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Ambient water weaponisation: The permeation of violence in the hydrosphere

Jeremy J. Schmidt [a,*], Cameron Harrington [b]

[a] Department of Geography and Environmental Science, Queen Mary University of London, London, UK
[b] School of Government and International Affairs, Durham University, Durham, UK

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ABSTRACT

Water weaponisation is proliferating in ways standard accounts do not adequately identify or explain. This article offers a novel conceptualisation of water weaponisation that reflects how both water's life-giving affordances and limits are prefigured as weapons across an increasingly expansive range of interventions. We anchor a new account of weaponisation in water's non-essential nature, and its dynamism as an object, a co-constituent of life, and a key force driving planetary conditions. Because water both surrounds and suffuses, the forms of vulnerability induced through its weaponisation can be productively understood in terms of ambience. Foregrounding water's ambient dimensions also troubles conventional notions of what a weapon is. The article explores this using in-depth case studies and illustrative examples drawn from recent and long-standing water conflicts. These, collectively, animate our account of ambient water weaponisation, which captures well-recognised forms of weaponisation and the many that remain unaccounted for. The latter demand an approach attentive to how water is weaponised across its liquid, gaseous, and solid states and how phase shifts between them are violently manipulated. Further, by refusing to polarise water's liveliness and its finitude, we contribute to broader discussions within and beyond political geography and water conflict studies.

1. Introduction

The weaponisation of water has recently accelerated. The Pacific Institute's (2025) water conflict chronology database records 173 cases of water being weaponised in the 120 years from 1900 to 2019, while from 2020 to 2025 there were 105 cases. Increased frequency also reveals a proliferation in kind that is central to this article's argument: water is being weaponised in ways that require a new, more comprehensive understanding of what water weaponisation is. During the war between Russia and Ukraine, for instance, reservoirs needed to cool nuclear reactors were drained while the dams bombed to flood downstream landscapes also released significant contaminants (Beasley, 2024; Shumilova et al., 2025). In 2026, direct attacks on desalination plants in Bahrain, Iran, and Kuwait threatened critical drinking water supplies. Attacks on wider energy infrastructure also threatened desalination through increased oil pollution in seawater and potential nuclear waste contamination affecting facilities (Mogensen, 2026). These events fit standard explanations of water weaponisation as the deliberate use of water resources, or water systems, to wield harm. Yet, water's weaponisation in Ukraine or elsewhere, carries diverse forms. In Donetsk, occupying troops cut off water to homes by declaring them "ownerless" after residents refused to comply with Russian paperwork (Khlyudzinsky, 2025). Israel has weaponised water against Palestine by: restricting water supplies in Gaza; rendering wells useless in the West Bank, and; flooding tunnel complexes (see also, Dader and Joronen, 2025). Combining illustrative examples and deeper case studies, this article offers a new account of water weaponisation that explains standard cases and those that exploit the manifold affordances and limits that water compels and constrains across its liquid, gas, and solid phases.

Contemporary political and scholarly responses to water conflicts in Ukraine and Gaza, as well as those in Bahrain, Iran, Kuwait, Lebanon, Syria, UAE, Yemen, and Sudan (among others) are numerous, yet they largely extend existing frameworks rather than reconsider whether the conceptual moorings of water weaponisation are sufficient to empirical, explanatory demands. The UN Security Council (2025), the UN Human Rights Council (2024), the International Court of Justice (2024), Amnesty International (2025), and Oxfam (Samad et al., 2024) have denounced water weaponisation and sought commitments to international law and norms regarding war crimes, humanitarianism, aid and human rights, especially for women and girls. Scholars argue increased

* Corresponding author.
E-mail addresses: jeremy.schmidt@qmul.ac.uk (J.J. Schmidt), cameron.harrington@durham.ac.uk (C. Harrington).

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water weaponisation erodes normative and legal restraints on targeting water resources and infrastructures, and the utilisation of water to attack or punish adversaries (Menga, 2025; Zeitoun et al., 2025); a breaking of the "water taboo" that emerged in the latter half of the twentieth century (Grech-Madin, 2021). Accordingly, scholars have sought to push prevailing theories of water weaponisation beyond high-profile instances where states and armed groups utilise water to advance strategic aims (e.g. Gleick, 2019; Daoudy, 2020; Gleick, Vyshnevskyi, and Shevchuk, 2023; cf. Schillinger et al., 2020). Now, multiple efforts are underway to extend water weaponisation: Gardashuk (2025) reconsiders how values and ethics connect weaponisation to environmental concerns, Grech-Madin (2025) develops a generalised, multi-level concept of water weaponisation, and Vuong et al. (2024) contextualise water within concerns over the weaponisation of climate change.

This article takes a more foundational point of departure that examines how, for water to be weaponised, it must first be prefigured as a vector of, and for, inducing vulnerability. Accounting for shifts in water weaponisation, we argue, must attend to different modes and practices of inducing vulnerability across the multiple affordances for life and its limits that water conditions and co-constitutes. Our account contrasts with prevailing approaches, which offer explanations of vulnerability as susceptibility to bodily harm, and which extend to environmental concerns through equations of risk times exposure, minus adaptive capacity. Such approaches fail to capture the political ecologies through which peoples and environments are rendered vulnerable (see Wescoat, 2015). Instead, a complex understanding of vulnerability is critical to adequately theorise, and sufficiently address, water weaponisation. This entails reappraising studies on water conflicts, which remain limited by dual attachments to prevailing ideas of water and of weapons. Across the literature water is positioned as a strategic, inert, liquid resource that can be leveraged at key times by capable actors against a target. We argue such accounts (re)produce a singular form of water that can obfuscate complex sociomaterial relations, and forms of vulnerability that attend different modes of weaponising water. Prevailing accounts also function through an uncritical, instrumental view of what a weapon is. In it, weapons are discrete objects instrumentally parsed from background environments and best apprehended by focusing on processes of rational decision-making. Water thus transmutes from natural resource to weapon when it is "directly (ab)used as an instrument of war, as a tool, in order to achieve strategic political and tactical military goals' (Lossow, 2016: 84). Or, as King (2016: 155) states, water is a weapon when it is, "… an item, action, offensive capability, or mechanism used or intended to kill, injure, or coerce."

The need for a new account is pressing owing to the myriad ways vulnerability can be induced beyond the traditional ken of water weaponisation. In July 2025, for instance, floods in Texas (USA) swept through the summer camps of children and, in total, killed 135 people. Conspiracy theorists and some political figures soon claimed cloud-seeding had weaponised water. In response, individuals destroyed several local weather monitoring stations (Gilbert and Taft, 2025). In Meehan's (2025) study on water shut-offs in the US, by contrast, weaponisation is configured as part of policing household debt. These are not standard cases of water weaponisation, such as when India suspended the 1960 Indus Water Treaty after the April 2025 attack on tourists by Pakistani militants. After bombing a hydroelectric facility in Pakistan, India threatened to stop transboundary water flows (Guzman, 2025). Pakistan subsequently lodged a complaint during preparation for the 2026 UN Water Conference about India weaponising water. These examples index something of the diversity of contemporary water weaponisation. They highlight the need for a new account of 'water weaponisation' not only because the term's use is shifting, but because water is prefigured to induce vulnerability through multiple valences—conspiracy, environmental manipulation, fiscal discipline—not consistently captured in conventional accounts.

To reconceptualise water weaponisation we engage Robinson and Williams' concept of "ambient vulnerability," which emphasises "the vulnerabilities that arise from and accumulate in a person's immediate surrounding environment" (2024: 2). Ambient vulnerability is not just a change to an external environment but present as a necessarily lived condition, such as vulnerability induced by poor air quality, pervasive toxicity, or excessive heat. As we argue, water's multiple affordances also mean ambient vulnerability can be induced across a range of phenomena as it circulates through cells, blood, bodies, homes, industries, cities, lands, and as water vapour affects climate change through intensified weather events—relations captured more broadly as hydrosocial cycles across lived, multispecies, and territorial scales (Liao and Schmidt, 2023). Extending ambient vulnerability to water productively complicates and deepens the notion of weaponisation owing to water's non-essential nature, which offers multiple affordances for life and livelihoods while also proliferating pathways for negative ecologies and geographies of harm. It also fits with calls to eschew linear narratives that do not capture the complex, emergent web of conditions affecting water and weapons in conflict (Warner, 2023).

The article has three sections. In "Ambient Vulnerabilities," we position Robinson and Williams' (2024) concept of ambient vulnerability to climate change as a corollary to atmospheric weaponisation, especially poison gas. These 'aerial' treatments throw into relief how and why understanding the weaponisation of water to induce or leverage ambient vulnerability is critical for explicating contemporary conflicts. More than extension, our novel account of ambient water weaponisation contributes to theoretical debates over how to reckon with lively, non-human possibilities versus 'negative geographies' that prioritise finitude. In the section, "What is Water Weaponisation?" we build a spatial and temporal account of ambient water weaponisation that captures water's prefiguration as a vector for inducing ambient vulnerability. In "Rethinking Weaponisation," we demonstrate the explanatory power of ambient water weaponisation by threading it through cases across the hydrosphere, including water's liquid, gaseous, and solid states. The conclusion consolidates key implications of ambient water weaponisation.

2. Ambient Vulnerabilities

Drawing upon the poet Wallace Stevens, Matteson (2022: 571) refers to ambience as "the nothing that is". Something perceived but not fully comprehended; sensed yet incompletely known. Ambience is not something one gets outside of. Ambience has a long history across Western thought. According to Spitzer (1942: 170), the term emerges from the Greek *τὸ περιἐχων*, which translates to "that which surrounds and encompasses, and is used to refer to the all-embracing air, space, sky, atmosphere, climate, the cosmic 'milieu' of man." The Latin equivalent, *ambiēns*, means 'going around' (Pinkus, 2013). Today, numerous allied terms reveal the complex genealogies discussing surroundings: milieu, environment, nature, background, place, or planetary (Benson, 2020). Though diverse meanings exist across these terms, Spitzer (1942: 170) suggested they represent the same concept of an "an aggregate of influences or conditions which shape or determine the being, development, life, or behavior of a person or thing".

Distinguishing ambience from adjacent concepts, however, holds critical implications for understandings of environmental security and vulnerability. For instance, the 'environment' emerged to represent an organism's external world; an arena in which evolutionary struggle took place and which displaced earlier terms, like 'circumstances,' that Darwin and others once used to discuss inter-relationships co-produced by organisms and processes (Pearce, 2010). Here, the 'environment' was part of naturalising evolution in theories of Social Darwinism where the 'survival of the fittest' ran cover for colonial agendas (Hofstadter, 1944). Ambience is not a precise synonym for the environment. As Benson's (2020) detailed history argues, the environment is an explicitly relational concept. Ambience, by contrast, encompasses the multiple, overlapping material and affective forms that envelop, influence, and comprise something's relational experiences. Ambience also signals the

co-constitution of objects and surroundings, allowing us to see water as an object, a co-constituent of life, and key to planetary processes. The corollary to water's facilitative roles are its non-relational limits, which condition Earth across scale, from being the planet's dominant greenhouse gas through to the effects of latent heat transfer for cooling bodies through perspiration/evaporation. Our concern with the relational and the non-relational echoes Yusoff's (2024) argument that racialised violence is often mediated by, and manifested through, the categories through which life (*bios*) is separated from non-life (*geos*). As Schmidt's (2017) analysis of how American settler colonialism shaped global water imaginaries shows, water's agency formed the explicit bridge between *bios* and *geos*—an essential element to life and a geologic force vital to (claimed) settler superiority. In this context, ambience presses for treatments of water as materially vital for life's possibilities and as a limiting condition. Because water straddles *bios* and *geos*, its weaponisation induces vulnerability on a wider relational and non-relational plane than accounts of 'environmental security' or water conflict have traditionally recognised.

Attention to ambience also advances theoretical understanding of how efforts to recognise more radical possibilities associated with non-human agency encounter conditions of finitude. This tension is not restricted to debates in political and geographic theory over how 21st century turns towards 'agentic matter' are challenged by 'negative' geographies and ecologies that focus on foreclosure and reject the appeal to liveliness as an emancipatory pathway (Bissell et al., 2021; Dekeyser & Jellis, 2021; Greaves, 2024; Mann, 2008; Roberts and Dewsbury, 2021). To think about water's ambient dynamics in this context is to recognise how it conditions both possibilities and limits, from the affordances of water across *bios* and *geos* to the myriad opportunities and endings between dehydration and drowning. Rather than casting these theoretical dispositions in terms of their polarity, however, water's dynamics demand ambience be recognised as both necessary and contingent—water's relation to life and planetary conditions might evolve otherwise elsewhere, but on Earth they have not. As Berlant (2011: 230) argues, ambience opens up new understandings of "the way the political suffuses the ordinary," allowing us to perceive how surroundings are not backdrops, but instead circulate around and through the political both formally and informally. Ambience orients matters of concern toward worlds where violence and vulnerability are always already latent, and often reproduced and diffused alongside other more spectacular eruptions. As Khayyat (2022) argues, violence and vitality are not intrinsically opposed; in Lebanon, for instance, they mutually form terrains of existence, resistance, and struggle. Likewise, Aijazi's (2024) work in Kashmir shows how violence-as-condition shapes social life in ways that blur the boundary between what is chronic and what is acute. Ambience, then, is not presumed peace that conflict interrupts. It is rather a condition of lived existence. One that, for water, owes to how socio-material affordances create and constrain the personal and the planetary.

Our account of water weaponisation is not a mere application of more lively ontologies of water to a field of water and conflict studies that remains stubbornly fixed to notions of water *qua* resource. Instead, we are interested in how water's constitutive functions, which enable life's possibilities and constrain its limits, are weaponised across an ambient plane scarcely recognised. This plane is usefully positioned by reconsidering the non-essential nature of water. Water is necessary and contingent in a way that opens its affordances to myriad possibilities for life, and permutations for violence. It is now well rehearsed, for instance, that water is not H_2O. Not only do water's characteristics, like boiling point or pH, depend on altitude and its other chemical constituents (e.g. H_3O, OH^-), the average time liquid H_2O molecules stay together is less than a millisecond (Chang, 2012; Chaplin, 2019). There are so many chemical variants being arranged and rearranged so rapidly that water, which is essential for life, itself has no essential structure. Integrating this non-essentialist view of water into understandings of ambience has implications for rethinking its weaponisation. Rather than water's weaponisation being confined to the moment when natural resources are violently instrumentalised, water's manifold relations open possibilities for exploitation across a range of spatial and temporal scales owing to the many combinations of contingency and necessity through which water is an object, a co-constituent of human and non-human life, and a force in planetary processes.

Ambience is spatial. It recognises the relations of organisms, their habitats, territories, and lifeworlds, while also providing opportunities to think across, and with, what is not always manifest. The threats that appear as if from nowhere—felt but not always fully acknowledged affective atmospheres (Adey, 2014). Robinson and Williams' account of ambient vulnerability is instructive here. They define ambient vulnerability as "the differential susceptibility to harm, both physical and phenomenological, [that arises] because of the diverse and interrelated stressors associated with a person's immediate material and affective surrounding environment" (2024: 3). Ambient vulnerability destabilises necessary, lived relations, such as through chronic air pollution, or excess heat from climate change. Under such conditions, the fact that organisms are co-constituted and constrained by—live their lives within—necessary bodily relations that cannot be fully parsed from their surroundings, points to a form of vulnerability that is not necessarily defined by understandings of individuals or populations being exposed to out-of-the-ordinary events, hazards, or weapons, but owes instead to ambient conditions.

Ambient vulnerability deepens our understanding of how more-than-human relations interact with martial logics during periods of war, conflict, and peace. By focusing on vulnerabilities that arise and accumulate in lived surroundings, ambient vulnerabilities can be both strategic and affective; ontological and phenomenological. Robinson and Williams (2024) identify numerous examples including air quality, humidity, noise, and light to show how ambient stressors shift, shape, and accumulate in intimate interrelationships. Across diverse phenomena, common features of ambient vulnerability structure the concept. For Robinson and Williams (2024) these are: cumulative impacts; permeability; uneven exposures; phenomenological differentiation; and multiple temporalities. Some features, like cumulative impacts, are more easily discerned. Others, like phenomenological differentiation, are less tangible. For instance, measuring the effects of poor air quality on asthma rates is complex, but it is easier than accounting for individual or shared experiences of asthma across intersections of gender, class, or race. Yet, studies show ambient experiences shape feelings of insecurity and belonging. Living in insufficiently warm or excessively hot dwellings is linked to poor bodily health outcomes as well as increased feelings of sadness, anxiety, and fear, which can reduce one's self-worth and lead to various forms of societal withdrawal (Pellicer-Sifres et al., 2021; Martiskainen, 2023).

Inducing vulnerability through the weaponisation of ambient conditions ranks among the most important dynamics of 20th century conflict. Sloterdijk (2016) argues the 20th century was distinguished by the use of poison gas during the First World War. Altering ambient conditions showed that if an enemy proves too elusive, "the attacker is now presented with the possibility of making their continued existence impossible by immersing them in an unlivable milieu for a sufficiently long time" (Sloterdijk, 2016: 91). Brandimarte (2023) uses the Abyssinian War to theorise air's relation to war beyond its material or technical dimensions. In this reading, aerial relations produce and are conditioned by affective, strategic, and embodied dynamics of militarised racial violence. The 'atmosphere' of war, in such accounts, is not additive to existing theorisations of conflict or security. Instead, as Nieuwenhuis (2016) argues, incorporating air into accounts of conflict demands a new spectrum through which different scales of violence might be understood: from poison gas in war, to tear gas against protestors, to embodied state violence as in the case of Eric Garner's suffocation by police and his repeated last words: "I can't breathe."

When ambience and recognised forms of atmospheric warfare are placed astride water's non-essential nature it jars standard

understandings of vulnerability. This is because, just as water refuses the distinction of *bios* and *geos*, it also refuses essentialised positionings of ontological possibilities or negative limits. Instead of vulnerability being confined to notions of susceptibility to bodily harm or to environmental changes in excess of adaptive capacity, water forces recognition of how multiple, contingently composed and recomposed possibilities and limits take shape in ways productive for life, but which also harbor profound potential when water is weaponised. Ambient weaponisation is a concept designed to get at how vulnerability is induced in this richer context of what water is and does. This challenges traditional approaches to water and conflict to attend to more "vibrant" forms of water, and to think through different phenomenological relations with water (Bennett, 2010; Neimanis, 2017). However, it also compels consideration of how water's finitude—its capacity to foreclose on lived possibilities—does not play out on ontologically stable terrain. Here, as Griffiths and Rubaii (2025) argue, it is important to attend to the ecological 'beforemaths' of conflict, such as the impacts on water of procuring critical minerals for military technologies but which must expand to include massive water inputs, often sourced from water-stressed areas, used to cool AI data centres that also support algorithmic warfare (see generally: Shehabi et al., 2024). To account for this congestion of concerns across contingency and necessity, scholarship on water conflict must recognise how water's solid, liquid, and gaseous states may be weaponised to induce ambient vulnerability.

3. What is water weaponisation?

Political geographers increasingly examine emerging arrangements through which nature is weaponised (e.g. Bigger and Neimark, 2017; Gregory, 2016). To understand water weaponisation through ambient vulnerability requires departing from conventional accounts of water conflict. A wealth of literature on water conflict exists, and examines the conditions that lead to conflict and the requirements for preventing their occurrence (see Lopes and Gama, 2025; Zeitoun et al. 2020). Linked to this literature is an emerging field studying water's weaponisation. Whereas water wars have long been contested, studies on water's weaponisation are relatively new. Most prominently introduced by Peter Gleick (1993, 1994), weaponisation occurs when "water resources, or water systems themselves, are used as a tool or weapon in a violent conflict. Examples include manipulating a hydro dam to release damaging flood waters or withholding water supply to dependent communities; or contaminating water resources to poison a population or deprive it of water" (Gleick, 2019: 5). This view derives from a traditional view of weaponisation, where static objects (i.e. water resources) become tools wielded to advance strategic, violent aims.

Subsequent studies have sharpened and expanded initial conceptualisations. King (2015, 2023) explores conflicts in the Middle East and Africa and categorises water's weaponisation according to seven aims: strategic, tactical, coercive, unintentional, psychological, extortionate, or incentivisation. Others, such as Lossow (2016), Daoudy (2020), and Grech-Madin (2021) add nuance by focusing on factors such as the type of weaponisation (e.g. inundation vs. deprivation of water, or offensive vs. defensive actions), water's historical dynamics, and whether it has been weaponised for cooperative ends rather than conflictual ones. Mamshai (2025) extends these concerns to state-backed insurgents to broaden appreciation of actors and crossborder tactics. Recently, Grech-Madin (2025) offered a generalizable theory of water weaponisation focused on 'physical water,' its inundation or deprivation, and mapped this against strategic versus tactical actions. In this model, weaponisation is accompanied by a hierarchy of "intensity" wherein the most virulent acts of weaponisation poison water or bomb dams while others are less intense (descending in this order): forced dehydration, minor obstructions and diversions, and the use of water cannons or cloud seeding to induce rainfall.

What unites conventional studies is an understanding that water's weaponisation is conditioned upon water's unique affordances to harm and make vulnerable. These accounts, however, do not capture water's *liveliness* across different forms, spaces, and times. They also do not contend with water's *latency*—with how its material and affective power present opportunities for exploiting its finitude. Instead, they depend upon and circulate a conception of material vulnerability that is detached from the ambient conditions water co-constitutes. Water is presented singularly, a discrete liquid object to be leveraged for strategic ends. It lies dormant until the moment of weaponisation, when it then becomes a tool to degrade an adversary's material conditions by producing or increasing forms of vulnerability associated with water resources. These views are serviceable for some accounts, but they do not account for the multiple, shifting, accumulating, and intersecting forms of vulnerability—material, embodied, anticipated—induced by water's contingent yet necessary co-constitution of ambient social and physical conditions.

3.1. Expanding weaponisation

What is needed is a way to think about water's weaponisation that captures both well-recognised acts of violent conflict as well as vulnerabilities that arise from and accumulate in one's immediate, everyday surroundings. These vulnerabilities cross scales, from international to domestic concerns, to embodied and lived experiences. Unlike air, ambient water vulnerability requires thinking across water's multiple states of liquid, gas, and solid. Water is also a medium. So whereas poison gases irritate airways to provoke pulmonary edema, or attack the ability of cells to utilise oxygen, water's capacity to dissolve harmful materials can reduce water quality and affect vulnerability through multiple acute and cumulative pathways. As we will show below, exploiting the phase transition of water from liquid to gas (i.e. evaporation) is also part of how ambient weaponisation proceeds. The aim is to provide insights into complex transmutations of waters and weapons, insights that attend to the diversity of experiences and responses to ambient vulnerability. We consider how ambient water weaponisation challenges two central tenets of weaponisation: (1) the presumption that the socio-physical spatiality of water weaponisation is explained by its instrumentalisation as a tool rather than its co-constitutive roles in socio-ecological processes; (2) the idea that the temporality of weaponisation is fixed and/or discrete.

(1) *Spatiality*. The idea that weaponisation involves a deliberate wielding of water as a tool of direct violence, threat, or coercion is central to the conventional accounts discussed above. This view, however, foregrounds the violent instrumentalisation of water in a way that does not fully explain how water's co-constitutive role in social and ecological processes matter to weaponisation. Water certainly can be, and is, instrumentalised as a weapon in the standard sense. An adequate account of the spatiality of water weaponisation, however, also needs to account for how water is used to alter ambient surroundings in ways both discrete and cumulative—and which proceed by exploiting water's role in organisms and processes. For instance, in 2026 the UN (and others) condemned reports that Israel was spraying glyphosate on villages and agricultural land in the "Blue Line" that separates it from southern Lebanon. The herbicide, which kills vegetation that is not genetically modified to withstand it, is a known carcinogen and has been found in Lebanon at levels 20-30 times higher than recommended concentrations for safe agricultural use (United Nations, 2026). In such cases, water's capacity to dissolve chemicals, and achieve landscape coverage to deliver toxics to plant cells are weaponised to destroy flora, with residues doing so long after the initial event. Beyond the economic vulnerability induced by the unsanctioned spraying of glyphosate by Israel or other states, there are also potential health impacts as the socio-physical spaces that comprise local human ecologies are targeted across international territorial boundaries. Like the U.S. use of Agent Orange in Vietnam, this form of violence proceeds via water. A wider plane of thinking about water's affordances, and the ways everything from dissolution to osmosis can be wielded to induce vulnerability, is

needed to capture the socio-physical spaces of weaponisation.

Rethinking water weaponisation through ambience is not limited to international cases. Intimate violence also matters. For instance, waterboarding has been recognised as torture since the 14th century but it is not identified as a form of water weaponisation today (see generally: Cox, 2018). There is a strong argument, however, that inducing drowning sensations by forcing victims into a supine position (i.e. laid on their backs), covering their air passages with absorbent material, and pouring water on their face meets standards of both torture and water weaponisation. In addition to physical violence, however, waterboarding is psychological, and often used to try and extract information or confessions. It is a form of ambient weaponisation in which intimate socio-physical space is violently reordered through fear, physics, and physiology. Here, it is also important that water is wielded in a way not captured by contemporary accounts of weaponisation. Moreover, in order to capture the phenomenological experience of this form of weaponisation it is necessary to have an account of vulnerability capacious enough to capture changes to ambient socio-physical processes across mental, emotional, material, and military dimensions of violence.

Water weaponisation is also entrained with matters of epistemic injustice owing to how different forms of life are lived, and particularly how those with different (or no) distinctions of *bios* and *geos*, are oppressed. Following Fricker (2007), epistemic injustice is committed against somebody in their capacity as a knower. In particular, the lack of language, categories, or discourses to articulate harms is a form of hermeneutic injustice. Hermeneutical injustice is heightened when weaponisation goes unrecognised owing to ontological or epistemic incommensurabilities. For instance, understandings of, and responses to mercury poisoning in waters and fish in the United States can involve substantial differences across epistemic practices of Indigenous and non-Indigenous groups such that even well-intentioned efforts of non-Indigenous scientists fail to get purchase on what are—for the scientists—unknowable harms experienced by Indigenous peoples (see Dotson and Whyte, 2013). Tellingly, colonial dispossession of Indigenous peoples of territories and relations to water are not found in the Pacific Institute's water conflict chronology even though its definition of weaponisation includes violence to water systems. The earliest reference to an Indigenous water conflict of any kind in that database is from 1982. This does not accord with longstanding Indigenous struggles against how water is wielded physically to dispossess Indigenous peoples of land and relations (Estes, 2019). Nor does it account for how colonial violence is enacted through legal systems (Lane, 2024), or how the violence of infrastructure is, for many Indigenous communities, a kind of military beachhead (Curley, 2021). Unlike explanations that position these as so many 'structural injustices' an account of ambient water weaponisation must attend to how, as Simpson (2025) argues, Indigenous relations with water anchor sovereignty, obligations, law, land, and theory. Harms to those relations is harm with place-based specificity that demands recognition as such. Ambient water weaponisation alters the spatial register of weaponisation across social and biophysical relations, with implications across international and intimate scales.

Some might question whether our conceptualisation of ambient weaponisation undercuts the ability of scholars and others (e.g. international legal experts) to establish intentionality. If weaponisation is co-constituted through ambient change, the objection might go, efforts to establish responsibility for harms could become intractably diffuse. For some cases, as the above examples of waterboarding and pesticide pollution suggest, this is obviously not so. Other cases require thinking about how intentionality is often tied to instrumentalisation, but without always reckoning with the distributed ways the latter takes place. Meiches (2017) argues weaponisation is less binary than whether an object is instrumentalised or not owing to how phenomena enable different kinds of violence to be prefigured, even desired. As Kaelin et al. (2025: 1147) argue, "reverberating effects and cumulative impacts, often unfolding over days, weeks, or even months" may treat acts of water weaponisation as discrete events and so produce data that fails to capture the extent of violence. Water's non-essential nature and the vulnerabilities entailed by it are in this sense *enabling*; they are not passive properties but part of how prefiguring water as a weapon is entangled with how water gave life, and took it, before it was ever weaponised. Further, human agency is rarely singular. It is often distributed through relations, networks, and materials involving multiple individuals (Enfield and Kocklman, 2017). Sometimes agency is more akin to what Berlant (2011: 17) calls "'lateral' agency, a mode of coasting consciousness within the ordinary that helps people survive the stress on their sensorium that comes from the difficulty of reproducing contemporary life." In sum, weaponising actors might violently shape socio-physical spaces with direct intention, while others may do so just by getting by, such as the bureaucrats more interested in municipal finances and public reputations than in classed and racialised harms caused by contaminated water during the crisis in Flint, Michigan (see Pauli, 2019). An adequate account of weaponisation needs to capture this richer range of cases and how they coproduce spaces of ambient vulnerability.

(2) *Temporality*. When does the weaponisation of water begin or end if vulnerability is an ambient dynamic? Considering the above, in cases where ambient vulnerability is induced and internalised through diffuse events, the temporal account is likely to vary based on the epistemologies, ontologies, and values employed to appreciate harms. Accordingly, the origins and end points of weaponisation are likely to be temporally diffuse. This diffusion is, of course, not unique to ambient weaponisation, even if it does not typically figure in standard accounts of water and conflict. Consider a dam that is bombed. One can imagine a scenario where the building of a dam is considered an act of weaponisation; perhaps because it reduces water available to a downstream enemy or it displaces communities.[1] As the reservoir of the dam fills, perhaps it also gathers and concentrates toxins previously diluted. Imagine it is then bombed and those waters and toxins flood across lands, homes, and cities downstream. In such cases, the bookends to weaponisation are temporally spread out, and could also extend to the rebuilding of the dam, or be resolved only through the completed project—usually partial—of ecological restoration. Even in this fairly conventional case multiple temporalities are at play, notably even without the social variables the thought experiment leaves out.

Ultimately, determining temporal boundaries to cases of water weaponisation is an empirical matter. But given the range of cases mentioned above, and discussed further below, it is prudent to work within an approach to temporality that operates across different expressions of weaponisation, from those more acute to those more diffuse. In our approach, acute forms of weaponisation are those more temporally constrained in their duration. For example, poisoning an artesian well that, through its natural flow, removes toxins and becomes safe again in a short time without significant downstream effects. To think analytically about more diffuse expressions of weaponisation we draw on Nixon's (2011) idea of 'slow violence,' which makes legible how the temporal distribution of violence means that it often passes unnoticed in broader accounts even though accreting and accumulating effects are harmful. Weaponisation through forms of slow violence might not necessarily break international norms or laws. For instance, Thomas's (2017) examination of transboundary conflict between India and Bangladesh mobilises the idea of "mundane violence," to think about how India's release of water during dry season extremes can produce harm even while complying with agreed, aggregate volumes for water sharing. Sultana (2025) argues India weaponises transboundary waters through practices of 'hydro-coercion' that amount to political colonisation. Alexander (2024), by contrast, shows how the militarised governance of infrastructure in sites of humanitarian aid in Brazil

[1] Ukraine built such a dam in 2014 to limit water to Crimea after Russia annexed it (Plotnikov, 2021).

reinforces conditions of exclusion and precarity through water, and perpetuates intimate forms of slow violence as refugees seek access to showers. In these cases, 'slow violence,' seasonality, and the normalised presence of martial logics suggest that ambient water vulnerability "can be understood as both a state of emergency or a chronic stress;" something that fluctuates, even over the course of a day (Robinson and Williams, 2024: 5). A focus on the interdependent temporalities embedded in the ambient conditions accompanying water weaponisation challenges the progressivist timescape animating traditional accounts of water conflict. It exposes the limitations of studies deriving from a unidirectional, linear interpretation of water weaponisation, thickening the present with entangled and involved timelines. This creates an opportunity to push studies on water weaponisation beyond measuring the duration of acute violence and/or vulnerability and to show how experiences within weaponised, ambient surroundings transform and fluctuate in complex ways over multiple temporal registers.

3.2. Toward ambient water weaponisation

Weapons are not static material objects passively waiting to be instrumentalised. They are more productively understood as, "technical beings in perpetual formation, transmuting in tandem with their ambient milieus". Weapons can also be embodied and inscribed in uncanny social relations (Kirby, 2020). From this perspective, weapons can be understood as situated in ambient networks of social, ecological, and political relations that extend beyond moments and locations of overt conflict. This allows us to understand how environmental phenomena become weaponised as they manifest across discrete and cumulative expressions of violence and with respect to how vulnerability is induced across acute to more diffuse expressions of force. For water, weaponisation can emerge dynamically across its liquid, solid, or gaseous states. Critical to our account is how, as a weapon, water cannot be analytically parsed from its broader relations; water is not removed from the environment before returning to it as a weapon. Rather, weaponised water can both induce and circulate vulnerabilities through its alteration of ambient conditions—water is simultaneously a non-essential object, a co-constituent of life, and a conditioning force in planetary processes. These dynamics, in turn, require examining the relations through which weaponisation takes place.

As Fig. 1 depicts schematically, ambient water weaponisation traces relations through which particular forms of water are weaponised. This always entails reckoning with how relations that concatenate in forms of weaponisation incite forms of ambient vulnerability. We identify relations between weaponisation and vulnerability as 'ambient horizons.' These horizons are not always smooth arcs as Fig. 1 might imply, but can instead lead to perforated, non-linear outcomes owing to the different physical, social, and phenomenological ways ambient vulnerabilities are experienced in relation to weaponisation. So while we should expect realities to be far messier empirically in many cases, in others causal relations will be more linear, such as when an acute moment of weaponisation has a discrete impact, such as attacks on desalination facilities in Bahrain, Kuwait, Iran, and UAE during the 2026 Iran War (Low, 2026; Nereim, 2026). Our account also considers water's multiple states. Fig. 1 is shaded to capture predominant accounts of how liquid water resources are weaponised. Beyond liquid waters, gaseous and solid forms of water weaponisation suggest modalities of inducing ambient vulnerabilities that should not be overlooked.

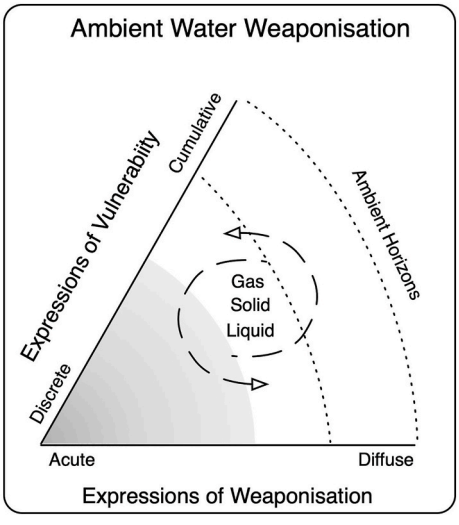

Fig. 1. Ambient Water Weaponisation. Relations of ambient vulnerability, water and weaponisation. Shaded area indexes water weaponisation captured in conventional accounts.

A number of challenges to our conceptualisation can be raised. For instance, it may appear overly broad to characterise everything from diffuse poisons to mass contamination as examples of "weaponisation." Surely, one might object, this risks diluting the concept of weaponisation. Yet what is necessary is an account sufficient to capture forms of weaponisation that range from those already recognised to those that are not, including those built into the structure of societies premised on Indigenous elimination (i.e. settler colonial states). In such cases, as Liboiron (2021) argues, pollution is colonialism. That is, one only arrives at more palatable terms, such as pollution, if the structure enabling Indigenous genocide is ignored, or reified in ways that remove the specificity of harm (see above). If it is recognised that Indigenous genocide does not depend on being accomplished in a particular timeframe, it becomes clearer how and why accounting for 'pollution' as a diffuse form of weaponisation is appropriate. Waste dumping in the West Bank, which overwhelms wastewater treatment systems and despoils water once used to create ambient soil and plant conditions for crops, is not only 'pollution' but a way of laying siege (Stamatopoulou-Robbins, 2019; see also Joronen, 2025).

4. Rethinking Weaponisation

In this section we take a speculative approach to thinking through ambient water vulnerability and forms of weaponisation across water's different states—liquid, gas, and solid—and the phrase transitions between them. We draw on different cases to show how water's properties, politics, and phenomenological relations require an expanded repertoire of weaponisation. The aim is not to derive an account of weaponising water's gaseous or solid states from more well-travelled paths. Instead, it is to think across ambient vulnerabilities and recognise that water's multiple states present different temporalities, rhythms, and relations (Krause, 2022). Different, multiple waters, in turn, have multiple horizons through which different expressions of vulnerability and weaponisation combine. Often, water's phase transitions feature in ways that trouble efforts to conceptualise ambient water weaponisation that would treat liquid, vapour, or solid water as anything other than entry points, or as independent of its latent limits or lively affordances.

4.1. Liquid waters

In 2008, Israeli border police began using 'skunk water' to disperse weekly protesters from gathering in Ni'lin, Palestine to oppose the separation wall. Initially, skunk water was delivered directly by Israeli personnel wearing backpacks, a process that put them amid the sprays, mists, and puddles through which the foul concoction lands and sticks on people, other species, objects, and infrastructure. Once something is hit, a putrid odour described as a mixture of rotting animals, excrement, and open sewage sticks to it for days or weeks (Joronen, 2023). This close contact deployment was soon revisited, and today skunk water is blasted onto bodies and collective spaces by cannons from up to 40m

away, or dropped by drones (Joronen and Ghantous, 2024). Targets have expanded too. Misting clouds of stench are not reserved for protestors but also used to cover roads, business, passing bodies, vegetable stands, trucks carrying bananas to shops, funeral processions, and children playing. Sometimes skunk water is sprayed directly through windows into homes (Bourbeau and Ryan, 2018). When the water evaporates, the malodorous remnant is a semi-solid admixture that is difficult to remove and transfers to whatever it touches: shoes, tires, wheelchairs, bicycles.

Skunk water is a form of weaponisation that induces ambient vulnerabilities. It is delivered in acute moments but has a longer, more diffuse afterlife, once the redness and burning in one's eyes dissipates and as it lingers in homes, on clothes, in restaurants, and manifests in the deterioration of mental health among children (Massad et al., 2017). It mobilises water's potential to create ambient horizons linking weaponisation and vulnerability in multiple ways through: (1) dilution of the chemical composition to deliver olfactory effects; (2) saturation for seeping into hair, clothes, tarmacs, awnings, wood, and other materials, and; (3) evaporation that leaves residues of paste and malodour in place. So, although water is weaponised to induce vulnerability discretely in the moments of misting skunk water across neighbourhoods or blasting it at protestors, it also has other spatial and temporal dimensions. When water is weaponised through skunk water it has atmospheric effects—air carries the smell—and water's material, ambient relations mean that weaponisation in this case does not stop and start with it alone.

Liquid waters are more than just strategic resources to be leveraged for violent aims. They can be mediums of crowd dispersal, of social interruption, and of phenomenological distress through changes to ambient environments that are intimately experienced and widely spread across domestic and public spaces and multiple registers of time. Other cases of liquid water's weaponisation could be similarly considered for how they combine with extractive practices, such as how mining in Nauru lowered and contaminated the island's water table upon which Indigenous peoples and asylum seekers rely (Kanngieser, 2020). Or how the shutting-off of household waters is used as a means of fiscal discipline, or in cases where harms to waters go unrecognised and unknown owing to epistemic constraints (both above). Together, they suggest that liquid water's capacity to induce vulnerability through changes to ambient conditions should be considered beyond strategic resource interventions.

4.2. Gaseous waters

Evaporation is a key hydrological process yet typically ignored in water politics (Jackson and Head, 2022). This is changing, however, through enhanced understandings of atmospheric catchments, sometimes called "precipitationsheds," which are aerial equivalents of terrestrial watersheds that capture and direct water flows. The concept—another hermeneutical development—makes legible how evaporation (and evapotranspiration) affects where and how water vapour travels, and how those waters are linked to ambient vulnerabilities associated with too little, or too much, rainfall elsewhere (Keys et al., 2012). For instance, many megacities around the world depend on distant terrestrial evaporation for around a third of their water—a percentage higher in dry years—and face water security risks associated with changes to landscapes beyond the physical watersheds in which they are located (Keys et al., 2018). Precipitationsheds are affected by evaporation rates, such as from increased temperatures, and by changes to evapotranspiration associated with landscape shifts such as from forests to agriculture. As landscape changes accelerate anthropogenic impacts on the global water cycle, scientists are now attempting to anticipate scenarios in which future drought and excess will induce vulnerability in ways not accounted for in the models that currently dominate state or climate planning (Keys et al., 2024).

Altering the precipitationshed of a city or region changes ambient conditions and can induce vulnerability in multiple ways. Water supply is the most direct. There is already analogous recognition of these relations. For instance, efforts to harvest atmospheric water in dry regions, such as through cloud seeding in the Middle East, can raise concerns about transboundary "sky waters" and their role in international relations (Dezfuli and Zaitchik, 2024). In Venezuela and dozens of other countries, cloud seeding carries implications for international humidity and raises questions around the ownership of, and claims to, water vapour (Simms, 2010). Like skunk water, phase shifts matters to these processes, but in a different way. In cloud seeding, which has been a mainstay in weather modification technologies for decades, evaporation and condensation are more about volumes of water increased or decreased. As a weapon, cloud seeding is an attempt to produce liquid water from water vapour either by inducing rainfall to one's local advantage (e.g. rain for crops) or to another's detriment (excess or want of precipitation). In this sense it is a form of weaponisation that induces ambient vulnerability through complex physical interactions and in ways that complicate notions of "air space," which typically are associated with territorial control, but not (wetter or drier) air parcels.

Recently, Indian analysts have cited earlier American efforts to prolong monsoons during the Vietnam war to argue that Chinese cloud seeding in the Tibetan plateau is critical to India's security (see Verma, 2024). Those earlier American interventions, which also took place in Laos and Cambodia (and elsewhere) have their own longer histories (see Pincus, 2017). The utilisation of cloud seeding in the Qinghai-Tibetan plateau, however, is often interpreted as an effort to manipulate a "sky river" (aka. "atmospheric river") to advantage China (cf. Wang et al., 2018). The Sky River project, which is backed by Chinese state and university enterprises, evokes conceptualisations of water's aerial geographies to coordinate satellite data with terrestrial interventions (Hunchuck et al., 2021). The latter involves deploying thousands of special chimneys to deliver silver iodide high above the Himalayas, and has been questioned for how close it is to outright geoengineering of the atmosphere to one state's advantage (Mackay, 2024). Yeh (2022) argues the project is a form of "Promethean environmentalism" that seeks new techno-geographies linking water above and at the surface. Simon et al. (2023) point out that it is also a potential violation of international law and a potentially destabilising factor for regional geopolitics.

Geoengineering using gaseous forms of water weaponisation could also include brightening clouds to moderate the Earth's climate. This form of geoengineering does not receive the same attention as lofting sulphates into the high-atmosphere, yet it is one of the proposed technologies of "solar radiation management" designed to reflect shortwave radiation from the Sun back out to space. The technology operates by spraying marine (i.e. salt) water into air where it deposits aerosols in the lower atmosphere—mimicking the pollution known as "ship tracks" that once followed sulphur-spewing tanker routes across the ocean (Feingold et al., 2024). Marine cloud brightening could theoretically be done autonomously by ships that run day and night. Critically, however, changes induced in the lower atmosphere are unlikely to stay there, with marine cloud brightening likely to affect other parts of the troposphere and up into the stratosphere (Bednarz et al., 2025). In such cases, the range of concerns that already attend solar radiation management arise not solely through stratospheric aerosol injection and instead find a parallel in water and a shared concern that geoengineering could potentially be weaponised by nations against one another (Corry et al., 2024). Or, in other cases, that threats of its use and uncertainty about outcomes leads to conflict (cf. Sovacool et al., 2023).

Purposefully manipulating evaporation and condensation through marine cloud brightening diverges from strategic saturation and evaporation, as in skunk water, or cumulative impacts of land cover change or cloud seeding, as in augmented upwind/downwind relations affecting precipitationsheds. These all take advantage of how water vapour can be mobilised to alter ambient conditions. To create clouds is to augment Earth's entire energy balance, and to shift power relations through the real or perceived threat of untold numbers of microscopic water droplets convening the reflective work of aerosols. There are acute moments

required to geoengineer in this way, but it is only effective at scale once a cumulative mass is reached across a sufficiently large area. That collecting water from the sky holds potential for weaponisation is given further heft when considering how forms of solidarity and cooperation can be produced through it too. In Morocco, for instance, international field schools on how to harvest fog are described by Farnum (2018) as a form of hydro-diplomacy.

4.3. Solid waters

Snow, permafrost, and flowing and melting ice presents geopolitical challenges for Arctic states, Indigenous peoples, and the borderwork that plays out through and on solid waters. These are not only high latitude matters or limited to securitising anticipated losses of ice or permafrost across multiple ways of apprehending and engaging solid waters (cf. Bennett and Dodds, 2024). Instead, they are increasingly understood as part of the rapid changes to the global cryosphere, which officials from Turkmenistan noted when they convened a high-level panel to discuss the management of shared glaciers with regional neighbours in May 2025 (UNESCO, 2025). For instance, over 200 000 km of roads and 3900 km of railways in the Qinghai-Tibet Plateau are threatened by permafrost melting (Hjort et al., 2022). By 2050, melting across Russian permafrost is expected to put 45% of its globally significant oil and gas reserves in areas of potentially high hazard (Hjort et al., 2018). In these ways, the ambient environments provided by frozen water are key to infrastructure and energy security.

How might solid waters be weaponised? There are straightforward examples one can imagine: creating avalanches of snow to stop supply routes of an enemy, freezing rivers to allow military transport over them, or sabotaging the many miles of ice roads and scores of ice airstrips in the circumpolar North. There are also other possibilities. For instance, efforts to geoengineer the Antarctic ice sheet to slow or reduce its thaw and movement (and contributions to sea-level rise) could introduce military technologies to the continent and potentially undermine the current treaty regarding peaceful activities and infrastructures on the continent (see Flamm and Shibata, 2025). The concerns over weaponisation in such cases find corollaries with other geoengineering technologies and risks. At the other pole, concerns over the cascading effects of ice and permafrost loss on the global water system have led to calls for the US to create an ice restoration programme to shore up its own national security (Strawa et al., 2020). The efforts to brace infrastructure for icy environments, however, carries risks of furthering the reach and impact of colonialism on Indigenous communities (Povoroznyuk et al., 2023). Or, in other words, securing solid water infrastructure could further weaponise water against Indigenous peoples. There are cases that appear less conceivable too, yet which have geopolitical resonance, such as when the mining company Barrick Gold proposed to move three glaciers along the border of Chile and Argentina to facilitate extraction (Li, 2018). Although that didn't happen, the threat that it could be done suggests a new, ice-addled scale of weaponisation.

The articulation by Indigenous scholars and activists of the "right to be cold" presents, in the language of human rights, an explicit claim to ambient environments wherein vulnerability is induced to entire ways of life when ice, snow, and permafrost are lost (Watt-Cloutier, 2018). In these and other cases, ice loss is not merely cultural, but affects political resistance in ways that recall how colonial changes to water elsewhere—canals, dams, dredging—affected Indigenous survivance, sovereignty, and self-determination (Smith, 2025). The loss of ambient environments that are sufficiently cold distribute violence through temporalities that involve local and regional tipping points, while also distributing the impacts of global warming across hundreds and likely thousands of years. Here, multiple ambient horizons link weaponisation to vulnerability across space and scale. This form of weaponisation extends beyond the standard range of concerns over liquid water resources but, in ways that climate change and energy scholars point out elsewhere, also pushes for a reconsideration of weaponisation given ambient changes (see Sovacool et al., 2023).

5. Conclusion

Ambient water weaponisation responds to the rapid erosion of the water "taboo" while simultaneously offering a new way to conceptualise it within complex and emergent forms of war, violence, and conflict. Extending 'ambient vulnerability' to the hydrosphere, emphasising the contingent, non-essential dynamics of liquid, gaseous, and solid waters offers a way to incorporate and move beyond the predominant focus on liquid water resources in studies of water conflict. In so doing we stay alert to water's destructive and generative powers—its multiple affordances and horizons of finitude—across its constitutive role within ambient environments. This new approach captures both standard notions of weaponisation and the proliferating ways water is prefigured as a weapon: hackers gaining control of waterworks and remotely manipulating chemical water treatment facilities; conspiracy theories; cloud-seeding; household water shut-offs, or; colonial oppression of Indigenous relations to territory.

Ambient water weaponisation is a tool to conceptualise multiple forces—-acute and diffuse, discrete and cumulative—through which vulnerability and violence emerge and persist in necessarily lived relations through the hydrosphere. It acknowledges multiple material and phenomenological registers of water and shows how reconceptualising weaponisation can explain recognised cases while also addressing violence unaccounted for in the literature. It advances scholarship by showing how vitality and finitude are not natural poles for contrasting theoretical dispositions. Thinking through how water co-constitutes and conditions both affordances and limits encourages a more capacious approach to weaponisation, one not premised on developing hierarchies of harm but rather attentive to matters of concern too often found on the unequal end of epistemic injustice. Those sites are not isolated from broader systems that waters sustain, enliven and limit, and which open multiple avenues for inducing vulnerabilities not well accounted for in conventional accounts. Moreover, the cases identified in this article are not the full range of how weaponisation of water might converge with, or exploit, intersectional dimensions of water security across considerations of gender, class, race, Indigeneity, or caste (among others) (Harrington et al., 2023). Rather, this article is a call to think with ambient vulnerabilities as an exercise in encountering and addressing the proliferating ways water becomes weaponised.

CRediT authorship contribution statement

Jeremy J. Schmidt: Writing – review & editing, Writing – original draft, Conceptualization. **Cameron Harrington:** Writing – review & editing, Writing – original draft, Conceptualization.

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