



Vulnerability Revisited: Advancing Feminist Political Ecology Approaches in Climate and Health Studies

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Panagiota Kotsila¹ , Sergio Ruiz Cayuela¹ ,
and Marien González-Hidalgo² 

Abstract

The risks of climate change on human health are increasingly studied through various conceptualizations of (social, environmental, and health) vulnerability, from different ontological and epistemological standpoints. Within this diverse body of work, questions around how different structures and forms of power shape why, how, where, and by whom such vulnerability is experienced and contested remain marginal, fragmented, or concentrated in certain disciplines. Synthesizing transdisciplinary literature and insights from a Feminist Political Ecology perspective, this paper advances four future directions in research and proposes new questions related to climate-related health vulnerability regarding: its intersectional, systemic, and structural drivers; its relational nature; the agency and strategies of resistance that emerge from and against it; and the embodied forms of knowing around it.

Keywords

vulnerability, feminist political ecology, climate change, health, intersectionality

Introduction

Taking a feminist political ecology (FPE) approach to vulnerability is urgent to understand and unpack underlying drivers and to strengthen collective efforts for transformative change. Feminist political ecologists have contributed to a conceptualization of vulnerability that is not fixed (to places, people, or systems) nor independent from the historical, deeply rooted, structural, and power-laden characteristics of the systems that unequally produce it (e.g., Tschakert and Tuana 2013). They point to the importance of examining issues like climate governance at the “everyday” scale; those routine and often mundane activities that offer ways of understanding

“how social relations are shaped by power, and how responsibility and action are placed on differently and unequally situated bodies” (Bee, Rice, and

¹Institute of Environmental Science and Technology (ICTA-UAB), Universitat Autònoma de Barcelona, Spain

²Department of Urban and Rural Development, Swedish University of Agricultural Sciences, Uppsala, Sweden

Corresponding Author:

Panagiota Kotsila, Institute of Environmental Science and Technology (ICTA-UAB), Universitat Autònoma de Barcelona, Edifici Z, Carrer de les columnes, Bellaterra (Cerdanyola del Vallès - Barcelona), 08193, Spain.

Email: Panagiota.kotsila@uab.cat

Trauger 2015, 343). As Doshi (2017) stresses, socio-environmental change is embodied in intimate, meaningful, and power-laden ways, including through formal and informal labors, intersectional positionalities, visceral experiences, and with consequences for political subjectification and resistance.

In this paper, we seek to synthesize a feminist political ecologist perspective on vulnerability and sketch how such understandings can be more directly applied to research around climate and health. Addressing this issue is essential if climate and health studies are to meaningfully incorporate feminist perspectives on vulnerability. This requires engaging with key concepts such as intersectionality, relationality, and resistance. Furthermore, this is important for the overall meaningful advancement of inter- and trans-disciplinarity in health- and climate-related studies, especially because the common (but perhaps less explored) denominator of both feminism and climate-related health is the “body”—as a field of concern, study and inquiry, as a concept, and as a social, political, and cultural site.

To pursue our aim, we apply a thematically guided, expert-informed literature exploration. We employ a conceptual and interpretive approach, drawing on our extensive collective transdisciplinary experience—spanning over 35 years—in critical environmental research. We engage in a purposive and reflective examination of key scholarly works that have shaped, influenced, or responded to debates around vulnerability within several traditions—including environmental justice, political ecology, feminist studies, human geography, and environmental humanities, among others—and read them from a FPE lens to underline relevant trends in intellectual debates. Our selection is guided by thematic relevance, conceptual significance, and our professional familiarity with the field, allowing us to surface critical insights and patterns that may not be immediately visible through formal review protocols.

The first and main author was involved in the WEGO-ITN network on FPE, where she had the opportunity to engage with and learn from scholars across different generations and geographies. Through this experience, she explored and contributed to (re)defining FPE as less of a canonical

“field” and more as a scholarly space of encounter (Harcourt et al. 2023). Her initial reflections on how FPE could inform understandings of health-related vulnerability led to the publication of a short commentary (Kotsila 2026). Building on this initial work, the other two authors were invited to contribute their expertise on topics such as the commons, militant research, and emotional political ecology. This collaboration aimed to expand the initial ideas by bringing together different strands and interpretations of vulnerability from an FPE perspective, and to consider how these can be mobilized in research on climate and health. Our exploration of the literature has been a collective process, shaped through multiple online and in-person meetings, mostly between the first and second author. During these discussions, the three authors selected works based on both their influence in shaping the field of FPE and the particular relevance of these works to the concept of vulnerability.

In this regard, it is crucial to acknowledge the limitations of our review and knowledge, explained due to our own positionality, as white, middle-class researchers based in universities in the Global North, and our familiarity and networks within certain geographical contexts. These limitations are further compounded by the global agendas that determine the publication of academic articles in English. With this in mind, our account is not intended to be exhaustive; rather, we seek to establish its relevance and significance through a thematic and reflective perspective.

Over the last decades, the concept of vulnerability has drawn much critique, revision, and expansion from different disciplines and perspectives, especially as climate-contingent vulnerabilities become more far-reaching, complex, and immediate. Within the field of geography, but also beyond its strict boundaries, political ecologists and critical human geographers have since the 1990s increasingly phrased vulnerability as socially constructed (Wisner et al. 2004). This was initially linked to so-called “natural” hazards and disasters, but increasingly also to broader environmental and climate change, linking issues of urbanization, land use change, migration, infrastructure development, and socio-environmental justice (Blaikie and

Brookfield 1987; Adger, Safra de Campos, and Mortreux 2018; Connolly 2018; Bouma et al. 2023). Vulnerability has often been articulated around health and well-being, particularly in terms of food insecurity, access to basic services such as housing or healthcare, but also in relation to heat-waves, droughts, wildfires, and the rise of infectious diseases or extreme weather events, all exacerbated by climate change (Few 2007; Quesada, Hart, and Bourgois 2011; Mayrhuber et al. 2018; González-Hidalgo 2023; Li, Toll, and Bentley 2023; Daalen et al. 2024). The COVID-19 pandemic only intensified this geographic interest in health vulnerability (Honey-Rosés et al. 2020; Cole et al. 2021; Sultana 2021).

In a broad sense, vulnerability can be seen as a set of conditions which increase the degree to which people, places, or systems may experience some form of harm. These conditions can be specific or universal, socio-economic or ecological, individual or collective, bodily or place-bound, emotional or physical, and usually a combination of all the above. But vulnerability is neither an innocent nor an inert concept. It carries implications as to who is responsible to overcome or mitigate their own vulnerability and to enhance or “deliver” resilience or adaptation, at what cost, and at whose expense (Cote and Nightingale 2012; Eriksen, Nightingale, and Eakin 2015). Demarcating “the vulnerable” from “the resilient,” moreover, can be a subjectifying process that positions people or groups as less capable, delegitimizing their knowledge and justifying resilience-oriented interventions (Andreucci and Zografos 2022; Eriksen 2022). Further, vulnerability can become too vague and depoliticized a concept if directed towards individual responsibility and segmented change, rather than broader and systemic transformation (Bee, Rice, and Trauger 2015). Depoliticized conceptions of vulnerability often rely exclusively on calculable indicators and rational governance models that tend to obscure the role of power relations, reinforcing such subjectifying processes (Meding and Chmutina 2023).

Vulnerability is not easily quantifiable; it manifests in various scales, and multiple vulnerabilities can overlap and reinforce each other (Adger 2006). In natural hazards studies, vulnerability

describes how likely a system or population is to be harmed by an external disturbance and its capacity to cope, recover, adapt, or collapse; in economics it is often expressed as the expected degree of loss from a catastrophic event; while in development and poverty studies, it puts emphasis on existing social, economic, and political conditions and how these shape people’s exposure to risks and their overall wellbeing. In this complexity, and with a burgeoning literature around it, there has been a widening compartmentalization of vulnerability (climatic, ecological, social, or health-specific)—depending on what kind of risk(s) or pressure(s) are taken into consideration—and a misalignment of the different approaches to research it. This disciplinary and thematic fragmentation is ill-suited to address the increasingly interconnected and multifaceted vulnerabilities people experience today (Cutter 2003).

Much of the natural, engineering, and medical sciences have traditionally adopted an “outcome-based” vulnerability approach. This approach is often considered technocratic and managerial as it focuses more on measuring the impacts of a harmful event with limited attention to historical and social contexts (O’Brien et al. 2004, 2007) or to local knowledge and practices (Sletto 2008). As a result, this approach tends to (re)produce socio-environmental inequalities. In contrast, political ecologists have advanced “context-based” approaches which focus more on capacities to adapt and the dynamic nature of vulnerability depending on both biophysical and social processes (O’Brien and Wolf 2010). But context-based approaches are also not free of critique. Here, the focus tends to be on large-scale processes (control of resources, decision-making processes, resulting policies), providing one-dimensional and sweeping depictions of what makes people vulnerable, focusing on geographical setting (e.g., the Global South), income level, or gender, to name a few. Such focus, while necessary, often tends to “describe—and reproduce—social difference, setting people apart at local and global scales” (Eriksen 2022). Moreover, it often also fails to grasp the intersectional operation of power in ways that permeate scales (from the global to the local) (Sultana 2022), and the subjectification processes taking place through embodied experiences

related to historical and shifting patterns of oppression/domination (Garcia and Tschakert 2022). FPE has been a convening space enriched with diverse transdisciplinary contributions from a wide range of critical perspectives, where such gaps in context-based critical approaches to socio-environmental vulnerability have been highlighted and addressed.

In this article, we thus first discuss a diverse and transdisciplinary body of literature on vulnerability from a FPE perspective and underline emerging trends in this literature, including both the mainstream and the more peripheral/marginal ways these trends have been expressed (section “FPE Approaches to Vulnerability: Intersectionality, Insurgency, and Embodied Knowledges”). We, then, move to examine what new questions and approaches arise when mobilizing these insights to scrutinize vulnerability related to climate and health (section “Towards Feminist Political Ecologies of Climate-Related Health Vulnerability”), drawing a future research agenda along four core and interrelated directions: (i) highlighting the intersectional systemic and structural drivers of vulnerability; (ii) understanding the relational nature of such vulnerability; (iii) revealing the agency and strategies of resistance that emerge from and against the condition of vulnerability; and (iv) centering embodied forms of knowing. We conclude with some guiding questions for researchers seeking to operationalize FPE approaches in climate and health research.

FPE Approaches to Vulnerability: Intersectionality, Insurgency, and Embodied Knowledges

Scholars, theorists, and activists have approached the concept of vulnerability from a wide range of (trans)disciplinary angles in ways that have informed FPE towards new, transformative, and emancipatory grounds. Here we review three main shifts we see arising—more so over the last decade—within this growing field. Our effort to “take stock” of such shifts is, first, serving the purpose of bringing together relevant contributions and debates on vulnerability under a FPE framework, highlighting the tensions, and shedding light on

the still marginal but promising ways of pushing these conversations forward. Second, this review provides a backdrop against which to examine how to apply this relatively new FPE framing on vulnerability to issues concerning the connections between climate change and human health, in order to more deeply and meaningfully explore “the body” as one common denominator of both feminism and climate-related health: the body as a field of concern, study, and inquiry, as well as a concept and a social, political, and cultural site—an issue to which we return and develop further in section “Towards Feminist Political Ecologies of Climate-Related Health Vulnerability.”

From Gendered and Intersectional to Queering and “Crippling” Vulnerability

Feminist studies have shown how intersecting positionalities in networks of power create differential vulnerabilities. This impacts people’s health and wellbeing, as well as the way actors understand themselves in relation to their changing surroundings (including biophysical environments, weather, and infrastructures) and the actions they engage in as a result, with clear implications for justice (Nightingale 2013; Garcia and Tschakert 2022; Mikulewicz et al. 2023). From this standpoint, and with a focus on gender, the uneven vulnerability of women and subaltern subjects to the impacts of environmental change such as land degradation, air pollution and toxicity, or climate-induced catastrophes has been documented and analyzed (Crenshaw 1991; Salleh 2009; Ojeda 2021; Navas 2023). Along these lines, the work of Rocheleau, Thomas-Slayter, and Wangari (2013), for example, points to how women’s socially constructed roles and designation in certain types of environments, laboring tasks, and decision-making spheres have historically resulted in gendered access to, or control over, land and ecological systems more broadly. The structural exclusion of women and other marginalized subjects, like Indigenous communities, from decision-making and environmental governance has also led to their prominent roles as environmental defenders, in turn unequally exposing them to both direct and slow types of violence enmeshed

in socio-ecological conflicts (Federici 2011; Nixon 2011; MacGregor 2020; Tran and Hanaček 2023).

Notwithstanding the gendered facets of environmental injustices, a deeper engagement of feminist scholarship with power moves away from seeing gender as a singular identity or an intrinsic factor of vulnerability. The work of Hill Collins (2022) pushed feminist studies to examine how intersectional experiences of injustice are produced through structural (social, institutional, legal), disciplinary (internalized norms and standards), hegemonic (discursive, dominant ideas, common sensical), and interpersonal (everyday level, emotional) power dynamics that interact and co-constitute identity and experiences. Vulnerability is thus to be understood as power-laden, depending on social-geographical context but also intersecting aspects of identity; as gendered but also at the same time race-based, class-defined, age-contingent, and so on (Arora-Jonsson 2011; Kaijser and Kronsell 2014). An intersectionality lens reveals vulnerability as context-based and as a shifting manifestation of oppression and control over certain people, groups, or territories. Correspondingly, Garcia and Tschakert (2022, 656) engage with intersectionality as a lens that can reveal the multidimensional and “complex constellations of inequality and [its] effects on adaptation efforts”. They problematize power in adaptation through attention to subjectivity¹ and subjectivation; processes through which “groups and individuals can be brought into complex power relations in their everyday lives and perpetuate processes of “othering” and “subalternity” (Garcia and Tschakert 2022 citing Spivak 2023). Under this lens, there are no vulnerable people or places per se, but rather ongoing relationships of power at multiple scales and levels of governance, and along intersecting axes of social position, which shape uneven and shifting positionalities of vulnerability in time and place.

Feminists have also questioned the very ontology of vulnerability through a critique of how definitions and metrics of vulnerability are often underpinned by assumptions around social, ecological, and bodily normalcy (and deviancy). That is, representations and imaginaries of vulnerability are often attached to certain identities and places which are cast as undesirable and negative. Queer and

disability studies scholars have questioned the meanings and assumptions that mainstream environmentalism has projected onto “nature” (its essence, desirable aspects, and surrounding politics), and the consequences of such projections for how we understand and deal with questions of power, identity, and environmental justice (Patrick 2014). For example, the systematic exclusion of marginalized LGBTQ+ collectives or people with disability from environmental movements, or their absence from policy-making processes, has meant the reproduction of heteronormative paradigms around the use, governance, relationality, and meaning of nature, ecologies, and space more generally (Mortimer-Sandilands and Erickson 2010; Kusiani and Kotsila 2024).

In similar ways, able-bodiness and normative gender imaginaries have informed ideas about what is “natural,” “normal,” “desirable,” and “healthy” (Mortimer-Sandilands and Erickson 2010; Alaimo 2017). Consequently, when environmental justice struggles are cast in terms of health, it is often done in a way that equalizes environmental health to the lack of disability, sickness or bodily vulnerability—as if a “natural” state of human existence exists that is characterized by strength, bodily ability, fertility, physical activity, etc. Inspired by disability justice, we see emerging studies that support how struggles for environmental and climate justice cannot be struggles against diverse and vulnerable bodies, but need to be struggles for feminist/queer/crip alliances and collective liberation (Kafer 2013; Jampel 2018). As Jampel (2018) explains, we need to disaggregate the person from the exposure to risks that are the results of environmental injustice, “however [these risks] are embodied.” In other words, fighting against the structural drivers of vulnerability cannot be a denial of bodily diversity or of the presence of vulnerability in the futures we envision and the social and political processes we craft to get there.

From a Static and External Condition to Vulnerability as Relation, Insurgency, and Resistance

A second and related wave of feminist thought during the last three decades has been advocating for an

understanding of vulnerability as relational. That is, instead of understanding vulnerability as a negative condition which “happens” to people due to external, extra-social, or exceptional stressors (and thus controlling for or adapting to such stressors is seen as minimizing vulnerability), to rather view vulnerability as a form of interdependence between bodies, territories, institutions, and environments, and an intrinsic human, social, and ecological condition (Tschakert and Tuana 2013; Cole 2016; Butler 2017). Questions of whether vulnerability should be considered an inherent characteristic of all beings, a fluctuating situation, or a matter of relations have all frequently featured in feminist thought both within and beyond environmentalism.

In her book “The force of non-violence,” Judith Butler (2017, 45) argues that “we are never simply vulnerable, but vulnerable to a situation, a person, a social structure, something upon which we rely and in relation to which we are exposed”, emphasizing the relational nature of vulnerability. Similarly, feminist political ecologists urge us to see vulnerability “as an ability to affect and be affected [...] the condition of being in relation to others” (Tschakert and Tuana 2013 cited in Ravera et al. 2016, S239) and “as co-suffering, linking lived experiences with a shared humanity” (Eriksen 2022, 1279). This contradicts neoliberal claims that contrast vulnerability with resilience, transferring responsibility to certain people and communities and focusing on what these can do by themselves to escape vulnerability (Bee, Rice, and Trauger 2015; Kaika 2017; von Meding and Chmutina 2023). It also questions the tendency of “external expert-policymaker elites” labelling people and places as vulnerable, legitimizing the adoption of top-down adaptation or resilience interventions and delegitimizing local knowledge and agency (Mikulewicz 2020; Eriksen 2022; Mayrhofer 2024).

Bringing relationality into all levels and scales of vulnerability as a common condition can help break away from identitarian or geographical “othering” by challenging safe havens of invulnerability. Butler (2017) theorizes this interdependence as a process of “letting go of the body as a ‘unit’, to understand one’s boundaries as relational and social

predicaments.” While the condition of interdependence does not itself foreclose the deeply unequal ways in which contextual and relational experiences of vulnerability affect different people, the recognition of deeply interspecies, intersectional, and cross-geographical interdependencies might be able to mobilize a different kind of politics. As Cole (2016, 1568) writes: “all of us are vulnerable, but some are more vulnerable than others,” and this is a matter of asymmetrical power and privilege, whereby some have the means to mitigate (inherent or external) vulnerabilities and others not, being systematically forced into conditions of increased exposure and limited adaptability. A relational lens, nevertheless, allows possibilities for agency, resistance, and insurgency within and despite of vulnerability.

In this vein, Stacy Alaimo (2009) conceptualizes “insurgent” vulnerability as a form of political and ethical openness to the entanglements of the world, including its dangers and uncertainties. Insurgent vulnerability recognizes and responds to the interconnectedness of all life forms, particularly in the context of environmental crises and social injustices, challenging dominant modes of disengagement, control over others, or claims to invulnerability. In other words, recognizing material and bodily (transcorporeal)² interconnections with the wider environment, insurgent vulnerability is seen as countering masculinist cultures of impermeability against risks, including those experienced due to climate change. Indeed, climate change as well as the COVID-19 pandemic are vivid examples of how interconnectedly (albeit unequally) vulnerable life in this planet is. When global phenomena like these—or their aftermaths and the ongoing discourses and actions around them—inform our daily lives, space and place approximate a notion of unboundedness (Massey et al. 2009, 413). This unboundedness, if linked to a shared condition of vulnerability, can also ferment social relationships of solidarity across social or geographical boundaries, informing a new ethics and politics of care, responsibility, and resistance (MacGregor, Arora-Jonsson, and Cohen 2022; Weatherill 2025; Harcourt 2026).

Expanding our understanding of vulnerability through a transcorporeal view of socionatural

relationships (Alaimo 2009) means also to recognize and decipher the often informal, subtle, every day, and unseen ways through which “vulnerable” individuals and communities resist oppressive structures and imagine new possibilities for living and thriving in the world. According to Butler (2017), “vulnerability ought not to be identified exclusively with passivity; it makes sense only in light of an embodied set of social relations, including practices of resistance.” Alaimo, too, notes that unlike notions of vulnerability often associated with helplessness or weakness, *insurgent* vulnerability is about embracing one’s exposure to the world as a site of resistance and transformation (Alaimo 2009). As González-Hidalgo (2023) has recently noted through her research on wildfires, vulnerability should be understood as “an emotional, care-related process that opens up contradictory and transformative interconnections between peoples, nature and the state.”

This perhaps uncanny association between relational dimensions of vulnerability and empowerment is deeply rooted in earlier writings from scholars such as bell Hooks (1989), who spoke of marginality not only as a space of deprivation and oppression but also a site of radical possibility and resistance. The margin, often seen as a (pre-)condition of vulnerability, is, according to hooks, continuously rearticulated by and through those who inhabit it, and who are transformed both individually and collectively in this process of inhabitation, their subjectivities and common senses reaffirmed (Ibid.). Iengo (2022), for example, in her work on endometriosis in the context of waste-dumping and toxicity in the “Land of Fires” (Southern Italy), shows how disability, as one form of vulnerability, “is a site of knowledge production about socio-ecological processes [where] we understand ourselves in relation to one another and the environment” (347; citing Kafer 2013).

Importantly, hooks notes “a definite distinction between that marginality which is imposed by oppressive structures and that marginality one chooses as site of resistance, as location of radical openness and possibility” (Hooks 2014, 23). There needs, thus, to be a conceptual and empirical distinction between elite-driven “othering” processes of

labelling people vulnerable and which often end up being oppressive, and the very different processes through which the term might be appropriated by people who are making sense of the drivers of their vulnerabilization while devising ways for survival, resistance, and emancipation. Focusing on shifting intersectional subjectivities conducive to vulnerability, rather than fixed social identities assigned to vulnerability, would allow for a more nuanced and complex understanding of how agency is performed (Garcia and Tschakert 2022).

Going a step further, Butler (2022) links embodiment to vulnerability as performative and in relation to power/resistance. She argues that while relationality refers to how material and discursive conditions shape vulnerability by preceding and conditioning our embodied existence, vulnerability can also be an act of “deliberate exposure to power,” not just a signifier for undesired exposure to harmful conditions. This opens possibilities for understanding political resistance as an embodied enactment of vulnerability. Using the example of bodies who are willingly exposing themselves to power and violence, for example, during a demonstration, vulnerability is no longer to be seen as in opposition to agency. Butler invites us to think of vulnerability and resistance as two sides of the same coin, whereby resistance is mobilized against the drivers of vulnerability, but also resistance itself *needs* a conscious vulnerable positioning:

It would seem that without being able to think about vulnerability we cannot think about resistance and by thinking about resistance we are already underway dismantling the resistance to vulnerability in order precisely to resist. (Ibid.)

From “Unbiased Objectivity” to Vulnerability Through Embodied and Situated Knowledge

To examine the relationship between vulnerability and empowerment is tightly connected to questions around the epistemology around vulnerability, or how we get to “know” what vulnerability is and what constitutes it, but also to questions around knowledge production more generally. A feminist

lens expressly draws attention to what knowledges can be produced through embodied experiences. The body has been a central yet relatively undertheorized “field” within mainstream studies of environmental/climate vulnerability, to which feminist perspectives have added critical insights (Rice, Burke, and Heynen 2015; Doshi 2017; Inngo, Kotsila, and Nelson 2023).

Although environmental degradation and “natural” disasters are usually addressed with the goal of reducing risk and protecting human health, directly affecting people’s bodies, these phenomena have traditionally been studied through disembodied scientific approaches and methods. Western medicine, for example, often deals with bodily vulnerability in compartmentalized ways that treat the body solely as an “ecology” but not an agent; as individual but not social or cultural; as physical but not spiritual; and as object but not as subject (Scheper-Hughes and Lock 1987; Leder 1990). Shifting away from such Cartesian Western rationalism in terms of epistemology would mean to shift away from claims of unbiased objectivity (and thus the splitting of subject and object). Feminist objectivity, as Donna Haraway writes, is about limited location and situated knowledge and allows us to “become answerable for what we learn how to ‘see’” (Haraway 1988, 583). In other words, science ought to be critical of science itself, and research subjects must have a “voice” in the process of knowledge production, as their embodied experiences are made to count.

A feminist objectivity approach to climate and environmental risk emphasizes the importance of lived experience in understanding how, for example, adaptation policies affect people differently. It highlights how colonial and gendered power asymmetries shape these experiences in everyday life. This perspective also challenges us to rethink the bodily scale—not as isolated or fixed, but as deeply entangled with daily practices and broader systemic processes. Along these lines, ecofeminism and decolonial epistemologies have emphasized the continuity between territory and the body, through the concept of *cuerpo-territorio*, claiming that there is no ontological difference between the two (Zaragocin and Caretta 2021). In a similar vein, environmental

justice activism and critical environmental humanities literature have brought to the fore how “nature” or “the environment” is not something outside a somewhat bounded body, but that human bodies and the non-human environment are in constant interaction and exist in relationship to each other in both material and symbolic ways (Bullard and Lewis 1996; Bullard and Wright 2010; Taylor 2014; Pellow 2016).

Moreover, the body is more than a biophysical, albeit permeable, entity. A visceral and emotional turn in political ecology scholarship engages with embodied agency and provides useful conceptual tools for investigating the ways in which transcorporeal entanglements work (González-Hidalgo and Zografos 2020). A focus on the visceral, understood as “the sensations, moods, and ways of being that emerge from our sensory engagement with the material and discursive environments in which we live” (Longhurst, Johnston, and Ho 2009, 334), traces power structures that produce vulnerability from a contextualized and interactive perspective that challenges dualistic boundaries such as body/mind or active/passive, but also connects the visceral/emotional with wider structural and cultural systems (Hayes-Conroy and Hayes-Conroy 2010). Looking at how embodied experiences of food shape environmental/food activism, Hayes-Conroy and Martin (2010) show, for example, how biophysical and visceral aspects (of taste, smell, memory, the practice of eating) are informing personal and political ideas and decisions. This resonates with Sultana’s (2011) study of a water crisis in Bangladesh, through which she shows how embodied subjectivities greatly influence wider power configurations, highlighting the role of perceptions and emotions in influencing access, use and control of water in everyday life.

Alaimo’s work on *Bodily Natures* (2010) has further inspired political ecologists to suggest that agency is not an individual or isolated trait, but rather something that emerges through interactions between beings, matter, and environments. Redefining agency to include nonhuman elements, positing that everything from pollutants to animal behaviors can affect and shape human lives, connects back to discussions on body-territory: both

human bodies and the non-human environment are subject to power relations and are controlled, governed, and discursively constructed. Alternative epistemologies based on the experiences of subaltern subjects emphasize, for example, relationships of “reciprocity and mutual spiritual affectation and networks” between humans and non-humans (Ulloa 2021). These porous interactions need to be seen as deeply political processes which define who, under which conditions, and with what consequences, becomes entangled with or exposed to risky natures, environments, ecologies, or spaces (Iengo, Kotsila, and Nelson 2023).

So far, we have discussed a transdisciplinary body of work that has questioned the ontology of vulnerability and the body, inviting us to think of vulnerability as a common feature of human (and non-human) existence, yet politically shaped and unequally experienced. At the same time, vulnerability is seen as able to mobilize resistance, if not being a necessary element of resistance itself. This relates to how and from whom knowledge around vulnerability is produced. To further examine such issues of vulnerability’s “onto-epistemologies” (Barad 2007), we return to Hooks (1989), who suggests that, rather than a passive experience, being on the margins (and inhabiting vulnerability) offers an empowering space exactly because it’s a place from where individuals can critique dominant structures; a standpoint that is less entangled with those structures’ benefits or illusions.

This very positioning of speaking and learning from vulnerability, if engaged with epistemologically, can offer new ways of thinking, new articulations around vulnerability itself, and the radical possibilities of collective care, mutual responsibility, and solidarity in struggles for justice. Indeed, many have pointed to how deriving from the (intersectional) experience of marginalization and its diverse subjectivities and positionalities, different types of knowledges are produced (Code 2014). Haraway reminds us that: “[i]t matters what thoughts think thoughts ... what knowledges know knowledges ... what relations relate relations” (1988, 35). When thinking about how we get to know vulnerability, feminist onto-epistemologies point to the (shifting, unstable, contested) inhabited

body-territories of vulnerability, as places of knowledge production. This means to understand vulnerability as a process of a non-fixed “becoming” (Nightingale, Gonda, and Eriksen 2022), whereby vulnerability is not only experienced but also interpreted, contested and responded to, in relation to material, discursive, human and non-human environments. Such an onto-epistemology would also mean to give space for experiential and embodied ways of knowing to affect transformative change, including on issues and questions whose “scientific” or complex nature has cast local and everyday forms of knowledge as irrelevant. Importantly, such an approach is not a matter of assigning fixed knowledge “types” or “insights” to specific social groups, but instead “questioning [...] universal claims of knowledge production” and “looking for grounds for agency and engagement around common interests and objectives” (Kaijser and Kronsell 2014, 423).

Towards Feminist Political Ecologies of Climate-Related Health Vulnerability

In this section, we bring the FPE framing of vulnerability more specifically to the emerging field of climate and health, articulating a set of conceptual, analytical, and methodological questions that, in conjunction, form a new research agenda. As is the case with the strands of research described above (section “FPE Approaches to Vulnerability: Intersectionality, Insurgency, and Embodied Knowledges”), the directions of this new research agenda develop in ongoing dialogue, shaping and reshaping each other over time. Furthermore, although we directly relate the core domains of FPE framing of vulnerability (section “FPE Approaches to Vulnerability: Intersectionality, Insurgency, and Embodied Knowledges”) and the questions proposed in this new research agenda (section “Towards Feminist Political Ecologies of Climate-Related Health Vulnerability”), there are also complex and cross-cutting exchanges in the way FPE might inform the field of climate-related health vulnerability—itsself a dynamic body of work where categories and ideas are continually reshaped (see Table 1).

Table 1. Overview of FPE Framing of Key Contributions to the Concept of Vulnerability, and How These Relate to Proposed Advancements of Feminist Political Ecologies in Climate- and Health-Related Vulnerability Studies.

FPE Thinking Around Vulnerability			Directions in Research on Climate-Related Health Vulnerability from an FPE Perspective	
Section/Shift	Key FPE Contributions to Vulnerability	Future Directions	Core Conceptual Focus	New Research Questions
2.1 From gendered and intersectional to queering and "cripping" vulnerability	<ul style="list-style-type: none"> - Challenges essentialist views of gendered vulnerability and highlights the limits of intersectionality - Emphasizes power, identity, and embodiment - Introduces queer/crip critiques of normative environmental imaginaries 	3.1 Intersectional systemic and structural processes as drivers of climate-related health vulnerability	Systemic climate (and) health injustice. Intersectional oppressions as drivers of vulnerability. Neoliberal planning/governing as (re) creating vulnerability.	<ul style="list-style-type: none"> - How do global-local power asymmetries shape climate-health vulnerability? - What institutional shifts are needed to integrate intersectional analysis into health governance?
2.2 From a static and external condition to vulnerability as relation, insurgency and resistance	<ul style="list-style-type: none"> - Reframes vulnerability as an ontological condition and emphasizes its political potential - Undermines binaries like invulnerability/resilience - Highlights vulnerability as a performative site of resistance 	3.2 Climate-health vulnerability and adaptation as deeply relational processes	Place-making as core for adaptation, spatial injustice in terms of socio-cultural relations with space shaping vulnerability. Thick time and slow violence as crucial dimensions of climate vulnerability.	<ul style="list-style-type: none"> - How do territorial planning and temporal scales influence experiences of climate-health risk? - What are the contradictions in resilience planning and existing inequalities?
2.3 From "unbiased objectivity" to vulnerability through knowledge	<ul style="list-style-type: none"> - Centers lived and embodied experiences as sources of knowledge 	3.3 Agency and strategies of resistance from and against conditions of climate health vulnerability	Insurgent health vulnerability, radical adaptation to climate change, collective care as a strategy of resistance and resilience.	<ul style="list-style-type: none"> - How does vulnerability generate political subjectivities? - What resistance strategies are emerging from vulnerable communities in response to climate-health risks?
2.3 From "unbiased objectivity" to vulnerability through knowledge	<ul style="list-style-type: none"> - Centers lived and embodied experiences as sources of knowledge 	3.4 Centering embodied knowledge(s) in climate and health vulnerability studies	Situated climate health knowledge from and with marginalized communities. Co-production of knowledge(s) for adaptation.	<ul style="list-style-type: none"> - How can embodied knowledge reshape dominant climate-health research?

(continued)

Table 1. Continued.

FPE Thinking Around Vulnerability		Directions in Research on Climate-Related Health Vulnerability from an FPE Perspective		
Section/Shift	Key FPE Contributions to Vulnerability	Future Directions	Core Conceptual Focus	New Research Questions
embodied and situated knowledge	<ul style="list-style-type: none"> - Critiques disembodied, Western epistemologies - Challenges boundaries between bodies and environments and connects them through material exchange, affect, and emotion 		Experiential and affective data to understand vulnerability.	<ul style="list-style-type: none"> - What methods center affected communities in knowledge creation and decision-making?

Intersectional Systemic and Structural Processes as Drivers of Climate-Related Health Vulnerability

Recognizing the unequal experiences of vulnerability produced through asymmetrical power relations, research has already pointed to the global injustice of climate health impacts, produced through historical social-geographical power dynamics. Richer countries in the Western world and predominantly the Global North exceed their fair share of emissions, while poorer countries are mostly affected by the consequences of climate change, with dire consequences on the well-being of their populations (Abi Deivanayagam et al. 2023). This injustice is also expressed at the local scale, within the same country, region, or neighborhood, witnessed through intersectional inequities of exposure to harm and related health impacts unequally experienced among the local population. As scholars from the fields of critical urban studies, urban (health) geography, and public health have shown, this is due to forms of oppression that include overlapping processes such as racism, sexism, or class-based social hierarchies, expressing in planning decisions, access to adaptation-promoting infrastructures, and health vulnerability (Anguelovski et al. 2021; Ranganathan and Bratman 2021; Shannon et al. 2022).

Recently, there has been increased interest on how health vulnerability in a changing climate can be understood beyond counts of fatalities and their statistical relationship to demographic characteristics. From a FPE perspective, to understand climate health vulnerability as power-laden and systemic means, on the one hand, to ask where and how does climate change act as an additional stressor, posing risks to health and well-being in both direct and indirect ways. Hansen et al. (2013), for example, explore the reasons why ethnic minorities may be more susceptible to extreme heat in the context of Australian cities, identifying social and economic disparities, living conditions, language barriers, and occupational exposures of these groups as some of the driving factors of increased vulnerability. The same conclusions have been drawn when looking at migrants' health more generally

(Moyce and Schenker 2018; Lebano et al. 2020), highlighting how climate change is one additional stressor to already established health vulnerabilities. Similarly, Kotsila et al. (2025) find labor and housing precarity along with limited access to public spaces of heat relief in neighborhoods of Barcelona with a high percentage of migrant residents, as shaping heat injustice. These trends are driven by neoliberal urbanism, which prioritizes policy and interventions that boost municipal budgets and attract international investments, while benefitting powerful actors and industries, as well as by the ingrained systemic discrimination that racialized minorities and migrants experience in their day-to-day lives, compounded by other types of oppressions linked to gender roles or religion, to name a few.

What these emerging lines of research point to, is the need to re-dress questions of health as questions of climate justice and vice versa, through an intersectionality lens. Methodologically, this would mean to overcome the limited perception of validity in health research, which confines data to quantitative records of health outcomes (and thus an outcome-based approach to vulnerability) and instead adopt a mixed-methods approach that incorporates qualitative data—including beyond strictly “health” questions—to capture the full breadth of what drives climate-health vulnerability in each context. Importantly, this would mean not simply expanding demographic indicators and analyzing data by gender, class or race, but rather examining how local and global patterns of oppression and privilege play out in shaping everyday processes of exposure and harm, or facilitation and protection, for different collectives.

On the other hand, an intersectional feminist PE perspective would also mean to recognize and investigate closer how climate change is an expression of and works together with and through existing structures of oppression and inequality, (re)defining health injustice (van Abi Deivanayagam et al. 2023; Daalen et al. 2023; Kotsila and Anguelovski 2023). For example, the systemic local drivers of vulnerability are contingent to global patterns of climate injustice, whereby global North economies appropriate hours of embodied labor from the global South, enabling rich countries to

acquire and maintain their wealth (along with neo-colonial extractivist practices) and to pollute through large amounts of climate change provoking emissions and waste, while also “draining the South of productive capacity that could be used instead for local human needs and development” (Hickel, Hanbury Lemos, and Barbour 2024). These same migrant workers from the global South are experiencing the worst of climate and health impacts when living and working in the global North (Wiesböck et al. 2016; Issa et al. 2023).

New questions that could be asked particularly in relation to this aspect could involve the relationships and connections between communities that struggle with the compounded impacts of climate change in their country of origin and those who have migrated; the commonalities or different ways in which socio-economic, political, and cultural context impacts their abilities to adapt; the broader patterns of power and privilege, including actors and trends in policies, affecting both “sides” of migration in relation to climate justice, and the internationalist and cross-border alliances that have or can develop.

Linked are the lessons learnt through environmental and disability justice scholars, who have been defending the right for diverse and vulnerable bodies to exist, and the need to disaggregate the person from the exposure to what is the result of environmental injustice, explaining instead the political processes through which such vulnerability was created (Puar 2017; Bullard 2018). In the example of health, as witnessed through the COVID-19 pandemic, while older persons and immunocompromised individuals do have a heightened sensitivity, the high number of deaths witnessed among those collectives during the pandemic also had to do with the collapse of public health care and the bad quality of care in private old people’s residencies. Similarly, while older persons and pregnant women are generally more sensitive to the impacts of extreme heat (van Daalen et al. 2024), it is particularly the poor and racialized of those collectives that suffer the worst outcomes, as biophysical and socio-cultural vulnerability compound (Issa et al. 2023; Kotsila et al. 2025).

We need thus to build on theoretical frameworks that allow us to disaggregate “vulnerable populations” from the environmental/climate hazards

they are exposed to, in order to better identify the systemic forces producing harm—tracing political decisions, institutional failures, and policy blind spots that create and sustain climate-related health vulnerability. We also need to ask, what institutional or methodological changes are needed to value and legitimize experiential knowledge in climate and health governance, while making policy and planning more responsive and inclusive of bodily difference and care needs? This connects directly to the following sections.

Climate-Health Vulnerability and Adaptation as Deeply Relational Processes

Feminist perspectives on climate-related health vulnerability reveal that vulnerability is not an inherent trait of certain people or places. Rather, it is produced through ongoing power relations at multiple levels and across intersecting axes, shaping uneven and shifting experiences of vulnerability over time and across contexts (Viruell-Fuentes, Miranda, and Abdulrahim 2012; Bowleg 2021; Mikulewicz et al. 2023). In case of climate-induced and recurring heatwaves, for example, urban residents are considered more vulnerable than their rural counterparts (Zacharias, Koppe, and Mücke 2015; van Daalen et al. 2024). But city-making—including dominant ideas of what cities ought to look like that result in dominant grey infrastructure and the disappearance of peri-urban agricultural and biodiverse landscapes—is an ongoing political project that defines the shape and form of urban environments, and thus also shapes differential vulnerability to heat (Heynen, Kaika, and Swyngedouw 2006; Heynen 2014). Vulnerability is (unequally) produced and distributed both geographically and socially within cities. Some neighborhoods, for instance, have undergone circles of state abandonment and stigmatization within a context of structural and institutional racism. This has not only made their residents more likely to suffer from bad health (Maantay 2013; Riley 2018) but has also put them at a higher climate-related health risk. Informal settlements, social housing complexes, or entire high-density segregated neighborhoods with majority migrant or racialized populations, have been pushed into a

position of climate insecurity and injustice as they lack green spaces, do not have accessible or functional public health units, and their residents cannot access funds for energy-efficient retrofitting (Rudge 2023; Anguelovski et al. 2025).

In the case of extreme flooding events, the neighborhood of Parque Alcosa, in Alfafar, Valencia, was one of the hardest hit areas by the floods related to torrential rain and flooding (high-altitude isolated depression, DANA for its initials in Spanish) in October 2024. This is a neighborhood which has, in the last 40 years, struggled with the highest percentages of poverty (70%), unemployment, problems of mental health and drug abuse in the city, as well as hosting a high number of undocumented migrants. The rebuilding of the Túria River and the projects of expansive urbanization taking place since Francoist times have contributed to the overdevelopment of flood-prone regions and the disappearance of orchards and farms, which were substituted by hard infrastructure (roads, industry, housing, and commercial units), transferring hydrological flooding risk to neighborhoods such as Parque Alcosa (Josephson 2025). As seen elsewhere, the vulnerability of these neighborhoods is a combination of growth-driven urban development, the perpetuation of social inequalities, and exclusive urban planning (Kotsila et al. 2022). However, as is the case with several other disasters and socio-environmental changes, issues of vulnerability are not limited solely to marginalized groups. Some authors highlight the relationship between vulnerability and privilege, an issue that is particularly relevant in the context of wildfires (Eriksen and Simon 2017). In such cases, the populations most negatively affected may include racialized communities (Davies et al. 2018), but also wealthier, white populations who choose to live in areas that are increasingly vulnerable to wildfires due to climate change.

In a context of increased climate-induced health risks, thinking of vulnerability through a relational FPE lens begs the question: what is the relationship between, on the one side, land use planning, and on the other, the current realities of climate vulnerability defined by geography and social position? Seen reversely, what contradictions might arise when new and necessary climate-resilient infrastructure

clash with pre-existing disadvantage and oppression? While, for example, energy retrofitted and more resilient housing could appear as a blessing to climate vulnerable neighborhoods, many long-term residents fear being exposed to displacement and gentrification, exposing them to other kinds of vulnerabilities, including climate and health, elsewhere (Angelovski et al. 2025; Woodhall-Melnik, Haley, and Reiser 2025). Moreover, what is desirable in terms of climate health protection is tightly connected to different and situated experiences of place. In a context of already existing injustice and inequality, new questions arise around the (new) meanings, experiences, and feelings attached to climate-exposed or climate-protected infrastructures, and the related consequences for climate justice.

A relational lens also allows for a temporal horizon of climate-health to come into sight, for example, regarding processes that might not at first appear as connected to climate. Neimanis and Walker (2014) frame vulnerability within the context of “thick time,” questioning temporal boundaries and temporalities of climate change, placing attention to the long-term, cumulative effects of environmental degradation and climate change unfolding across temporal scales and impacting multiple generations. Bringing these questions to the field of climate-related health vulnerability means to challenge the simplistic, short-term views of vulnerability as something immediately visible and spectacular, and instead also recognizing climate impacts as gradual, invisible, and a form of slow violence (Nixon 2011); considering the far-reaching implications of changing weather patterns for all forms of life and their inter-dependence and relations.

Opening the concept of climate-health vulnerability to different biosocial rhythms and temporalities allows for seeing the connections, for example, between wildfires and processes of displacement, loss of livelihood and opportunities, and long-term anxiety (To, Eboreime, and Agyapong 2021; Hennighausen and James 2024), beyond the more immediate effects like respiratory problems, injuries, or mortality. In another example, the psychological impacts of flooding—such as

PTSD, depression, anxiety, and substance use—often outlast the physical damage, with emotional trauma stemming not just from the event itself but also from the recovery process, including challenges with insurance, repairs, and fears of financial or housing insecurity (Trugeon 2006; Kuhlicke et al. 2011).

Similarly, projects that have an “adaptation” or “resilience” flag, such as neighborhood regeneration and renaturalization, can have long-term effects on some residents’ health. In the case of an urban forest transformation in Tbilisi, Georgia, Kusiani and Kotsila (2024) find that what used to serve as a refuge for queer sex workers and gay cruisers was re-ordered as a municipally managed park—an intervention which formed part of both an urban greening agenda and a broader politics of erasing queer bodies in the city. This changed materiality and institutionalization of the landscape (less vegetation, more lighting, more cameras) had dire consequences for the safety and well-being of these groups, who found themselves more exposed to violence. Feminist urban studies have long stressed the mutually constitutive relationship between cities and human bodies (Grosz 1995)—where bodies shape urban materiality and, in turn, cities shape embodied experiences, perceptions, and spatial relations—an insight that should inform the broader field of urban climate adaptation.

Considering the deeper and “thicker” implications of how people experience and understand climate and health, urges us to think through and investigate what new environmental and political subjectivities may come about through the experience of climate-induced weather events, the infrastructural/social interventions that emerge to address them, and their immediate and longer-term impacts on people’s well-being. How can new connections between place, climate, health, time, and meaning change the way people organize their lives to face these new realities, and how does this in turn shape processes of city-making, social dynamics, and social cohesion? Here also, it is important to consider that climate and health vulnerability evolve in relation to place-based histories and identities and people’s sense of place and belonging. A central research and policy question that arises is how

climate adaptation can ensure that situated experiences are valued alongside more technical considerations of climate risk and vulnerability.

Agency and Strategies of Resistance from and against Conditions of Climate Health Vulnerability

Inspired by feminist writings on the topic, we here examine how vulnerability can be seen as a generative “place,” and how, through vulnerability, radical knowledge and action might emerge. Concepts such as trans-corporeality and insurgent vulnerability (Alaimo 2010, 2009) help in understanding relationships between human health and climate not just as “good” or “bad” outcomes, but as relationships in constant shift and transformation along webs of power relations and at various scales, which are mobilized, felt, and contested in embodied ways. As such, inter-species, intersectional, and cross-geographical inter-dependences can also act as sites of resistance and transformation, as *a different kind of politics*. In that sense, climate-health vulnerability arises as a common eco-social responsibility and a basis of confluence for social and climate justice movements.

If we see climate-health vulnerability as relational and generative, embodiment becomes integral to our being in, knowing of, and reacting to the world surrounding us, including extreme climate events and their impacts, and other forms of life such as urban ecologies and disease vectors, with which we exist in a state of interdependence. As González-Hidalgo (2023) finds from research in Spain and Sweden, experiences of vulnerability during and after wildfires show how, without denying vulnerability, residents in both contexts were engaged in critical action related to or prompted by the fire events, contradicting conceptualizations of vulnerability as passivity, incapacity, or weakness (Ibid.). Such engagement was facilitated by the fact of feeling, precisely, vulnerable, as well as the capacity of some residents to use their political agency to advance discussions concerning the structural inequalities surrounding the fires. New questions in this regard can be asked about how emotional, embodied experiences of climate events

and their consequences in terms of health contribute to the formation of political subjectivities that either align with or resist state-led adaptation agendas.

Moreover, concepts such as “insurgent vulnerability”—as a politicized, collective stance that mobilizes vulnerability as a basis for resistance, solidarity, and action—can form part of future research that examines how making visible the experience of climate impacts on everyday life and health in unequal ways can mobilize resistance against such inequality and injustice. As De Rosa, de Moor, and Dabaieh (2022) find in the case of Malmö, Sweden, politicizing issues of climate vulnerability in cities and formulating responses that can lead to transformative adaptation depends largely on the capacity of social and climate movements to build diverse coalitions between them, and to broaden the scope of climate justice activism beyond state-level decisions for mitigating climate change, and towards addressing the local needs of communities that first and foremost face climate-related impacts.

At the same time, recognizing transcorporeal interconnections with the wider environment and thinking through “insurgent vulnerabilities” also means to counter masculinist ideas of impermeability against risks, including those experienced due to climate change. Instead, part of building adaptation strategies, while resisting further planetary destruction, means to embrace one’s exposure to the world as a site of resistance and transformation (Alaimo 2009). This might also mean, relating to previous sections, that the perfect adaptation is a “fantasy” which further entrenches underlying inequalities (Pohl and Swyngedouw 2025). Resisting this fantasy of absolute resilience and acknowledging the “emancipatory potential of embracing maladaptation” might bring us closer to eradicating inequality rather than eradicating vulnerability.

On the one hand, to think with, from, and of places of “inevitable” vulnerability opens new ways of defining and contesting such concepts, not in an act of acceptance and paralysis, but rather as a way of re-imagining what climate- and health-related vulnerability and adaptation could be. In Barcelona, Spain, for example, Kotsila et al. (2025) find everyday resistance and social infrastructures—in the form of community gardens, occupied buildings,

public squares, and migrant-owned businesses—acting as spaces of collective care, unionism, and climate refuge. These emerge from within heat-vulnerable neighborhoods as forms of radical adaptation that not only address exposure to heat but are generative of more just urban adaptation futures.

On the other hand, in many cases, communities resist mainstream climate adaptation, but such resistance is not merely opposition; it provides critical insights into local needs and vulnerabilities and points to the need for more context-sensitive and transformative adaptation strategies (Brink, Vargas Falla, and Boyd 2023). In this vein, Kaika (2017) finds how communities use their vulnerability as a base for refusal and struggle. In several similar examples from Barcelona, local activists question and resist top-down greening agendas, as they see the risks of perpetuating social inequalities and marginalizing vulnerable communities overpowering any socio-ecological benefits such greening might bring to the neighborhood. These very refusals often put residents in embodied positions of other types of vulnerability, as they often confront local authorities and the police, facing the risk of being detained or legally charged. Thus, vulnerability is not mono-dimensional nor static and can also be seen as generative of, or accompanying the potential for, radical praxis. More research is thus needed that centers the agency of vulnerable groups in research, moving beyond victimhood and instead focusing on strategies of resistance and adaptation. How can we go beyond vulnerability as a stigmatizing fixed identity or a vicious circle, towards vulnerability as a shared characteristic and a force for socio-ecological transformation? What seeds have already been sown among movements that struggle for different forms of liberation despite, beyond and through their vulnerabilities, and how can we link those to studies and struggles for climate and health justice?

Centering Embodied Knowledge(s) in Climate and Health Vulnerability Studies

Centering embodied knowledges in the study of climate-health vulnerability brings to the fore issues

of epistemic justice by undoing established ideas on what constitutes valid, credible, or legitimate knowledge and making space for the testimonies of unprivileged or oppressed groups and the broader civil society. This includes introducing methods and tools that allow for such knowledge to take center stage in climate and health science, and to co-create vocabularies, research questions, methodologies, and interpretations of findings in ways that blur the distinction between researcher and researched (Rocheleau 1995; Peake, Razavi, and Smyth 2025).

Feminist methodological approaches help in this regard by integrating the embodied experiences of women, marginalized communities, and Indigenous people into frameworks of study. In the field of environmental justice, efforts to employ research co-design with communities inform more “just, inclusive and socially relevant scholarship” (Temper and Del Bene 2016), while authors also caution that “dismantling hierarchies in knowledge production remains an unfinished process that calls for ongoing attention to power dynamics and ‘care-full’ scholarship” (Ibid.). In the field of climate adaptation, Taylor et al. (2025) argue that embracing knowledge pluralism is a crucial component through methods that enact knowledge co-production, which ideally “occurs with an ethic of mutual reciprocity and equality to help create inclusive and transformative spaces with decolonial potential and a specific emphasis on gendered inequities.”

Researching climate and health through this lens would mean to mobilize local knowledge and street science in the study of vulnerability and the design of adaptation policy. Methodologically, this would invite methods that recognize the embodied experience as a source of knowledge for what defines vulnerability, examining the emotions, memories, and material interactions that characterize past, present, and future landscapes, infrastructures, and everyday spaces. One could think, for example, of the application of corporeal storytelling (Armiero and Lengo 2023) as a way of documenting and explaining health vulnerability related to climate change, such as heatstroke and exhaustion or flood-related injuries and skin infections. Or the application of the “go-along” method (Carpiano 2009) to enable immersive discussions about how certain spaces in

a neighborhood feel more risky or unhealthy than others.

Such methodologies indicate how non-quantifiable aspects, such as emotions, can be incorporated into vulnerability studies as components of, or responses to vulnerability. Several studies have shown how struggles over territory, land use, and resilience are often tightly connected to struggles over the validity of vernacular knowledge (Huber et al. 2017) through what some have called epistemic resistance (Mendes Barbosa and Walker 2020). Through an FPE epistemological and methodological approach, research might be better able to understand why some residents might prefer living with some level of (climate-health) risk or uncertainty, and might even resist top-down adaptation plans, as they see other types of risk threatening their livelihoods and their health if such plans go through (e.g., the loss of social networks, loss of sense of home, uncertainty about future housing conditions, sudden change of neighborhood identity, etc.) (Brink, Vargas Falla, and Boyd 2023).

A closer examination of embodied knowledge and epistemic resistance in climate and health studies further invites investigation into how knowledge claims become dominant in fields such as urbanism, development, social organization, and health more broadly. For example, when modelling for flood risk in Dublin, Ireland, De Tymowski and Hurst (2025) find that flood risk management is centered around private property homes. The assumption of homeownership permeates flood models and thus obscures property-related inequities (renters, people living in semi-basements, etc.). Moreover, model outputs are used for maximizing development opportunities, thus putting marginalized residents at increased risk of both (residual) flooding and eviction (Ibid.). What new forms of knowledge about flood risk and vulnerability might emerge if the experiences and insights of those most affected were placed at the center—not merely to inform flood models, but to expose the deeper power imbalances that shape related policy areas such as housing, social welfare, employment, and citizenship?

Working with different forms or systems of knowledge around issues such as “nature,” “the body,” “territory,” and their interrelationships, often

brings to the fore epistemological contradictions or questions fundamental assumptions around such concepts. From a feminist perspective, this is not a sign of weakness in one or another knowledge system, but rather speaks to the situatedness of all knowledge claims (Haraway 1988) and the need for different methods, sources, and knowledges to be brought in conversation, critically examining what their paradoxes, gaps, and silences say about existing and shifting power dynamics (Rocheleau 1995). Climate vulnerability assessments (and resulting adaptation policy), for example, typically rely on scientific, technical, and quantitative data rooted in Western epistemologies, such as climate models, risk metrics, and standardized indicators. This can overlook or devalue alternative ways of knowing, especially those grounded in lived experience, oral traditions, spiritual relationships to land, and place-based ecological knowledge, as has been the case with Indigenous communities (Byskov and Hyams 2022).

In the field of health, Neely (2021) examines social medicine as a dynamic, place-based practice that centers the knowledge of Black South African women whose everyday expertise has shaped public health interventions. She challenges dominant hierarchies of knowledge in global health, urging a broader definition of the “social” that includes environmental, cultural, and relational factors, and doing so, grounding (health)care in grassroots epistemologies. As others also note, in the field of climate-related health and vulnerability studies, research and practice on these issues should not be about “imposing hegemonic conceptions of the environment, body, humanity and health, but rather, constructing the conditions necessary for dialogue with different communities and respecting their traditional practices and forms of knowledge” (Porto, Ferreira, and Finamore 2017).

Questions that remain to be examined and experimented with in this respect, include ways in which climate- and health-related vulnerabilities can be assessed in a way that accounts for complexity, dynamism, and relationality, including through different, multiple, and alternative epistemologies, able to challenge dominant narratives (about climate, health, and vulnerability) and with a potential

for transformative change (see also Fischer et al. 2026). Considering that in academia verbal language dominates and often limits meaning through the rigid logic of scientific texts, alternative ways of doing research and the use of art-based methodologies can be promising in this regard (Solera and Ortecho 2023). The use of a wider range of expressive forms (visual art, interactive drama, narrative writing, and photography/videography) have been known to reveal everyday challenges of physical, mental, and emotional well-being as they connect to sexuality and gender (Khan and Marnell 2022), urban change and gentrification (Sánchez-Ledesma et al. 2020), healthy food access dynamics (Díez et al. 2017), and overall connection with and mobilization around climate issues (Sitas, Selomane, and Atkins 2022) to name a few.

Conclusion

In this article, we have undertaken the task of advancing and revisiting the concept of vulnerability, drawing on a FPE reading of previous work in many disciplines ranging from human geography to environmental humanities. This has enabled us to discuss and refine work that has been done to consider vulnerability as a question of power inequality, relationality, and agency (see summary of our analysis in Table 1). Building on this, we sought to explore the complexities surrounding the relationship between climate change and health from an intersectional FPE perspective. This has led to the identification of promising areas for further research and development, including the structural drivers of the unequal health consequences brought about or exacerbated by climate change, and the associated local and embodied knowledges and grassroots counter-practices and resistances.

Our exploration of the literature reveals the significant contributions of a diverse and transdisciplinary body of work to the field of FPE around the concept of vulnerability. We did not aim at a comprehensive review of all studies relevant to the very broad theme that is vulnerability, but to show how FPE has yielded a substantial body of conceptual, methodological, and empirical arguments. Although new, creative, and radical avenues for research continue to emerge, this

growing body also suggests that the challenge is no longer producing more knowledge, but of mobilizing and applying what is already known. This work has allowed us to advance an understanding of climate health vulnerability not just as an expression of the extent to which people or communities are exposed to (and likely to suffer health consequences from) socio-environmental conditions related to climate change, but to see such vulnerability also as: a site of conflict, contradiction, and contestation along intersecting, shifting, and compounded power-related positionalities (oppression or privilege); a site of resistance and insurgency fertile for new cross-boundary solidarities along an ethics and politics of care and responsibility; and a site of knowledge production that collapses scales from the global to the intimate, inviting embodied ways of experiencing, interpreting, and re-imagining climate-impacted socialities.

For researchers, activists, and political agents examining the health impacts of climate change, this implies shifting attention from the sole measurement of hazards and health outcomes towards the structural processes that unevenly distribute the experiences of harm and protection. Such an orientation requires examining how entrenched inequalities, linked to class, race, gender, migration status, and colonial histories, shape exposure, sensitivity, and the capacity to respond, while also interrogating how dominant policy and planning approaches centered on market logics, individual responsibility, and technocratic adaptation may reproduce vulnerability. It also calls for closer attention to the spatial and temporal dimensions through which climate-related health harms unfold: the ways in which housing, infrastructure, and relationships to place shape everyday risk, and the cumulative, delayed, and intergenerational effects.

Moving forward, therefore, requires not only new analytical frameworks but also a reorientation of research practice itself, one that recognizes the transformative strategies already emerging within communities facing disproportionate burdens, including informal care networks and collective responses to environmental stress. Engaging with these practices through collaborative forms of inquiry can help generate knowledge grounded in

lived and embodied experience, complementing epidemiological and environmental data while strengthening the relevance and transformative potential of climate–health research.

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ORCID iDs

Panagiota Kotsila  <https://orcid.org/0000-0003-0498-8362>

Sergio Ruiz Cayuela  <https://orcid.org/0000-0001-7968-1539>

Marién González-Hidalgo  <https://orcid.org/0000-0003-4702-4109>

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Notes

1. The authors define subjectivity as “a discursive process through which individuals are “subjected” by power, and in turn, how they internalize, perform, re-express, and resist uneven dynamics through everyday relations.”
2. Despite its emphasis on embodiment, trans-corporeality in Alaimo’s work recognizes the interdependence between bodies and the environment and other forms of life and is not an individualistic stance.

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