the international setting. There, multiple conflicting values overlap. The history of development projects is checkered at best, as seemingly helpful initiatives turn out to be unworkable in one place though they may have been successful elsewhere. Disaster response is replete with potential conflicts. For example, the SPHERE standards for

acceptable disaster response hold that communities that are evacuated should be kept together if possible in the place where they are resettled. But if there are pre-existing conflicts that may not be the best advice, and it may be possible to inadvertently reproduce the conditions for conflict over space. Western standards of gender equality are not appreciated everywhere. Moreover, strong norms toward public participation and local involvement, which are at the heart of Western disaster response philosophy, are out of place in settings with authoritarian power structures, where existing norms of participation are minimal, or where certain populations are suppressed in their economic and political participation, such as women. Thus there is no universal guidance for implementing disaster responses that practitioners can take with them into the global setting. Everything must be local, particular, contingent, and re-learned from place to place. And by now perverse effects of disaster aid have been documented. In Haiti, for example, the post-quake availability of free health care displaced some local providers (King et al. 2011). To send no assistance doesn't seem to be a good answer either. And precisely tuning the arrival, expense, and departure of various forms of aid, such as medical care, is outside of our administrative capacities. Advising prospective donors to send money has long been standard guidance, to avoid undercutting the local economy and to assist the economic sector in recovery, but at the same time, some things are needed in kind, such as doctors to provide direct care.

If Botha's chapter isn't provocative enough, Malka Older provides another iconoclastic view of disaster: of disaster response as a second disaster. Sometimes we hear that convergence of unwanted donations is a "second disaster," but Older goes even further. She points out the conflicts that arise in a setting were decisions are to be made that affect many interests. Often, communities have to do new things (Kendra and Wachtendorf 2007) and often there are no clear guidelines. In the sociopolitical ecology of swirling resources and eddies of power (Peacock and Ragsdale 1997), response and recovery strategies are bound to be uncomfortable for some. Blame, perceptions (or realities!) of inequitable treatment, and subordination of community goals by powerful outsiders can destabilize trust and discredit any choices that have to be made. Older notes that response agencies themselves bring their own challenges, their own uncertainties, as they affect local decision-making. Disaster response, as a combination of activities, can paradoxically have the same effect as a technological disaster; inadequate responses become a source of blame and discord.

Constituency

Scholars and policymakers have long sought to find a constituency for disaster risk reduction, one that is amenable to the changes in land use, building design, policies, and other human-environmental interactions that will be necessary. At present that constituency does not exist. Because risks and responsibilities are so fragmented, the sustained and focused interest groups that are necessary to mobilize policy

action are not able to coalesce. Several writers address this. Experienced allies for engagement could be existing environmental and social justice advocacy groups, but in his contribution Carlos Martin observes that they have not been active in hazard focused policy areas.

Local participation is not so easy. Martin notes that environmental and social justice advocacy groups are less energetic about disaster risk reduction because many of the concerns in their portfolios comprise many more immediate challenges for their populations of concern. In Martin's study, organizations gave a number of reasons, among which-confirming what has long been suspected-is the challenge of bringing environmental hazard to the forefront of attention, and to communicate in communities with other, seemingly more immediate worries. It may well be, as we noted earlier, the lack of good options balanced against daily demands, and the diffuse and often invisible benefits of mitigation. One's risk is reduced, but that is invisible to the senses. The risks are not obvious in many places, and organizations and resources are always stretched thin.

Their limited involvement is a serious deficiency, because they have the resources and organizational prowess to understand where are the strategic pressure points. Indeed, James K. Mitchell (2006) argued that much of US disaster science and policy had been the work of a relatively small group of scholars, officials, and other advocates who had managed to shift attention away from disaster response and in the direction of disaster mitigation. In this volume, Mitchell expands these ideas to look at the need for a larger constituency, and how to kindle the engagement of several possible groups. Similarly, Philip Barnes and Andrea Sarzynski home in on community-based action, in their case study of the Transition Movement. They note that environmental initiatives tended to be dominated by middle-class people—that is, people with both disposable time and disposable income. If that is the case, then it is possible for these movements to simply reproduce the same kinds of political and economic marginalization that exists already. Fortunately, they find the little evidence of this in their study of the Transition Movement.

There is another reason for the lack of a constituency: mitigation is boring, uninteresting, uninspiring. It's not fun and it's usually not beautiful. Flood insurance, retrofitting, and durable construction doesn't yield any particular pleasure, like new paint or new furniture. A resident doesn't even have the benefit of showing off their foresight or good sense to the neighbors, as with solar panels, or enjoying the benefit of a cleaned-up landscape, as we saw with the environmental movement. Cleaning up a park yields a nice view; tying the water heater to the wall, not so much. Other than through the use of regulations—faulty at best in driving social change—what kinds of marketing could persuade adjustments whose benefits are largely hidden and whose main effect is in lowering the risks that most people don't feel anyway? Fausto Marincioni and his colleagues shift the discussion in a different direction: that of good landscape design. To them, mitigation should be artful: it should be beautiful as well as functional.

What else can be the basis of a constituency? Barnes and Sarzynski posit multiple constituencies emerging from localized conditions and needs. The approach is reminiscent of one advocated by Sclove (1995), who advocated small technologies as a way of reducing dependencies on larger systems. Still related to the idea of

building a constituency, Bercht takes a different tack, a psychological look at sense making under environmental change. In building an argument that spans scales, from individual cognition to group and society, Bercht explains how people take risk information and fold it into their repertoires for action.

We think we might be onto something with regard to burgeoning concerns in the research field: quite a number of the submissions emphasized some aspect of bolstering public awareness and interest in hazards. Some were explicit in that; for example, James K. Mitchell titled his chapter "Building a Constituency." Others approached the question from the flank like Fausto Marincioni and his colleagues. In an elegant essay, Sara Bonati takes a different look at landscape. Extending the classical geographic understanding of landscape as a dual natural and social form (e.g. Tuan 1977), she argues that teaching through landscape can create a sense that people act in a common tableau. Sadly, in many places, especially in the United States, such education is completely off the charts in schools, making it even more difficult to build a constituency for such thinking later in life.

The idea of the constituency is especially significant because it resonates with our own look back on the first environmental crisis of some 50 years ago. We saw such a constituency develop around the environmental movement in the 1960s. In that tumultuous era environmental advocates made enormous progress. The era was marked by change that took both a present perspective and, in the "conservation" and "ecology" rhetorics that emerged, presaged the later shift to "sustainability" as an environmental and—at least for some—moral imperative. This was accomplished by harnessing rhetrorics of responsibility and stewardship of the land. One can look back to a well-known public service advertisement of the early 1970s. Setting aside the rather stereotypical portrayal of a Native American, which would be discordant to today's eyes, there is no denying the influential character of that advertisement in which we see him canoe his way along a pristine waterway and into a dirty and polluted urban center. Even to the non-scientist, the crisis was evident in air pollution, in litter, in rivers that smelled or caught fire. Influential scientists, artists, musicians, organizers, legislators, and others built a policy-moving coalition that generated laws and regulations and, in addition, a moral shift and behavioral change that went far in cleaning up the environment. Good people don't throw trash out of the car window; good people clean up after themselves. Good people recycle. Yet now potential constituents are disconnected, and there is no galvanizing message, nothing to excite interest, or to call forth an emotional response, or moral resonance.

Ethical Concerns

Two chapters are rather different in their approaches to the same topic: ethics in disaster. For some scholars, concerns arise from a sense that research is disrespectful or harmful to people who have experienced a disaster. The most intense antagonism is directed at quick response research, what Gaillard and Gomez (2015) call a "gold rush." To them, incidental contacts are a problem. These views are oddly

contradictory in a field that asserts the capacity of disaster survivors. In a forceful chapter, James Kendra and Sarah Gregory rebut these views. But there are other research concerns, concerns that become even more intense the closer the researchers are to people who are affected. For example, Browne and Peek (2014) detail the ethical challenge when researchers, trying to subvert the researcher/object dynamic, become more closely involved in the lives of the people they are writing about. In this vein, Henderson and Liboiron tackle the difficult challenge of disaster field research, especially action research. Away from the controlled conditions of the laboratory, research with actual people in actual places raises ethical dilemmas of disclosure, truth, and local versus wider benefits of science. In a departure from the usual way of thinking about these issues, they build a case study in a faraway place (where the strangeness of the setting concentrates focus) to highlight how scientific habits can lead the action-researcher into ethical traps. Multiple values are at stake, from community wellbeing to scientific fidelity, and missteps can bring unexpected and harmful consequences.

The Moon Shot

We have seen large-scale, sustained research initiatives in other areas, such as exploration of outer space, and exploration of atoms and even smaller particles that tries to discern the essence of space and time. In these studies, at issue is nothing less than understanding the origin and future of the universe. We have, over the course of civilizations around the world, seen massive engineering projects spurred by ambitions of technical prowess and longevity. Of course interest waxes and wanes over time, but discoveries in these areas build on each other so that knowledge and practice for the most part advance. What about disaster research? Surviving, thriving, improving, advancing toward a better life should be the great goal of humanity. Instead we have squabbles about resilience. The closing chapter by Tricia Wachtendorf calls on the disaster research field to think big.

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