Pollution, Health, and Disaster

Emerging Contributions in Ethnographic Research

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■ **ABSTRACT:** The materiality of pollution is increasingly embodied in humans, animals, and the living environment. Ethnographic research, especially from within the fields broadly construed as medical anthropology, environmental anthropology, disaster anthropology, and science and technology studies are all positioned to make important contributions to understanding present lived experiences in disastrous environmental contexts. This article examines points of articulation within recent research in these areas, which have much in common but are not always in conversation with one another. Research and writing collaborations, as well as shared knowledge bases between ethnographic researchers who center different aspects of the spectrum of toxics-based environmental health, are needed to better account for and address the material and lived realities of increasing pollution levels in the time of a warming climate.

■ **KEYWORDS:** ethnography, disasters, materiality, medical anthropology, political ecology, pollution

In an early 2017 discussion of future research priorities in disaster studies, Lori Peek, Director of the Natural Hazards Center at the University of Colorado Boulder, opined that social research on disasters would very soon confront a global cascading emergency moment.¹ In her view, climate and other human-influenced environmental change was creating a set of circumstances where rather than responding to temporally distinct, more isolated emergency events, with some period of recovery time possible, human societies around the world would soon be experiencing many, and more serious disasters concurrently. The 2017 hurricane season proved her to be correct, as have the years since, with more hurricanes, wildfires, earthquakes, and a global pandemic. These disaster events, catalyzed by both natural hazards and human action, have brought into greater usage the notions of “concurrent,” “cascading,” and “compound” disasters (see, for example, Cutter 2018; CONVERGE 2020). At the same time, for communities with acute experience of persistent contamination this is not a new experience—they have long dealt with disasters in multiples (Blanks et al. 2021).

For example, frontline communities that bear the brunt of health and environmental inequalities, which has been referred to as “slow violence” (Nixon 2011), are also frequently the central focus of more explicit state-sponsored (or “state-tacitly-approved”) violence. Referring to the pervasiveness and repetitive quality of state violence as it impacts Black women, Christen Smith (2016) invokes a medical term, *sequelae*—the compounding negative impact on health and well-being experienced by Black women in their struggle to nurture Black children in an anti-Black context such as the United States or Brazil. In Smith’s work and that of others, it

becomes clear how many environmental and health justice advocates put their lives at material risk when they call attention to the broader structural violence (Farmer 1996) being perpetrated by governments and corporations (Jacka 2015; Kirsch 2014; Welker 2014). These domains of health, environment, justice, and disaster are now so increasingly intertwined that ethnographic research approaches must more explicitly draw on the connections and insights that come from conversations that in practice often happen in separate lanes, such as in specialized conferences and journals.²

Cascading disasters³ (Pescaroli and Alexander 2015) make up an area in which anthropologists and other ethnographic researchers may be able to make important contributions to understanding their processes and the imagining of new futures (Masco 2017), based in their long-term engagements with particular communities, organizations, and locations. One thing that distinguishes anthropology from other social research fields is an emphasis on experience-near methods, as well as on critical analysis of the cultural qualities of the people and groups with whom they practice long-duration, participatory research (including within institutions, such as government agencies). This level of situational and shared cultural knowledge positions anthropologists well to work collaboratively with communities affected by disasters, and to analyze catastrophic events with greater depth and scope than disaster researchers in other fields, whose work tends to be less locally sustained and more comparative in approach. At the same time, as a discipline rooted in colonial dynamics, anthropologists in particular must attend to the ethical imperatives inherent in this work, and reflect on the motivations and outcomes of their research (Marino et al. 2020)

Engaging Environmental Health and Disaster

Ethnographic work on disasters has significant roots in anthropological political ecology and represents a range of work that has addressed both natural and human-spawned hazards (Oliver-Smith and Hoffman 2002). Research focusing on pollution frequently highlights the experiences of living with pollution, social relationships with polluters, and how affected communities seek justice (e.g., Checker 2005; Fortun 2001; Kirsch 2014). Work that centers the materiality of that pollution and its ecological impacts may lean toward a less explicitly political mode of analysis (Paulson et al. 2003), while work focused heavily on the political within political ecology has inversely been accused of lacking sufficiently in ecology (Vayda and Walters 1999; Walker 2005). There have been some concerted efforts to account more closely for the combined material and embodied experience of contaminated environments within medical anthropology (e.g., Dietrich 2013; Dietrich and Harper 2007; Harper 2004) attending especially to the challenges of proving health impact through traditional epidemiological studies by public health institutions. The insights produced by these projects have been productive, but the work has often been caught between the fields it means to bridge—equal parts medical and environmental anthropology, adjacent to science and technology studies (STS) and until recently relatively unfamiliar to disaster anthropologists.

While anthropologists have studied environmental crises in specific contexts for as long as the discipline has existed (Oliver-Smith and Hoffman 2019), the coalescence of a specialized subfield with disasters as a central interest is more recent. In their 2002 essay urging anthropologists to make disasters a more explicit focus of research, Anthony Oliver-Smith and Susanna Hoffman suggested that such a focus “could lead to reducing the theoretical and methodological gaps that presently separate the ecological, political-economic, and cultural perspectives” in the discipline as a whole (2002: 6). The ensuing 20 years of research has proven genera-

tive in that endeavor, and as some of the work reviewed here will show, has the potential to fruitfully combine environmental and health research and policy questions (Barrios 2017; Browne 2015; Dietrich 2020), especially as increasing numbers of events provoked by natural hazards (such as hurricanes) threaten polluted communities. This field also increasingly has the capacity to influence the work of emergency management systems at structural and policy levels (see FEMA 2019). However, the field of disaster studies in anthropology and the social sciences more broadly has not consistently engaged with health sector research (Fjord and Manderson 2009), reflecting much of the awkwardness of attempts at cooperation by these fields within government agencies (Tierney 2012). Research focused on health-related topics may involve specialized knowledge of methods, jargon, or previous experience with certain health issues (Stellmach et al. 2018). These potential barriers can limit the ability or comfort of researchers whose emphasis is, say, catastrophic flooding, or the institutional culture of the Federal Emergency Management Agency (FEMA), to engage in research around an unfolding health crisis. Some notable exceptions include work on Bhopal (Fortun 2001) and Fukushima (Sternsdorff-Cisterna 2015)—but work on these disasters often utilizes an STS perspective, staying equally long or longer with the work or systems of the acknowledged experts as with those of the people whose health has been most impacted.

Suffice it to say, there are important points of further articulation and abundant opportunities for collaboration across these fields. For example, researchers who center the phenomenological experience of health as well as those who center the questions of disaster have experience negotiating with the industries and agencies most responsible for carrying out distinct policies addressing both health and disasters. But while corporations and government agencies may operate with bureaucratic similarity across many topical areas, current climatic and toxic environmental circumstances require that researchers examine many such actors simultaneously. The many layers of environmental injustice that unfolded following Hurricane Harvey in 2017 (Lieberman-Cribbin et al. 2021) suggest one such example. Another potential case emerging in this landscape of research became clear in late July 2020, when news broke that the well-known photographic and chemical company Eastman Kodak had obtained a government loan to shift its production to provide basic chemicals for drugs related to the COVID-19 pandemic (Flanagan 2020). While this production shift may provide safeguards against the US reliance on foreign supply chains and boost employment in rust belt communities, the production of chemicals for pharmaceutical processes will surely require adherence to distinctive regulatory regimes for both health and environmental protection. This shift calls for ethnographic scrutiny from a range of perspectives.

Shared Futures in Research and Society

In the following sections, I review select works that show points of connection for a purposeful collaborative approach to understanding the lived materialities of environmental contamination; their deeply rooted, continuing, and cascading consequences; and their possible futures. I have grouped the selected literatures together under topical headings that I hope will engage researchers interested in what might be called acute and chronic environmental crises, whether they begin with a disaster framework or not. I am explicitly engaging research that can be defined as follows: medical anthropology (broadly construed—ethnographic work that primarily centers questions of health), science and technology studies (STS) (emphasizing health or the environment but privileging questions of expertise or the production of knowledge), disaster anthropology (ethnographic work that centers the catastrophic impact of cir-

cumstances and events), and environmental anthropologies in which health is more directly implicated. The majority of the work discussed is broadly focused on North American settler colonial states, under regulatory regimes that have largely favored corporate interests, and where advocacy often engages with an environmental justice framework. Exceptions may include works that have contributed to critiques or theory-building arguments that have been broadly influential.

This article seeks to engage across these specialties, finding through-lines of inquiry, collaboration, and debate, in the hope of advancing work around shared concerns at which many researchers have arrived from different starting points. The main concern of this article is a pragmatic one—that in reviewing these works researchers can avoid talking past one another, finding themselves at cross-purposes or reinventing wheels. As climate change and failed regulatory regimes lead ever-more locations and societies to an accelerating state of emergency, more researchers feel compelled to focus on these topics, blurring boundaries we once thought sharply drawn. While for the sake of practicality I will at times categorize certain work as belonging predominantly to one field or another, part of the point is that we are already crossing into one another's specialties, and this will only increase.

In the latter part of the article, I offer a few examples of ethnographic work at the intersections of these fields (including my own) to illustrate how researchers might further draw together some of these threads. In particular, I draw attention to recent work on the multifold disaster in Puerto Rico, as well as recent collaborative work spurred by the COVID-19 pandemic. Although not all the research reviewed is conducted by anthropologists, I am emphasizing work with an experience-near or ethnographic approach in order to draw attention to the contributions that researchers with deep knowledge of particular locations and collaborative histories working with communities have to offer to the larger understanding of the materiality of toxic experience. Inasmuch as recent writing has pointed to the enduring presence of materials that contribute to the formation of “toxic worlds” (Nading 2020; see also Liboiron et al. 2018), we can also recognize that many of our current circumstances, especially the accelerating impact of global climate change, create increasing imperatives for such research. I attempt to map here an emergent and needed field of collaboration that draws on Anna Tsing's notion that “transformation through collaboration, ugly and otherwise, is the human condition” (2015: 31). This is true for the topics of research and for the process itself, acknowledging the increasingly blurred lines between research and lived experience, and accounting for sometimes wide gaps in privilege and relative safety.

Medical and Environmental Anthropologies: An Initially Awkward Embrace

I began my training in a particularly open and eclectic mode of medical anthropology, one that embraced the notion that medical anthropology was the concern of all four fields of anthropology (cultural, biological, linguistic, and archaeological). Even still, I found myself reaching for other perspectives, most notably epidemiology and environmental anthropology, to analyze my dissertation research (Dietrich 2013). In this process, I became one of a growing number of medical anthropologists who received formal training in public health and/or clinical disciplines. The tools gained increasingly allow medical anthropologists to analyze shared health problems from within the perspectives of health systems, as well as from community and phenomenological perspectives (Hahn and Inhorn 2009). In some cases, medical anthropologists and medical sociologists have been able to bridge gaps in communication and different types of

expertise, supporting community-action research utilizing “popular epidemiology” and similar approaches (Hoover et al. 2015; Trostle 2005).

Many questions asked by medical anthropologists, in particular those collected under the umbrella of “critical medical anthropology,” have important analogs in ethnographic political ecology. Critiques of capitalism in general, and corporate capitalism specifically (see, e.g., Applbaum and Oldani 2010; and Oldani 2004), figure centrally in both approaches, as do questions about the mechanism of institutional control of both healthy and unhealthy bodies (Cartwright 2019; Scheper-Hughes and Lock 1987). More recently, the field has also taken up ontological questions about the tools of scientific expertise and quantification (see, e.g., Adams 2016; and Sangaramoorthy and Benton 2012). In many cases, social movements around environmental issues spring to life because of the health concerns of local communities, yet work emphasizing social advocacy has not always found favor among medical anthropologists, who have been concerned that their work would be devalued as being “applied” or insufficiently objective (Low and Merry 2010; Rylko-Bauer et al. 2006).

Searching in the index of flagship journals *Medical Anthropology Quarterly* and *Medical Anthropology*, for example, with the words “environment” or “ecology” yields few satisfying results, even with regard to the past five to ten years. Ecology in particular, when it appears, is most often a vague or almost metaphorical reference to the relationship between people and their environment, such as “the social ecology” of a particular health issue. Notable exceptions are a few articles in a special issue on “human animal health in medical anthropology” (Brown and Nading 2019) covering a broad range of topics from zoonoses to the health benefits of companion animals; an examination of the epigenetic impacts of life in the Anthropocene (Lock 2020); a review calling for further research on the ubiquitous presence of plastics and their health impacts (Pathak and Nichter 2019); and a collection of pieces on health and climate change put forward “as a way to reinvigorate the discussion over medical anthropology’s potential for contributing to this pressing topic” (Cartwright 2019: 438).

On closer observation, much of what once was considered “critical medical anthropology” might now be subsumed under the framework of “syndemics” (e.g., Himmelgreen et al. 2013; Mendenhall 2013; Willen et al. 2017), which can be defined as “two or more afflictions, interacting synergistically, contributing to excess burden of disease in a population” (Singer and Clair 2003). In this perspective, social and structural conditions, such as living as a racialized person in US society, as well as the toxic or precarious environments that can result from these conditions, would be viewed as syndemic with clinical conditions that actively increase the burden of negative health outcomes. At the same time, critics of the use of syndemics to address the lived experience of, for example, racial capitalism and settler colonialism have suggested that anthropologists would be better served (Sangaramoorthy and Benton 2021) by looking to the robust work of fields such as social epidemiology (e.g., Krieger 2016), intersectional politics (e.g., Crenshaw 2017), and of scholars whose work has long paid more explicit attention to the direct consequences of racism, sexism, and homo- and transphobia. These lines of inquiry have also been important to ethnographic work around ethics of care, and strategies such as “intra-vention” (Bailey 2009; Cheng and Garriga-López 2021) that communities can provide for one another when services and resources are scarce or outright denied (Duclos and Sánchez Criado 2019; Nelson 2016). The increased attention to networks of mutual aid in the context of disasters (Jones et al. 2015; Rodríguez Soto 2020) speaks to these concerns through a different lens.

In its initial crossovers, disaster anthropology, which tends to sit more closely to economic and environmental anthropology, has likewise been awkwardly in conversation with medical anthropology. In one example of an anthropologist approaching a disaster from these two orientations, the work of Vincanne Adams (2013) following Hurricane Katrina in New Orleans

demonstrates the trouble of the split focus. That work yielded a monograph focusing on volunteerism, recovery, and profiteering, taking aim at capitalism in the so-called “disaster recovery industry.” Adams’s coauthored articles (e.g., Adams et al. 2011) emphasize specific health issues, such as the confluence of aging and mortality risk with disaster recovery. While both approaches are important, there is less of clear sense of how to weave these perspectives together. A recent piece by Amanda Reinke and Erin Eldridge (2020) looks at disaster recovery drawing on concepts that have been central to critical works by medical anthropologists, such as structural violence. While their work does not address specific health issues as such, this shared analytic offers a point of articulation and potential shared inquiry.

Each of these specialty areas within anthropology also makes productive use of the device of casting certain negative outcomes as “unnatural.” References to the “unnatural selection” of adaptations to poor health environments (Martorell 1999; Singer 1996), and to “unnatural disasters” (Smith 2006), describe catastrophic events in the environment that have human-influenced origins or amplifiers. This perspective continues to provide a strong counternarrative to standard policy approaches that view disastrous events as isolated incidents, and local environmental health contexts as value-neutral. Recent work within medical anthropology emphasizing embodied pollution, described below, offers illustrative examples of how researchers are bringing what have previously been more isolated strands of inquiry together.

Arriving at Toxics: Medical Anthropology Engaging the Environment

There are threads in medical anthropology that are increasingly responding to the facts of living and working in polluted and frankly dangerous environs. For example, recent work examining the lives of immigrants, particularly those who are undocumented laborers, has emphasized the interwoven health consequences of migration status, access to care, and back-breaking work (Holmes 2013; Sangaramoorthy 2019). Workers in higher-risk industries and environments also suffer from the consequences of an increasingly polluted world, whether from direct exposure to toxic substances (Saxton 2015; see also Bohme 2014) or because they must go to further extremes in order to make a living, such in the case of deep-dive fishermen (Andrews 2020). Dvera Saxton’s (2021) action-research with farmworkers in California’s Central Valley documents both the harm of toxic exposure and the long-term efforts made by communities to improve working conditions and gain access to medical care. Saxton draws on anthropological work with community organizations (e.g., Checker 2005), which asserts that community or nonprofit groups rarely need an anthropologist per se, or even need research. Rather, the strongest anthropological research with communities of struggle and praxis is rooted in allyship, where the job of the anthropologist is to do what is needed for the community or organization, which in turn also directs the inquiries of the researcher. Anthropologists recognize that “the community” or any organization is not singular, so this work is not always straightforward, but a commitment to relationship-building is what can set anthropological work apart when researching the social, cultural, and material impact of contaminated worlds (Nading 2020).

The bringing together of multiple frameworks has had important impact within reproductive medical anthropology as well. As noted in a recent review (Lappé et al. 2019), emergent work at the boundaries of reproductive and environmental politics has drawn attention to environmental health impact encompassing the individual, the family, and shared social and health legacies, present and future. While key work on pollution’s effects on reproduction within medical anthropology has been conducted outside of North America (e.g., Lamoreaux 2016), significant work within North American contexts where environmental justice is a salient framework has

brought reproductive justice and environmental justice into productive conversation (Hoover 2018). Michelle Murphy's work (e.g., Murphy 2017) calls attention to how nonhuman chemical substances exist in complex relation to human society—harmful chemicals brought into the environment by settler actors (corporate or otherwise) in fact exist and persist around and within people who benefit most (or are least harmed) by them. At the same time, Indigenous, Black, and poor communities remain disproportionately impacted, and have struggled, through many generations, against both the chemicals themselves and the regimes that introduced them. In thinking through the lens of reproductive health, epigenetic considerations likewise are implicated, and show legacies of impact that go beyond a single person or generation. And Natali Valdez (2018) has shown that, in epigenetic research and clinical practice, the environment itself is conceptualized and presumptions about a patient's ability to control that environment are inherently both political and subject to cultural influence. The potential influence of the clinician, a traditional focus of medical anthropology, also speaks to the need to investigate a broad range of expert interlocutors who increasingly interpret what is meant by "the environment" in other contexts.

The multiplicity of environmental consequences of global climate change, when added to acute and pervasive environmental contamination, have only amplified health risks in many communities (human and nonhuman) already dealing with existing mental and physical health issues (Baer and Singer 2016; Rock et al. 2009). As the materiality of pollution is increasingly embodied, in humans, animals, and the living environment, there is a need for more and deeper synthetic work in this area, and work focused on analyzing the specific lives, and modes of nonhuman organisms and substances is key to these inquiries. In the following sections, I look at how medical and disaster anthropologists in particular, in conjunction with researchers with allied interests (such as science and technology studies, or STS), have contributed to knowledge production on the situated experience of environmental crises, drawing attention to spaces of existing overlap and potential affinity.

Sites of Knowledge and Positionality in Pollution and Disaster

In the context of questions about health and the environment, work in STS initially focused on what might be considered more elite spaces—laboratories, clinics, and corporations—where the production of scientific knowledge often occurs. Increasingly, researchers aligned with STS have also drawn attention to different spaces of knowledge work, as well as the agency of materials in the environment, those that support health (such as water; Ballesterio 2019) and may be detrimental to health (such as microplastics; Liboiron 2016). The combined human and nonhuman perspectives of such work is very helpful in understanding how the intricate and entangled spaces of our worlds are brought into being, including through health and environmentally related scientific research and production (see, e.g., O'Reilly 2017).

In disaster anthropology, the tendency of the research is often a long focus on the experiences of communities deemed "vulnerable," even as the field itself contests the utility of that designation (Marino and Faas 2020). There is an emergent interest in both analyzing the work of and collaborating with those broadly referred to as "practitioners," people who respond to disasters in a range of contexts and roles. As disasters unfold, however, when communities and responding agencies may have contentious relationships, researchers are often in a position where they have to negotiate their allegiances and may feel the need to temper criticism for the sake of access. This tension is not unknown to anthropologists in many specialty areas, yet the political stakes for these relationships has never been higher. Medical anthropology has taken both per-

spectives at different times, emphasizing each of these angles, via what is sometimes criticized as “the suffering stranger” paradigm (Butt 2002; Robbins 2013) and being more embedded in the clinical side of health delivery (e.g., Blumhagen 1979; Mattingly 2010). Sharing experiences and insights in working through, or when possible refusing, these conflicts would benefit researchers who deal with a range of public health and disaster agencies. Anthropological inquiry grounded in long-term relationships with communities may help work through some of these challenges, but in particular for researchers focused on the workings of the agencies themselves, there is a risk of emphasizing what Indigenous scholar Eve Tuck (2009) has called “damaged-centered” research, as the ethnographer may take on the perspectives of the responding agencies. Tuck calls attention to the potential of such work (relevant to all research described in this review) to embrace a theory of change “that establishes harm or injury in order to achieve reparation” (2009: 413). Similar critiques have also been leveled at the environmental justice movement (Pulido 2017), a framework to which many researchers focused on environmental crises, especially pollution, consider themselves allies. Drawing on multidisciplinary works emphasizing desire instead of damage, Tuck suggests a depathologizing approach that emphasizes the future focus of affected communities, even as it acknowledges present struggles. The move to depathologize behavior or perspectives outside of the norm also has resonance in anthropological health inquiry (see, e.g., Sobo 2016).

Even as critical approaches in medical anthropology emphasize inequality and social determinants of health, they have been rightly critiqued for hesitancy to more explicitly name racism, colonialism, sexism, homophobia, and, more recently, transphobia (Baker and Beagan 2014; Yates-Doerr 2020). In environmental and disaster anthropology, with their emphasis on the suffering of frontline communities, the work is often not as comfortable with the complex and contradictory space of resilience, where forms of self-sufficiency for individuals or affected communities could be interpreted through a neoliberal lens (Dietrich 2020; see also Reese 2019). Interesting parallels exist between studies of “vulnerability” in disaster research and the “social suffering” literature in critical medical anthropology approaches (Kleinman et al. 1997). At its core, there is a tension between representing inequality and suffering for the sake of supporting positive change, and falling into the trap of perpetrating disaster pornography, the exotification of suffering or the protagonism of charismatic leader-advocates. Recent feminist STS work (Liboiron et al. 2018) highlights the tendency of social researchers to focus on pollution-related activism at its most visible, most protagonistic, and, in Tuck’s (2009) words, most one-dimensional, while everyday political action in a world of persistent pollutants, whether resistance or simply survival, is often much smaller and at times invisible. The work of sitting with and speaking to the lived experience of persistence is crucial for understanding the connection between environment and health to which anthropologists are well suited.

Within disaster studies, anthropologists have been among those calling attention to the *longue durée* of disaster causality, emphasizing that preconditions go far beyond recent decades and policies, extending into the colonial and preindustrial past. The roots of many contemporary toxic catastrophes are not only found within modern industrial relations and practices, but in the legacies of colonial and extractive relations (Dietrich 2013; Lloréns and Stanchich 2019; Yazzie 2018). Again, a reckoning for the material persistence of colonial forms will continue to be a productive intervention for researchers, such as the specter of abandoned military bases, infrastructure, medical systems or programs, industries, and educational systems, which is similar to the work of Kim Fortun, which straddles anthropology, STS, and disaster studies. In addition to the deep engagement and “looping” ethnographic work (Fortun 2012) that allows for complex understandings of how the histories of people and places shape the present, more focused attention to interpretations of human and nonhuman agency, such as in the cases of

polluting materials (Liboiron 2016), as well as weather systems (Bica 2019), may be a productive approach to disrupt the dichotomy represented in persistent framings such as “vulnerability” and “resilience.” These perspectives help us critically engage with discourses of “choice” that permeate discourses of health behavior and disaster preparedness, response, and recovery.

Factors and Actors beyond the Human

Recent anthropological scholarship on the environment has taken up the increasingly pervasive notions of entanglements and assemblages, approaches to interconnectedness that are also notable in the medical humanities (see Shildrick et al. 2018). These approaches can lead to fruitful considerations of relationships between humans and nonhuman animals, as well as the agency, or even personhood, of crucial environmental resources such as rivers (Anderson et al. 2019; Tsing et al. 2019). These works are strongly influenced by both STS approaches (e.g., Latour 1987; Liboiron et al. 2018) as well as work by Indigenous scholars in anthropology and other fields (e.g., Carroll 2015; Liboiron 2016; Todd 2017; Whyte 2016).

Much of this research does not center health consequences of environmental change explicitly, yet the implications for health and well-being call for greater depth of engagement with the material. Anna Tsing reminds us “that staying alive—for every species—requires livable collaborations” (2015: 28), many of which are at scale and with entities we as human beings rarely acknowledge. Increasing attention is being paid to multispecies communities, which call for multispecies ethnographies (Kirksey and Helmreich 2010), and questions about destruction also come front and center (Kirksey 2015)—extinction and rejuvenation are a frequent focus, rather than health. Clint Carroll (2015) likewise embeds consideration of Cherokee medicinal plant knowledge into a broader argument about sovereignty and human–nonhuman relations, also noting that there are limits to what may be appropriate access to Indigenous knowledge by outside researchers, regardless of how urgent or informative the research may seem (see also Marino et al. 2020).

As with research on fracking (Pearson 2017), ethnographic inquiry into the consequences of corporate polluting practices will require increased attention to the technical materialities of the pollution itself, and carefully balance the local and global implications in the story. As studies of corporations have documented (e.g., Dolan and Rajak 2013; Welker 2014), corporate discourse increasingly appropriates references to nature, community, and other positively connoted concepts to distract from the inherently polluting qualities of their products and processes. A focus on these qualities and the logic, for example, that it is the intention of environmentally persistent chemicals to persist in the environment, and therefore to be harmful, is an important counter to corporate narratives designed to obfuscate responsibility.

Anthropologies of water (e.g., Ballesterio 2019; Hastrup and Hastrup 2015) also emerge from research in the many perspectives outlined above, and are crucial to future collaborative and creative work. Medical anthropologies of water initially focused closely on water-borne or water-related diseases (see Whiteford and Vindrola Padros 2011), but other, more subtle health issues have emerged at the intersection with environmental research. Of particular interest, beyond the potential to ingest toxins, the psychological and social strain of living with scarce water resources has been documented in a variety of locations (Ennis-McMillan 2001; Wutich and Ragsdale 2008). Collaborative research between medical anthropologists and biological scientists into toxic dinoflagellate blooms (Paolisso and Chambers 2001) is also due for a comparative revisit by teams of researchers, given the likelihood that its root causes will increase in frequency and intensity due to climate change. Caela O’Connell and colleagues (2017) exam-

ination of farmers' agency as participants in water-quality trading schemes suggests potential comparative and complementary work with veterinary and medical anthropologists. Anthropological work on infrastructure (e.g., Anand 2017; Anand et al. 2018; Schweitzer et al. 2017) has also reached an imperative moment, not only for what it can contribute to environmental understanding, but for health as well. As Barbara Rose Johnston and Shirley Fiske (2013) have noted, the hydrosphere (water in its many forms) is abundant, interconnected, and globally at risk. As a "biocultural resource . . . a human need, an economic good, and a global commons" (2013: 6), water is key to health in virtually any way it can be defined, and at every scale.

Margaret Weiner (in Cadena et al. 2015) has asked provocatively whether the project of decentering humans from social analysis fundamentally changes the anthropological project in ways that make it no longer anthropology. The flourishing of work on human/other-than-human spaces and dynamics within environmental anthropology in particular suggests this is not the case. The environmental health impacts of nonhuman entities, particularly in the forms of corporate "persons" that have successfully garnered legal protections that facilitate pollution and obscure accountability (Fitz-Henry 2018), are but one glaring example.

Toxics, Built Environments, Consequences

Several recent ethnographies of the toxic consequences of industrial (and in some instances colonial) business-as-usual are suggestive of an approach to link a number of these literatures. These studies of long-standing industrial pollution draw attention to the nexus between the handling and impact of particular chemicals, corporate and government action (or inaction), discourse framing, community activism, and the simultaneous certainty and uncertainty of particular health outcomes in the community. In a number of cases, anthropologists have documented how "contamination as a material and embodied threat" (Renfrew 2018: 10) is often experienced in conjunction with other crises, especially political and economic crises. These works pay particular attention to the social experience of these multiple crises (or perceived crises) as well as to the phenomenological experience of illness and questions of whether and how social movements form in these contexts. In the case of long-standing contamination from IBM in upstate New York, Peter Little (2014) delves into the technical management of vapor intrusion, complementing a more traditional trend in political ecology to pay attention to the experience of residents living with pollution. This consideration of the physical environmental process of pollution, as well as the regulatory regime as practiced by technical experts, offers a powerful, multivalent analysis (see also Wiebe 2016 for a complementary Canadian example).

Elizabeth Hoover's recent monograph, *The River Is in Us* (2017), unlike many works within anthropology, is explicitly methodological in its conception, documenting how environmental health researchers (including ethnographers) can contribute to environmental justice while letting communities (in particular, Indigenous communities) lead. While firmly rooted in anthropology, the text has a distinct multidisciplinary flavor, mostly succeeding in bridging all the difficult-to-harmonize elements needed to tell the full story of embodied pollution in a context of contested sovereignty. Forcing a shift from the equity framework to one of sovereignty is a vital intervention in the environmental justice literature, particularly in light of many front-line climate, environmental, and health struggles over access to community data (Carroll et al. 2020). These analytic perspectives and methodological approaches are a needed shift that holds merit for a number of contexts, especially as questions of sovereignty become increasingly salient to imagining alternative healthier and more sovereign environments.

Toxic Coloniality: The Case of Puerto Rico

In the relatively small archipelago of Puerto Rico, depending on the specific location, quite distinct environmental hazards must be confronted and are made increasingly more dangerous as tropical weather patterns become more severe (Dietrich et al. 2017; Garriga-López 2020). My own predominantly ethnographic research on pharmaceutical pollution combined sustained work with local activists with analyses of how public health and local municipal officials were complicit in the manipulation of epidemiological research, the relative appropriateness of water sanitation technologies implemented to manage the pollution, and the rising influence of the corporate social responsibility (CSR) movement (Dietrich 2013). In the wake of the 2017 hurricane season, physical damage to infrastructure and environment across Puerto Rico was felt in every sector—public utilities failed, hospitals and distribution systems were under severe stress, and local food production was decimated (Lloréns and Stanchich 2019). When the failure of the electrical grid led to many water distribution failures, some communities were forced to seek alternatives. In one community located near a Superfund site, the need for water put people in the path of choosing between possible toxic sources or none at all (García-López 2018), a tradeoff that resonates globally. And while some scholars and activists have called for the need for a stronger environmental justice perspective to analyze these multiple, intersecting sources of harm and death, the case of Puerto Rico is illustrative of how the coopting of environmental justice frameworks within government agencies such as the US Environmental Protection Agency can undermine significant change (Dietrich 2013; see also Pulido 2017).

Catalina de Onís's (2018) work on energy coloniality likewise highlights how elite discourses work to reinforce inequality and what she calls the "emergency manager effect," especially prevalent in colonial contexts. By ignoring the histories of extractive and polluting industries that have been the focus of Puerto Rico's economic development strategy, response and recovery policies pursued by the pro-statehood Roselló administration after Hurricanes Irma and Maria emphasized the need for outside assistance, and minimized the community-based work being done by local residents and groups to provide food, water, and other emergency supplies (Rodríguez Soto 2020).

The example of Puerto Rico also illustrates a case in point for some of the opportunities and concerns raised in this review. In the wake of so many recent compounded disasters (hurricanes, earthquakes, the COVID-19 pandemic), the archipelago has experienced a major increase in disaster-related research from many research sectors—experienced disaster researchers with relatively little experience in Puerto Rico, researchers with long-standing commitments to Puerto Rico but minimal experience with disasters, and of course local researchers with a wide range of backgrounds and interests.⁴ While the different constituencies (and others combining these different positionalities) have much to learn and share with one another, such conversations and collaborations inevitably find friction around differences of language, jargon, methods, frameworks, and past experiences. In Puerto Rico, it is absolutely critical to attend to the specific context of colonialism, extraction, and the expertise of local communities and researchers who are steeped in these lived experiences (see Santos-Lozada 2020). There are also important benefits to engaging with researchers and examples in other contexts in order to tease out where there is specificity and particularity—for example, teasing out when the actions and impacts of FEMA represent the inherent and targeted cruelties of a colonial administrative unit, and when failure is indicative of broader structural and governmental deficiency (Dietrich 2020).

Conclusion

Ethnographic researchers are increasingly likely to work with or otherwise be connected to communities affected by multimodal disasters. The global experience of the COVID-19 pandemic has provoked widespread suffering; made visible deeply ingrained social, economic, and health inequalities; and inspired new modes of organizing and collaboration. The pandemic has highlighted in particular a question that has been on my mind for several years: are we all disaster (or environmental health) researchers now (Knowles 2020)?

My answer to this question is a qualified “yes” and “no”—most importantly, ethnographic researchers whose work begins from different analytic perspectives should be more actively engaging one another as our communities of belonging and of praxis increasingly confront environmental disasters, whether they be disease, toxic hazards, or disasters rooted in meteorological events. As someone whose work is in conversation with the key fields touched upon in this article—medical, environmental, and disaster anthropologies, and science and technology studies—I continue to find that researchers who specialize in each are not as conversant with one another’s work as one might expect (or find beneficial). For example, for a researcher new to disasters and their management, the notion of “command and control” may be new—but only because they have not yet read 70 years of social science research on disasters (Tierney 2020). As a relative newcomer to disaster research explicitly framed as such, I have great empathy for the potentially steep, and shared, learning curve represented in this review.

Within medical anthropology, core concerns have been reproductive health, infectious diseases, chronic diseases affecting historically marginalized communities (a.k.a. “social determinants” research), focal areas that mirror specific tracks in medicine and, to a lesser extent, public health. With public health, anthropology’s standard engagements have been with international/global health, and epidemiology, often from a critical perspective, though also seeking rapprochement (Inhorn 1995; Trostle 2005). With the intensification of climate change as well as its amplifying effect on toxic and other pollutions, there is a need to re-engage all these areas of health inquiry through an environmental lens (Logan et al. 2018).

In just one example, recent medical anthropology work on chronic diseases, such as Parkinson’s, has engaged the anthropology of aging as well as several threads of critical medical anthropology analysis (i.e., how chronic conditions are the accumulation of both individual and structural factors), but have yet to closely and sustainably engage with material environmental analysis. Given increasing evidence that lifetime exposures to certain chemical solvents likely influence the development of Parkinson’s (Brody 2020; Goldman et al. 2011), this is an example of a fruitful area for a more promiscuous (or selectively promiscuous [Goodyear-Kaʻōpua 2015]) research conversation. Critical medical ethnographers of the environment can create research pathways that bridge scales and differentials of power—studying multiple “directions” or levels of privilege and access at the same time.

Medical anthropologists have begun to more directly examine how system-industries such as health insurance have impacted health and well-being (Dao and Mulligan 2015; Mulligan and Casteñeda 2017). There have also been important analyses of how such institutions create in effect “bad biocitizens” (Chavez 2013; Greenhalgh and Carney 2014)—particular groups that are seen as failing to advocate for themselves and their health, or to embrace identities grounded in the acceptance of biomedical definitions of healthiness or the appropriate ways of seeking health-related rights. There are parallel inquiries to be made in disaster anthropology as well. For example, how do local norms and understandings of the role of insurance meet personal and policy decisions (Maldonado 2016; Oliver-Smith 2016)? Important questions needing fur-

ther consideration address how deservingness or appropriateness of aid is framed and deployed in public discourse (Benton 2015; Morales and Hamm-Rodríguez 2018; Mulligan and Brunson 2020), and, similarly, how some people or groups are defined as being inherently capable of, or failing to be responsible for, disaster preparedness (Dietrich 2020; Vaughn 2017).

My own research experience with disasters has consistently demonstrated how complex the terrain of preparedness can be, and that what it means to be “prepared” at the level of Scheper-Hughes and Lock’s (1987) three bodies (the individual, the social, and the body politic) is highly contested. This becomes more complex if we follow Elizabeth Cartwright’s urging and add “the body environmental as a separate conceptual lens” (2019: 437; see also Agard-Jones 2013). The prescriptive discourse of standard preparedness regimens rarely accounts for preexisting social, environmental, and health conditions, for example a burgeoning opioid addiction crisis or a level of social acceptance of environmental pollution that influences risk perception (Dietrich 2013, 2020). As Roberto Barrios and colleagues (2020) have asked with respect to Hurricane Harvey’s impact in Houston: “What does [it] reveal for whom?” Approaches to preparedness likewise often fail to account for the inherent uncertainty of weather forecasting (Lazrus et al. 2019), which, when combined with many other aspects of uncertainty that pervade the present moment, make science communication, and therefore preparedness, far more complex than buying X amount of food and water for X number of people for X number of days.

Culture remains a core area of inquiry for anthropologists, and some of the most significant work to be done on the topics being considered here lies in the analysis of the clashing of cultural and structural modes, such as during a disaster between disaster responders and those affected (Dietrich 2020; Maldonado 2016). Indeed, while anthropologists eternally debate about how best to center culture (or *not*), work that identifies structural inequalities and structural violence has become central to environmental and health analyses, while striving to not essentialize the qualities of particular groups or circumstances. However, a more recent generation of anthropologists doing critical work has rightly noted that this productive and often justice-focused work across these areas within anthropology has inadequately accounted for the specific prejudices, processes, and harm grounded in racism and colonialism (Sangaramoorthy and Benton 2021; Todd 2015). These critiques, and the light they help shed on the historic, present, and future materiality of environmental harm, need to be attended to.

Tsing notes that “[s]elf-contained individuals are not transformed by encounter” (2015: 28). This may also be an apt description of the results of many previous attempts to bring together medical and environmental anthropologies. Likewise, Nolwazi Mkhwanazi (2015) calls our attention to how medical anthropologists have tended to harmonize toward telling unitary narratives about how things work with respect to health in Sub-Saharan Africa—an observation that surely holds in other areas as well. With these critical observations in mind, I suggest those of us working at the crossroads of medical, environmental, and disaster ethnographic research seek much more substantial insights from, and collaborations with, one another. The COVID-19 pandemic has already created opportunities and impulses for collaborations, in part due to both its urgency and ubiquity. Two examples where researchers draw on several threads outlined in this article were supported through a call for National Science Foundation-funded working group through the Natural Hazards Center (NHC) at the University of Colorado Boulder.⁵ A. J. Faas and colleagues’ research agenda calls for an applied approach to researching the pandemic that attends to “(post)colonialism and capitalism, multispecies networks, the politics of knowledge, gifts and mutual aid, and the work of recovery” (2020: 333), and acknowledges both the similarities and differences that a pandemic has to disasters rooted in other hazard events. Noting, for example, that “disaster recovery or risk reduction agencies differ from healthcare systems in many ways” (2020: 339), Faas and colleagues also point to a

recent piece on research ethics by a collective of disaster and medical anthropologists (Marino et al. 2020). Finally, a third collaboration, also drawing on the work of ethnographically oriented disaster and public health researchers, and supported by the same NHC initiative, produced an open-access research protocol and question bank to investigate the cumulative effects of successive disasters (CADAN 2020). The outcome of these approaches to work on life in this polluted world, drawing on both roots and rhizomes of multiple fields, pushes us toward a multiplicity of new, sharable perspectives on risk, harm, and the collective work of living together for equitable and safer futures.

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■ NOTES

1. She told me in a personal communication on April 6, 2017.
2. Online blogs and similar publications increasingly host such conversations (see Disaster Studies 2020), but work in these outlets is less acknowledged within the formal reward structures of academia.
3. "Cascading disasters are extreme events, in which cascading effects increase in progression over time and generate unexpected secondary events of strong impact. . . . These subsequent and unanticipated crises can be exacerbated by the failure of physical structures, and the social functions that depend on them, including critical facilities, or by the inadequacy of disaster mitigation strategies, such as evacuation procedures, land use planning and emergency management strategies." (Pescaroli and Alexander 2015: 65).
4. The University of Puerto Rico's Centro de Investigaciones Sociales hosted a year-long speaker series that demonstrated this richness and variety of research that has been underway since 2017 entitled "Serie de conferencias 'Desastres y sociedad: aportaciones desde las ciencias sociales.'"
5. See <https://converge.colorado.edu/resources/covid-19/working-groups>.

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