Introduction to special issue: "Reconceptualising toxicity and environmental justice"

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The interdisciplinary field of environmental justice has been driven from the outset by a commitment to expose and understand instances and forms of environmental injustice, and in doing so help to challenge and address it. R. Bullard's (1990) seminal work on toxic dumping among minoritized communities in the US is often regarded as a leading example of the power of scholarship to expose environmental injustice. Following Bullard's study of environmental racism in the US, scholars in the critical social sciences have documented how toxic exposure intersects with and exacerbates social, political and economic inequality in communities worldwide. Scholarly efforts have resulted in a large academic project focusing on the pervasive affects of toxic disasters – for example Chernobyl (Petryna 2002), Bhopal (Fortun 2001) and Seveso (Centemeri 2011) – as well as slower forms of contamination around industrial sites (Allen 2003; Murphy 2006; Little 2014) that often receive less attention and remain "out of sight" (Nixon 2011; see also Shapiro 2015; and Davies 2019). Today more than ever, environmental injustice and toxic violence continue to proliferate and make this work vital.

Building on this scholarship, more recent work has developed a broader range of approaches to studying a "permanently polluted world" (Liboiron et al. 2018) where contestation alone is not sufficient to address the ubiquity of toxic chemicals. This approach is committed to understanding toxic encounters as sites where new chemosocialities (Shapiro and Kirksey 2017) and toxic worlds (Nading 2020) are produced and contested (see Lou and Lora-Wainwright, this volume). Here toxicity and human intimacy are profoundly entangled and co-constitutive: chemicals can both disrupt and sustain life, entangled in wider webs of ecology, politics and histories (Agard-Jones 2013; Balayannis and Garnett 2020; Tousignant 2018). Human and more-than-human relationships can be weakened, enhanced or transformed through interactions with the chemical in what Nick Shapiro and Eben Kirksey (2017) conceptualize as "the longstanding relationships and emergent social forms that arise from chemical exposures and dependencies". In addition to the detrimental health effects of pollution in fenceline communities, this 'chemical turn' might also unveil emerging more-than-human relations that are formed amidst toxicity. Thinking toxicity through the more-than-human also raises the question of what constitutes the threshold of (in)justice, who determines it, and in whose interests (Chao et al. 2022). For communities living with toxicity, this means recognising justice not only in relation to human survival but also within wider webs of multispecies entanglement (see Kirkham, this volume).

M Murphy's (Murphy 2017) concept of *alterlife* provides another generative framework for thinking about these conditions. *Alterlife* names the ways of living, knowing, and being that emerge in the midst of toxic environments. It recognizes that chemicals are inseparable from human bodies and the ecologies they inhabit. Importantly, *alterlife* also points to the semiotic and political dimensions of chemical entanglement. Chemicals are not only agents of biological disruption, but manifestations of broader capitalist and colonial forces that control access to land, benefiting some while dispossessing others (see also Liboiron 2021). More importantly for this special issue, *alterlife* involves an awareness of the irreversible chemical modifications within the body and an openness to continuous change rather than the pursuit of remediation exclusively. This conceptual shift embodies an acceptance of our intertwined existence with the chemical world and the sociopolitical forces that shape it (see Kirksey 2020). In recognizing this entanglement, toxicity opens up possibilities for new becomings: ways of imagining justice and politics that do not rely on returning to an imagined purity but embrace the multiplicity of contaminated life.

This generative approach to studying chemicals has also been sustained by an increased scholarly attention to subtle forms of agency through which communities living with toxic exposure navigate everyday life. Ideas of 'slow observation' (Davies 2019), 'resigned activism' (Lora-Wainwright 2021, see also Tam, this volume), 'intimate activism' (Tironi 2018), 'jugarse la vida' (wagering one's own life - Valdivia 2021), 'unnoticing' pollution (Lou 2022), or adapting to the slow bureaucracy of welfare support amidst industrial contamination (Auyero and Swistun 2009; Ippolito 2022) are examples of conceptual frameworks that have been developed to study experiences of toxic exposures that can be only partially represented by traditional approaches to environmental justice. Collectively, this body of work expands the epistemic domain of toxicity to encompass not just the chemical, but also the political and the ethical, as Liboiron et al. (2018) capture in a special issue titled 'Toxic Politics' (see also Barry 2017).

Inspired by this work, in 2020 we (the guest editors of this special issue) began a research conversation around these themes. We were brought together by three projects investigating how residents of Taranto, Italy, live with and act amidst severe pollution caused by one of Europe's largest steel factories. Our scholarly engagement with the work cited above helped us rethink our own approaches to the study of toxicity, for example by reframing Taranto's 'risk perception' in terms of 'safety creation' (Jokela-Pansini et al. 2024). Building on this, between 2021 and 2024, we also hosted a series of academic events under the title 'Reconceptualising Toxicity', including a roundtable, a workshop, seminars, and conference sessions. These conversations—both online and in person—brought together colleagues interested in collectively rethinking approaches to better understand the mundane and intimate experiences of toxicity in affected

communities, especially when these are seemingly at odds with the aspirations of environmental advocacy.

This special issue gathers the contributions born out of this collective endeavor to critically rethink toxicity across the disciplines of geography, anthropology and sociology. Our aim is to unsettle potentially restrictive framings of environmental justice in communities living with toxic exposure. Within these communities, civil society mobilisation does not see the participation of all community members, but only of specific actors whose advocacy aligns with the framings of justice that fit mainstream discourse. While these voices do advocate for communities as cohesive wholes, in some cases they prevent dissonant experiences from emerging and shaping narratives and aspirations to justice. These exclusions risk reinforcing a form of epistemic injustice that is also connected to the perpetuation of slow and structural violence in affected communities (Davies 2019).

These alternative orientations to toxicity are often overshadowed by the dominance of damage-based research on environmental injustice. Speaking from the field of education studies in vulnerable communities Eve Tuck (2009) defines damage-based research as "research that operates, even benevolently, from a theory of change that establishes harm or injury in order to achieve reparation" (413). While this type of research may be well-intentioned, it risks reinforcing "a pathologizing approach in which the oppression singularly defines a community" (ibid.), solidifying a simplistic view of communities, sometimes even as completely depleted and devoid of hope. In this volume, for example, Paul Jobin shows how a thorough documentation of toxic damage in a Taiwanese court led to enhanced psycho-social suffering among the victims in what he terms 'chemo-anxiety'. This creates a paradox in which a focus on unveiling material harm perpetrates other forms of harm to the community itself.

Implicitly, this approach may also position such communities as passive victims rather than agents who actively navigate complex ecologies of toxicity and the social entanglements that intersect with them. In turn, this orientation can reinforce normative definitions of toxicity and justice that narrow the potential for scholarship to engage with the diverse experiences and relations through which toxicity is lived. Conversely, "suspending damage" (Tuck, 2009) means refusing to allow harm to be the sole lens through which communities are understood; it means recognizing that even in contexts of severe environmental violence, there are forms of hope, desire, and aspirations that cannot be reduced to injury alone (see Jokela-Pansini and Militz 2022).

Framing research around suspending toxic damage and care relations beyond environmental harm may also affect the way communities can imagine and bring about justice. Laura Centemeri (2015) highlights how models to pursue environmental justice premised solely on quantifiable injury cannot fully account for the lived realities of

toxicity, calling this tension the "incommensurability of environmental damage". For communities living in toxic environments, justice is not only about measuring harm or proving causality; it is about transforming the epistemic structures that guide our understanding and actions concerning environmental injustice. For example, in this volume, Nina Djukanović explores the unexpected connections that emerge between lithium extractivism and mass shootings in Serbia. The experience of toxic risk in the country, she argues, cannot be understood as an isolated event, but requires appraisal within lived histories that link together different forms of "violent politics". In this sense, the critique of damage is also a critique of narrow epistemologies that restrict the possibilities for imagining in/justice. In line with this scholarship, this shift toward "desire-based research" (Tuck 2009) is essential for restoring agency in communities living with severe toxicity and supporting them not only by amplifying their demands, but also by engaging with the knowledge systems and value frameworks through which those demands take shape (see also Ottinger 2023).

In light of the above, we asked ourselves: how do framings of environmental justice rooted in specific philosophical and activist traditions silence a broader spectrum of narratives on and engagements with pollution and justice? How might critical environmental justice research support a more inclusive and anti-colonial (Liboiron 2021; Tuck and Yang 2016) understanding of entanglements between toxicity and activism? Building on the contributors' ethnographic research, this special issue unpacks encounters with the toxic to reflect on the configurations of power that shape and/or suppress particular narratives on, and responses to, chemicals. These experiences lead to aspirations to justice that are premised on the recognition of the entanglement of toxicity with individual and collective life, as opposed to the measurement of chemical concentrations and damage to individual bodies (Shapiro et al. 2017).

Unpacking and pluralising the politics of studying toxicity leads to understanding that, to support the flourishing of communities that live with toxic damage, damage itself needs to become the starting point for new pursuits. By attending to the everyday practices through which people live with and through toxicity, we hope to illuminate forms of justice that are premised not on remediation or restitution, but on recognition, adaptation, and relationality. These are not necessarily optimistic stories; they often involve resignation, contradiction, or acceptance of irreversibility. Yet they also reveal forms of creativity, care, and hope that challenge the epistemic and political boundaries of environmental justice (see Paone, this volume). Thus, this special issue highlights how human engagements with toxicity generate multiple, sometimes contradictory, aspirations to justice, or set discordant parameters for what counts as a "good life" (see Ippolito et al., this volume). This complicates the assumption that justice must always be framed through harm, injury, or restoration. Instead, the articles open up space for envisioning justice in the midst of toxicity —not despite it, but through it.

In other words, this special issue gestures at the ambivalent process "of both being affected and learning to affect in return" (Nading, 2020, see also Liboiron et al. 2018 and Murphy 2017). Alex Nading (2020) frames this way of thinking about toxicity as 'toxic worlding', arguing that this approach is "less concerned with a politics of correction or mitigation than it is with one of creative social and ecological rearrangement". This process – Nading argues – responds to an understanding of toxicity as a slippery and "sweaty" (Ahmed 2017) concept that can only be grasped in relation to the assemblages it is part of. With toxicity as "a condition of modern life and the substance of ethical engagement" (Langwick 2018 420, in Nading 2020), we argue that toxic worlding calls for a reconceptualisation of toxicity by bringing forth an ethical commitment to epistemic empowerment in communities that have been disenfranchised not only through environmental injustice, but also through narrow definitions of justice (see also Fisher et al. 2021).

Lastly, we do not see this special issue as the first collective project to think critically about and with toxicity. In the last few years, colleagues before us have made important contributions highlighting different dimensions of living with chemicals. Camelia Dewan and Elizabeth Sibilia led a joint effort across anthropology and geography to think about "toxic flows" not as just physical substances, but also cultural, economic and political processes that shape which communities bear the brunt of environmental injustice. In line with them, this special issue produces reflections on how the contextualization of toxicity across different scales and temporalities may enable scholars and activists to address wider structural inequalities and think with as well as beyond local specificities.

Addressing the global waste-discard-toxicity nexus in another edited collection, Peter Little (2025) argues that anthropology is not in a critical position to contribute to clean solutions to toxicity and waste, but to promote "slow[ing] down and tak[ing] more seriously the greater need to advance how people and communities in the global North and South are already navigating the waste-discard-toxicity nexus." In their edited volume focusing on the relationship between environmental justice and citizen science in a post-truth age, Thom Davies and Alice Mah ask the question: "what does "justice" actually mean within environmental justice?" In doing so, they highlight environmental justice's inherent multivalence, reinforcing the call for greater attention to lived experience.

Finally, in a forthcoming edited volume titled 'Chemical Exposures: Toxicity in the Anthropocene', Sahra Gibbon, Emilie Glazer, Lucy Sabin, and Andrew Barry call for a similar, pluralistic approach to studying chemical exposure by questioning: 'what is a chemical'? The volume encourages critical social scientists to think beyond disciplinary boundaries to "trace the multiple, complex, and interconnected relations across the accumulation, scale and modalities of sensing that constitute the experience of chemical exposure".

What, then, should the role of geographers, anthropologists, sociologists and other critical social scientists be in reconceptualising toxicity? Developed in parallel to the reading groups and workshops that led up to the 'Chemical Exposures' volume, this special issue takes inspiration from the above scholarship and turns critical inquiry to the toxic. Similarly to Davies and Mah (2020) and Gibbon et al. (Forthcoming) we ask: what is toxicity? And how can it be reconceptualised to make room for more heterogeneous aspirations to environmental justice? The contributions in this special issue complement this collective effort in the critical social science by shedding light on the slippery, multivalent concept of toxicity. Rather than offering new conceptual frames to understand toxicity, these papers point at a need to 'de-conceptualise' and decentre it from the orbit of technoscience and instead pull it closer into the orbit of lived experience and situated knowledges. We believe that this decentering of toxicity is the first step toward multiplying conceptualisations of justice and surpassing the neoliberal framings that simultaneously animate the structures of power oppressing fenceline communities, as well as the modes of knowledge production that are abided by in academia.

The articles

Building on these reflections, the contributions to this special issue pursue the task of reconceptualising toxicity not through a single lens but by following its multiple articulations in everyday life. As in the work discussed above, the emphasis falls less on toxicity as a measurable substance than on the ways it is inhabited, negotiated, and transformed across contexts. Each article attends to the ambivalences of toxic encounters, showing how they are refracted through relationships, temporalities, histories, and more-than-human entanglements. Some foreground the chemosocialities (Shapiro and Kirksey, 2017) that emerge in contaminated environments, while others underscore fracture, anxiety, or the weight of historical violence. Together, the articles show that toxicity can be at once damaging and generative. Reading the articles alongside each other also makes recurring motifs visible such as temporality, solidarity, and adaptation, while also stressing how differently these take shape depending on context. In this way, the special issue offers a a set of situated accounts that unsettle one another and collectively expands what counts as environmental justice.

A first strand of contributions draws attention to the generative forms of sociality that arise within damaged environments. Man Kei Tam (this volume) explores experiments in living and the speculative futures emerging in a 'village where radiation still lingers'. Drawing on the work of Adriana Petryna (2002), amongst others, Tam gestures towards the innovative combination of scientific data and local knowledge and activism which works to make a post-nuclear landscape liveable. As Sanae, a young candle artist living in Iitate, Japan, insists, "I live a normal life (futsū ni kurashiteimasu/普通に暮らしています)" even while surrounded by radioactive waste and monitoring posts. This emphasis

on normalcy, in the face of what outsiders might read only as injury, resonates with the ways in which communities craft modes of continuity and care amidst disruption. In this context, toxicity becomes a condition that organises everyday life, delimiting possibilities while also opening space for new forms of belonging and speculative futures.

Similarly to Tam, Gabriele Paone's (this volume) visually compelling photo essay challenges us to recognise the agency of Roma children dwelling amongst illegally dumped toxic waste on the outskirts of Naples. Echoing Eve Tuck's (2009) call to 'suspend damage' when seeking to understand the lives of those living in fenceline communities, Paone's photos celebrate instead the adaptability and hidden talents of the children whose lives they document. Their “adaptive intelligence” (Paone 2025) emerges not in spite of toxicity but through it: knowledge of metals, vehicle parts, and the informal economies of waste become forms of expertise that allow children to survive and even flourish within hostile conditions. These two pieces decentre toxicity and concerns with injustice while simultaneously drawing attention to the agency, hopes and adaptability of their subjects.

If Tam and Paone illustrate what Shapiro and Kirksey (2017) term the chemosocialities emerging from shared experiences of toxic exposure, the next two articles encourage readers to reflect on the ways in which chemosocialities may might fracture and along generational and social lines. Following in the tradition of approaches to environmental justice which recognise its slow violence (Davies, 2019), Raffaele Ippolito, Carmen Sale and Maaret Jokela-Pansini (this volume) draw on the voices of three generations of residents living in the Italian Steel town of Taranto in order to trace how narratives of living amidst chronic pollution are reproduced and change over time, with each generation offering a different evaluation of the costs and benefits. In this way, their work contributes to a more heterogeneous understanding of environmental justice; one in which diverse forms of attachment to one’s hometown can intersect with wariness about toxicity as generations collaboratively care for each other and for their surroundings. This article adds an important aspect to existing studies of intimate forms of engagement with toxicity: an awareness of generational variations. Here, toxicity emerges as a temporal condition, shaping how memories of industrial prosperity, experiences of decline, and hopes for the future are woven into everyday practices of care.

Lou and Lora-Wainwright (this volume) also engage with chemosociality (Shapiro and Kirksey, 2017; Kirksey 2020) in order to call for a more precise definition of the term and to make sense of the various ways in which it may (or not) give rise to various forms of action. Similarly attentive to temporal changes, but over a shorter time span, they examine the shifting strategies of a Chinese environmental NGO devoted to engaging with chemical industries in China’s highly developed eastern provinces. They propose that the concept of “chemosolidarity” provides a valuable corrective for understanding how and why activists foreground chemicals to encourage participation in pollution

monitoring among local communities and industries and yet they fail to achieve the desired outcome. This case demonstrates that the co-presence with chemicals (chemosociality) is not sufficient to nurture practices of support and care (chemosolidarity) but that the NGO was able to nurture solidarity instead by encouraging communities to attend to their natural surroundings through nature walks. In turn, the article underscores the need for scholarship on environmental justice not to focus solely on the *effectiveness* of particular activist strategies, but on their *affective* aspects.

Paul Jobin (this volume) and Nina Djukanovic (this volume) both blur the boundaries between material and immaterial toxicity, and between historic, contemporary and anticipated future risk. The focus of Jobin's article—the protracted struggle by former workers in Taiwan's electronics industry to hold the company accountable for the environmental health harm caused—may seem a classic case of environmental justice scholarship portraying the suffering of workers. However, Jobin complicates our understanding of the effects of toxicity by also drawing attention to chemo-anxiety: the psychological harm caused by the awareness of environmental harm. While previous studies pointed to "toxic uncertainty"—that is, communities' inability to gain clarity about the effects of toxic exposure—as a form of domination (Auyero and Swistun 2009), Jobin highlights the emotional burden caused by growing certainty about the harm they have suffered. The process of suing the companies responsible carries with it not only the hope of financial compensation but also the cost to mental health of learning more about the potential damage caused by prior exposure. In this framing, toxicity is not reducible to a chemical substance or a biological threshold but becomes part of what Jobin calls "regimes of toxicity"—shifting assemblages of knowledge, law, and lived experience that structure how harm is defined and compensated. Chemo-anxiety, in turn, reveals toxicity as a temporal and relational condition unsettling the boundaries between present and future, as well as material mental wellbeing.

This important point is also elucidated by Djukanović's work. Her article examines how the toxic threat of proposed future lithium mining projects in Serbia becomes entangled with broader shared concerns around systemic violence in the present. It highlights how the wider political context affects the emergence of environmental activism. Other forms of violence—foremost experiences of war and genocide—shape the ways in which the potential of toxic violence is experienced. In turn, Djukanović demonstrates that toxicity is not only material, chemical pollution but also affective, political, and anticipatory: the uncertainty surrounding the Jadar Project already produces a form of "invisible toxicity" that degrades everyday life. By theorising "violent politics," she shows how toxicity circulates between extractivism, political repression, media discourse, and social fear, complicating neat separations between material and immaterial affects. In this sense, toxicity appears not simply as a future threat but as an active modality of violence in the present, a force that both reflects and reinforces histories of trauma. Like Jobin's chemo-

anxiety, it expands the scope of what counts as toxic harm, underscoring that toxicity must be understood not only as chemical exposure but also as the affective and political conditions that give it meaning.

While other contributions have sought to nuance when the effects of toxic exposure are felt, how and by whom, Kirkham (this volume) invites us to turn a critical lens to how toxicity itself is understood. Using the example of snakebite envenomation, he makes a case for paying attention to the impacts of biological as well as industrial toxins, as well as the specific social, cultural and environmental contexts within which toxic exposures take place, and invites comparisons between the experiences of communities affected by industrial and biological toxins. Unlike the other articles, which centre on pollutants generated by industrial activity, Kirkham highlights how toxicity is also produced in multispecies encounters, where venom and chemical residue may both threaten and sustain life. This shift unsettles the implicit hierarchy that treats "natural" toxins as outside the purview of environmental justice, and instead shows that the infrastructures of care, risk, and survival often overlap across domains. In this sense, his article pushes the special issue to reconceptualise toxicity not only as a social condition of industrial modernity but as a broader relational phenomenon, one that traverses species boundaries and requires attending to the ecological entanglements through which harm and healing take shape.

Taken together, the contributions gathered here suggest that toxicity can no longer be approached as a singular object of measurement or harm but must be understood as a relational condition that unfolds across temporal, social, and ecological registers. Toxicity appears not only in the persistence of chemical injury, but also in the creativity, fractures, and affects that accompany exposure; it surfaces in memories of violence, anticipations of uncertain futures, and in the multispecies encounters that complicate human-centred accounts. This special issue does not claim to provide a definitive framework, but rather to foreground the plurality of ways in which toxicity is inhabited and made meaningful. In doing so, it contributes modestly to the task of reconceptualising environmental justice: shifting attention from damage alone to the ambivalent, situated practices through which communities live with contamination, and to the diverse aspirations for justice that emerge from within these toxic worlds.

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