Introduction to Part III

Alice Mah

Science and politics are impossible to disentangle within environmental justice (EJ) struggles. What counts as legitimate data, and whose voices count? How can local communities that face disproportionate toxic burdens effectively mobilize science to support their campaigns for environment justice? Scientific evidence of toxic exposure is often not sufficient to ensure adequate compensation, remediation, or recognition (Boudia and Jas 2014). As the epidemiologist and environmental justice activist Steve Wing (2005, 55) argued, "The environmental justice movement has been led primarily by people of color, women, and people who live in communities that are adversely affected by environmental problems created by industry and government, the very institutions that are closest to science."

One of the key challenges within the environmental justice movement is the problem of quantifying the health risks of toxic exposure. Within epidemiology, there are established correlations between environmental exposure to particular chemicals and diseases. However, the levels of exposures are disputed (i.e., concentrations, duration, and measurement criteria), and these are notoriously difficult to isolate from other environmental factors (Tesh 2000; Vrijheid 2000). Debates about environmental health in contaminated areas are particularly controversial, reflecting competing and unequal interests between corporate profit, job security, environmental protection, and community health.

Corporations have frequently denied the health risks associated with toxic pollutants, emphasizing the uncertainty of science as a strategic use of ignorance (Markowitz and Rosner 2002; Michaels 2008; McGoey 2012). Moreover, contested forms of expertise have led to the problem of "undone science," whole avenues of scientific exploration that are too politicized to gain widespread support (Frickel et al. 2010; Hess 2016). Corporations are able to use scientific uncertainty over measurements of toxicity in order to move the goal posts, and thus ignore the "snapshots of chemical exposure" that citizen scientists are able to record (Murphy 2015, 110). The toxic yardsticks and standardized practices of science can become both a source of legitimacy for "fenceline" communities, but also the means of their downfall (Ottinger 2013).

The politicized nature of science has led academics and activists to call for the democratization of science and expertise, advancing forms of citizen science and participatory public interventions in science and policy (Irwin 1995; Fischer 2000; Carolan 2006). The community-based environmental justice research examples discussed earlier, in Part I of this book, exemplify some of the success stories of participatory citizen science while highlighting the need for enduring struggles. However, citizen-led environmental justice victories, where corporations or state actors are held legally responsible for costs of compensation, clean-up, or relocation, typically only occur in extreme cases of negligence (Bullard and Wright 2009). Following the uneven geography of toxic hazards, the environmental justice "wins" also correspond to "losses" in other places, as toxic hazards move to communities with weaker political voices.

Part III of *Toxic Truths* highlights the importance of context-specific environmental justice strategies, alongside crosscutting EJ concerns with political recognition (Schlosberg 2013) and the democratization of knowledge (Carolan 2006). The three chapters in this section foreground public engagements with science, rather than citizen science per se, drawing attention to the uses of science and how these have been mobilized strategically within different political contexts. Despite the well-documented public health consequences for people living and working close to contaminated sites around the world, the methodologies and strategies for addressing these problems are fragmented (see Pasetto and Iavarone, this volume). While there are systemic patterns of environmental injustice around the world, the social and political dynamics of interests, values, and actions are different in each case. These chapters highlight the political dilemmas of engaging with science for seeking environmental justice in different contexts in Spain, Italy, and China. In particular, the authors explore the challenges of addressing knowledge gaps about environmental health data; equitable participation and dialogue in environmental decision making; and effective local strategies of confrontation with industry and the state.

Miguel López-Navarro's chapter focuses on a local environmental organization's confrontational approach toward industry over air quality in the "northern petrochemical complex" in Tarragona, Spain. This chapter shows that the organization's adversarial approach toward industry was more effective than consensus-based approaches for changing the behavior of industry. The regional and industrial context is important for understanding the efficacy of this approach. The local environmental organization's confrontational approach was bolstered by the perceived scientific legitimacy of the study among multiple stakeholders. The absence of epidemiological studies and the limited number of pollutants monitored by the regional government were key factors behind the mobilization of the health study, which had been carried out by experts in which civil society organizations had actively participated. This chapter also shows how an environmental strategy based on confrontation does not necessarily exclude dialogue, because, in this case, it led to the local organization's active participation in a multi-stakeholder deliberative process.

The lack of epidemiological studies is a significant barrier to seeking environmental justice, particularly on a systemic level. The chapter by Roberto Pasetto and Ivano Iavarone addresses this issue from another angle, by examining the environmental justice implications of a national epidemiological monitoring system in Italy, where the health profile of populations who live in close proximity to Italian National Priority Contaminated Sites (NPCS) has been periodically assessed. The authors argue that the national epidemiological monitoring system could help contaminated communities in their struggles for environmental justice by identifying and communicating the environmental health risks that are concentrated in particular neighborhoods. In other words, the chapter seeks to address gaps in "epistemic injustice" (Fricker 2007) or "knowledge justice" (Allen, this volume) through the production and communication of official national epidemiological data, as a public resource for local communities. The authors conclude with a reflection on the widespread public health implications of living in close proximity to industrially contaminated sites around the world, yet the lack of common epidemiological methodologies or frameworks. They argue that there is an urgent need to promote international cooperation to identify appropriate strategies and methods to deal with these issues more systematically.

The case of China demonstrates the political barriers to such aspirational models of international cooperation on the epidemiology of toxic contaminated sites. Echoing the case of Tarragona in Spain, but on a much wider scale, polluted industrial sites in China also lack epidemiological data and reliable air quality monitoring. Air, water, and land pollution are pervasive throughout China, often at very high and alarming concentrations well above international

standards for acceptable thresholds. However, toxic pollution in China comes from multiple sources, and it is often difficult, if not impossible, to attribute it to a single industry. Furthermore, in most cases, having scientific data about toxic exposure risks would not be sufficient for seeking compensation or justice in China (see Van Rooij et al. 2012; Mah and Wang 2019). As Xinhong Wang and Yuanni Wang discuss in their chapter, civil society organizations face severe constraints in China, and environmental NGOs tend to adapt their work to avoid direct confrontation with the state. In contrast with López-Navarro's chapter, Wang and Wang argue that strategies of "soft confrontation" have been more successful than direct confrontational strategies for addressing environmental problems in Hunan Province in China. The authors demonstrate how Green Hunan, a local environmental volunteers' organization, has operated strategically to avoid direct confrontation while advocating for environmental protection, for example through the use of the media and lobbying rather than protests.

Participatory citizen science is one method for seeking environmental justice, and bearing witness through embodied experience is another. However, it is important to recognize the need for diverse citizen-led strategies for seeking environmental justice based on different contexts. Questions of power, including the role of the state, corporate interests, and civil society, are crucial in debates about the science of environmental justice. With the world beset by an increasing number of seemingly unsolvable environmental problems, the "uneasy alchemy" (Allen 2003) of citizen–expert alliances is all too often the social fallout of battles over scientific expertise. The stakes of this fallout are high in a post-truth age, where the interplay of science and politics is increasingly unpredictable.

References

Allen, B. L. 2003. *Uneasy Alchemy: Citizens and Experts in Louisiana's Chemical Corridor Disputes*. Cambridge, MA: MIT Press.

Boudia, S. and N. Jas. 2014. Introduction: The greatness and misery of science in a toxic world. In by S. Boudia and N. Jas (eds), *Powerless Science? Science and Politics in a Toxic World*. New York: Berghahn Books, pp. 1–28.

Bullard R. D and Wright B. 2009. *Race, Place, and Environmental Justice after Hurricane Katrina*. Boulder, CO: Westview Press.

Carolan, M. S. 2006. Science, expertise, and the democratization of the decision-making process. *Society and Natural Resources*, 19(7), 661–668.

Fischer, F. 2000. *Citizens, Experts, and the Environment*. Durham, NC: Duke University Press.

Frickel, S. et al. 2010. Undone science: Charting social movement and civil society challenges to research agenda setting. *Science, Technology & Human Values*, 35(4), 444–473.

Fricker, M. 2007. *Epistemic Injustice: Power and the Ethics of Knowing*. Oxford: Oxford University Press.

Hess, D. 2016. *Undone Science: Social Movements, Mobilized Publics, and Industrial Transitions*. Cambridge, MA: MIT Press.

Irwin, A. 1995. *Citizen Science: A Study of People, Expertise, and Sustainable Development*. Abingdon: Routledge.

Mah, A. and Wang, X. 2019. Accumulated injuries of environmental injustice: Living and working with petrochemical pollution in Nanjing, China. *Annals of the American Association of Geographers*. DOI: 10.1080/24694452.2019.1574551.

Markowitz, G. E. and Rosner, D. 2002. *Deceit and Denial: The Deadly Politics of Industrial Pollution*. Berkeley: University of California Press.

McGoey, L. 2012. Strategic unknowns: Towards a sociology of ignorance. *Economy & Society*, 41(1), 1–16.

Michaels, D. 2008. *Doubt Is Their Product: How Industry's Assault on Science Threatens Your Health*. Oxford: Oxford University Press.

Murphy, M. 2015. Chemical infrastructures of the St. Clair river. In S. Boudia and N. Jas (eds), *Toxicants, Health and Regulation since 1945*. London and New York: Routledge, pp. 103–115.

Ottinger, G. 2013. *Refining Expertise: How Responsible Engineers Subvert Environmental Justice Challenges*. New York and London: NYU Press.

Schlosberg, D. 2013. Theorising environmental justice: The expanding sphere of a discourse. *Environmental Politics*, 22(1), 37–55.

Tesh, S. N. 2000. *Uncertain Hazards: Environmental Activists and Scientific Proof*. Ithaca, NY: Cornell University Press.

Van Rooij, B., Wainwright, A. L., Wu, Y., and Zhang, Y. 2012. The compensation trap: The limits of community-based pollution regulation in China. *Pace Environmental Law Review*, 29(3), 701–745.

Vrijheid, M. 2000. Health effects of residence near hazardous waste landfill sites: A review of epidemiologic literature. *Environmental Health Perspectives*, 108(1), 101–112.

Wing, S. 2005. Environmental justice, science and public health. *Environmental Health Perspectives*, 113, 54–63.