Journal of Philosophical Investigations
Print ISSN: 2251-7960 Online ISSN: 2423-4419
Homepage: https://philosophy.tabrizu.ac.ir

Agency, Entanglement, and the Limits of Universalism: toward a situated posthuman ecology

Elmira Bazregarzadeh

Assistant Professor, Department of English Language and Literature, University of Tabriz, Tabriz, Iran. E-mail: e.bazregar@tabrizu.ac.ir

Article Info

Article type:
Research Article

Article history:
Received 12 December 2025
Received in revised form 30 December 2025
Accepted 04 January 2026
Published online 14 February 2026

Keywords:
Distributed Agency, Response-Ability, New Materialism, Ontological Entanglement, Posthuman Ecology, Trans-Corporeality.

ABSTRACT

This paper presents a systematic comparative and historical analysis of the concepts of agency and entanglement within ecological thought, arguing that contemporary new materialist approaches articulate a distinctly posthuman ecology. This ecology is fundamentally grounded in ontological entanglement, distributed agency across human and nonhuman entities, and an immanent, relational form of response-ability that emerges from intra-active becoming rather than individual intention. Drawing primarily on Karen Barad's agential realism, Jane Bennett's vital materialism, Rosi Braidotti's *zoe*-centred posthuman ethics, and Stacy Alaimo's trans-corporeality—while remaining critically attentive to recent decolonial, feminist, and Indigenous critiques that challenge universalized notions of entanglement—the paper meticulously traces a pivotal epistemic and ontological shift. It charts the movement away from earlier representational and managerial paradigms, such as systems ecology and deep ecology, which often preserved anthropocentric hierarchies despite their holistic rhetoric, toward a performative ontology of material-discursive intra-action. Through this transition, ethical and political responsibility is radically relocated: no longer vested in a sovereign, detached human subject issuing commands to passive Nature, but enacted performatively within the entangled phenomena themselves. The consequences are far-reaching, reshaping environmental theory, political ecology, climate justice frameworks, and praxis-oriented struggles in an era of planetary crisis.

Cite this article: Bazregarzadeh, E. (2026). Agency, Entanglement, and the Limits of Universalism: toward a situated posthuman ecology. *Journal of Philosophical Investigations*, 20(54), 631-652. https://doi.org/10.22034/jpiut.2026.70549.4362

Publisher: University of Tabriz.

Intruduction

> *The problem was that we did not know whom we meant when we said 'we* (Rich, 1986, as cited in Neimanis, 2017, 1).

In the Anthropocene, environmental thought has repeatedly run up against the limits of paradigms that quietly preserve human exceptionalism: humans as sovereign knowing subjects, Nature as an object to be mapped, managed, preserved, or granted moral consideration from a safe distance (Crutzen, 2002, 23). Classical systems ecology brilliantly revealed interconnectedness through energy flows and feedback loops, while deep ecology insisted on the intrinsic value of all life and the need for an enlarged "ecological self" (Odum, 1953; Naess, 1973). Yet both traditions largely retained a representational epistemology and an ontological asymmetry: humans observe, interpret, and intervene in a world they do not fundamentally share.

Over the past two decades, new materialist and posthumanist interventions have challenged this lingering anthropocentrism at its root. By treating matter as active and agentic, dissolving the subject/object binary, and reimagining agency as distributed and emergent from relational entanglements, these approaches relocate both knowing and ethical responsibility within the very phenomena they describe (Barad, 2007; Bennett, 2010; Coole & Frost, 2010). The result is not merely a new ecological ethic or epistemology, but a thoroughgoing ontological reorientation: ecology ceases to be the study of pre-existing systems or the application of human values to a separate domain and becomes instead a participatory ontology of material-discursive co-formation and ethical intra-activity. Such orientation is "an anti-hierarchical" practice that aims to reintegrate knowledge back into the material world and challenge the subject/object duality (Taylor, 2023, 153). Informed by "a novel understanding of and a renewed emphasis on materiality, the elusive and complex nature of matter, i. e. the immateriality of matter, indicates that our understanding of Nature needs to be updated (Coole & Frost, 2010, 5). In this light, relying on the posthumanist framework proves helpful as it "conceives of matter itself as lively or as exhibiting agency" (p. 7). Considering "the productivity and resilience of matter," thus, new materialism and posthumanism seek to "give materiality its due," while they remain alert about the many ways in which matter is both "self-constituting and invested with – and reconfigured by– intersubjective interventions that have their own quotient of materiality" (p. 7). Exploring a "*monist*" perspective and a "transversal" agenda, new materialism's "new metaphysics" of posthumanism (Dolphjin & Tuin, 2012, 88), is the inauguration of the transition from "representationalism to performativity" (Barad, 2003, 189) which, in terms of the posthumanist philosophy, is both "post-anthropocentrism" and "post-exceptionalism" (Ferrando, 2019, 55-56).

This paper therefore asks: How do new materialist reconceptions of agency and entanglement transform ecological theory and ethics to the point that we may legitimately speak of a posthuman ecology? To answer this question, it historicizes the shift from systems ecology and deep ecology to new materialist and posthuman critiques; clarifies the core concepts of distributed agency and intra-active entanglement; and traces their ethical, epistemological, and political consequences, including the urgent decolonial demand that every claim to universal entanglement be radically situated (Todd, 2016; Yusoff, 2019; Brito, 2025). In doing so, it offers a historically grounded, comparative framework that both illuminates the ruptures new materialism introduces into ecological thought and marks the limits that must be acknowledged if posthuman ecology is to avoid becoming another extractive universalism.

The analysis responds to two urgent needs in contemporary scholarship. First, it answers calls for greater clarity about what is genuinely new and what remains problematic in new materialist and posthumanist engagements with older ecological traditions (MacGregor, 2021; Skiveren, 2023). Second, as environmental humanities scholarship increasingly turns toward praxis, it asks how an ontological reorientation, if defensible, might reshape conceptions of responsibility, justice, policy, and action in an era of irreversible more-than-human entanglement (Alaimo, 2016; Olsson, 2021).

1. Literature Review: From Ecological Systems to Posthuman Entanglement

Scholarship on ecology, agency, and relationality has developed along several interlaced yet often tension-filled trajectories, spanning classical systems ecology, deep ecology, eco-phenomenology, feminist materialisms, posthumanism, and decolonial critique. While these traditions share a concern with interconnectedness and environmental responsibility, they diverge significantly in how they conceptualize ontology, agency, and ethical accountability. This literature review maps the major contours of these debates and identifies the conceptual gap that the present study addresses.

Early ecological theory was dominated by systems ecology, which sought to model ecosystems as energy-regulated networks governed by feedback loops, equilibrium, and homeostasis (Odum, 1953; Capra, 1996). This framework profoundly shaped environmental management by rendering ecological relations legible to scientific observation and policy intervention. Despite its holistic vocabulary, however, critics have noted that systems ecology largely preserved a representational epistemology in which humans stand outside ecological systems as observers, modelers, and regulators (Latour, 2005; 2018). While nonhuman entities are incorporated into models as functional components, agency remains implicitly concentrated in human epistemic authority and managerial control.

In response to the perceived anthropocentrism of technocratic environmentalism, the deep ecology movement advanced a radical ethical decentering of the human. Naess (1973) and later Devall and Sessions (1985) argued for the intrinsic value of all life and the

cultivation of an expanded "ecological self." Deep ecology significantly reshaped environmental ethics by challenging instrumental valuation and emphasizing biospheric egalitarianism. Yet subsequent feminist and political critiques have argued that deep ecology tends to retain an ontology of discrete beings linked by external relations and a universalizing ethical standpoint insufficiently attentive to power, difference, and historical inequality (Plumwood, 1993).

Between these scientific and ethical paradigms, eco-phenomenology and ecofeminism introduced a more radically embodied and relational critique of modern dualisms. Merleau-Ponty's late ontology dissolved rigid subject–object distinctions by revealing perception as an intercorporeal, world-embedded process (1968). Plumwood (1993) demonstrated how Western conceptions of Nature, rationality, and mastery are entangled with gendered and colonial logics of domination. Ecofeminist scholarship thus destabilized the sovereign human subject not only epistemologically but politically and materially, foregrounding dependency, vulnerability, and asymmetrical relations of power.

From the early 2000s onward, these critical currents converged in what has come to be known as new materialism and posthumanism, which reject the opposition between "Humanism and anti-humanism" and look "more affirmatively towards new alternatives," without a decline into "the rhetoric of the crisis of Man" (Braidotti, 2013, 37). This ody of work reconceptualizes matter as active, relational, and agential, thereby displacing representational epistemology in favor of process-oriented and participatory ontologies. Barad's (2007) agential realism introduced the concept of intra-action, arguing that entities do not precede their relations but emerge through material-discursive entanglement. Bennett's (2010) theory of vibrant matter similarly challenged human-centered models of causality by emphasizing the political and ethical force of nonhuman assemblages. Braidotti (2013) articulated a *zoe*-centered posthuman ethics that extends moral and political concern beyond the human without invoking transcendental humanist norms. Alaimo's (2010; 2016) theory of trans-corporeality further grounded posthuman ontologies in the permeability of bodies, showing how toxins, chemicals, and oceanic systems materially traverse the boundaries between human and environment.

Recent scholarship has extended and complicated these theoretical developments. Neimanis (2017) reconceptualizes corporeality through a watery ontology that emphasizes intra-active embodiment and planetary circulation. Skiveren (2023) interrogates the relation between new materialist vitality and eco-Marxist political economy, warning against the depoliticization of material agency in capitalist contexts. Brito (2025) exposes how unmarked invocations of activity and vitality can reproduce whiteness at the ontological level, challenging the presumed neutrality of matter in new materialist frameworks. Collectively, this work underscores that agency, vitality, and entanglement cannot be abstracted from the political, racialized, and economic structures within which they operate.

Parallel to these developments, decolonial and Indigenous scholars have issued sustained critiques of the so-called "ontological turn." Todd (2016) argues that Euro-Western theoretical celebrations of relationality often appropriate or erase Indigenous cosmologies that have long enacted more-than-human kinship. TallBear (2017) similarly challenges the life/non-life binary that underwrites many technoscientific and philosophical discourses. Yusoff (2019) demonstrates how geological materialism is inseparable from the racialized histories of extraction that structure the Anthropocene. These interventions do not reject relational ontologies but insist that entanglement must be historicized, racialized, and situated, rather than universalized as a neutral philosophical truth.

Despite the richness of this expanding field, several unresolved tensions remain. First, while systems ecology and deep ecology foreground interconnection and intrinsic value, they often retain an implicit ontological hierarchy in which relations link pre-existing entities rather than constituting them. Second, while new materialist and posthumanist theories powerfully reconceptualize agency and matter, they have been criticized for insufficient engagement with colonial histories, structural inequality, and environmental racism. Third, much of the literature remains theoretically fragmented, with limited sustained comparative work tracing conceptual transitions across ecological paradigms.

This paper addresses these gaps by offering a comparative, historically grounded analysis of agency and entanglement across three major ecological paradigms: classical systems ecology, deep ecology, and posthuman new materialism. Unlike studies that treat these traditions in isolation, this paper reconstructs their ontological assumptions about matter, relation, and agency, while also situating posthuman ecology within feminist, decolonial, and Indigenous critiques. In doing so, it advances the central claim that contemporary new materialist thought articulates a distinctively posthuman ecology grounded in distributed agency, ontological entanglement, and immanent ethical response-ability—yet one that must remain radically situated to avoid reproducing extractive universalism.

Building on the preceding literature review, reconfiguration of the historical and conceptual trajectory through which ecological thought has moved from systems-based managerial frameworks and ethical ecocentrism toward posthuman and new materialist ontologies of entanglement becomes crucial. Rather than treating these paradigms as isolated or mutually exclusive, the analysis situates them within a continuous epistemic struggle over the status of matter, the location of agency, and the grounds of ecological responsibility. What emerges is not a linear narrative of theoretical "progress," but a series of conceptual displacements in which each framework both contests and reproduces elements of its predecessors.

The shift traced here concerns not only changing environmental values but, more fundamentally, a transformation in how the human–Nature relation is ontologically configured. Classical systems ecology operationalized interdependence through quantitative

models while preserving the epistemic distance of the observing human subject. Deep ecology sought to subvert this hierarchy through moral egalitarianism and spiritual identification, yet continued to rely on the conceptual separation of discrete beings connected by external relations. Posthuman new materialism, by contrast, displaces this entire architecture by treating relation, rather than entity, as ontologically primary. It is within this theoretical horizon that agency becomes distributed rather than possessed, and ecological ethics becomes immanent rather than prescriptive.

The following subsections therefore do not simply recount intellectual history but isolate the ontological assumptions that organize each ecological paradigm. By reading systems ecology, deep ecology, and posthuman new materialism comparatively, the section demonstrates how contemporary posthuman ecology constitutes not merely an ethical revision of environmental thought but a fundamental reworking of what counts as action, matter, responsibility, and ecological being.

2. From Managerial and Ethical Decentering to Eco-Phenomenology & Posthumanist Turn

Modern ecological science emerged in the twentieth century with an emphasis on systems, energy flows, and self-regulating patterns. Foundational formulations—such as those synthesized by Eugene P. Odum (1953)—describe ecosystems in terms of trophic structures (p. 21), energy circuits (p.14), and feedback mechanisms (p. 68), offering powerful tools for modeling ecological interdependence. The value of systems ecology lies in its capacity to describe complex interrelations across scales and to provide frameworks for predicting systemic responses to perturbation. Capra (1996) popularized the view that living systems at every scale are networks that interact in network fashion, thereby dissolving traditional natural hierarchies and revealing the web of life as a thoroughly interconnected, self-organizing whole (p. 35).

However, despite their empirical strengths, these systems formulations often functioned within a managerial epistemology: humans are the observers and interveners who assess system health and implement corrective or preservationist policies. That stance leaves intact a representationalist asymmetry, "the idea that we can represent the world from a distance, as if we were not part of it" (Latour, 2005, 136), and a teleology of equilibrium and control that many critics find inadequate for the turbulent, non-stationary realities of the Anthropocene. As Latour (2018) later argued, such paradigms presume "a nature that is stable, predictable, and separate from culture," enabling humans to act as "engineers of a system that is supposed to run by itself" (Latour, 2018, 67).

In response to perceived anthropocentrism, the deep ecology movement argued for a radical ethical reorientation: rather than valuing Nature instrumentally, societies should recognize the intrinsic worth of nonhuman life and adopt lifestyles consistent with

ecological balance (Naess, 1973, 95-97; Devall & Sessions, 1985, 70). Deep ecology's insistence on biospheric egalitarianism and a broadened "ecological self" represented a major moral advance over instrumentalist conservationism, which has been particularly influential in provoking ethical reflection within both academic and activist milieus.

Yet deep ecology's strengths also expose its limits. While decentering the human in ethical valuation, it typically presupposes the ontological individuality of organisms and entities that stand in relations of interdependence—entities that, conceptually, pre-exist their relations. In this context, relations connect discrete entities rather than constituting them. The result is a persistent subject/object binary at the ontological level: even as the moral subject expands, the categories of subject and object remain analytically distinct (Plumwood, 1993, 142). Moreover, critics have pointed to deep ecology's occasional tendency toward a transcendental ethic (a normative vantage external to worldly practices) and problematic political implications (e.g., elitist or depoliticized prescriptions) (Devall & Sessions, 1985; Plumwood, 1993, 154).

Between systems science and the new materialist/posthuman turn lies a set of philosophical moves that pave the way for a nonrepresentational ontology. Phenomenologists such as Merleau-Ponty emphasized embodiment and the relational constitution of perception, foregrounding how living bodies are immersed in and co-constituted by their world (Merleau-Ponty, 1968, 135-6). By linking the theory of "body schema" to the theory of "perception," he further notes that we need to "reawaken our experience of the world as it appears to us in so far as we are in the world through our body and in so far as we perceive the world with our body," which is an act of self-rediscovery and views the body as "a natural self" and "the subject of perception" (Merleau-Ponty, 2002, 239). Ecofeminist thinkers, notably Val Plumwood, analyzed the gendered and colonial structures embedded in dualisms, stressing the material and ethical consequences of domination and separation. She aptly writes:

> The denial of dependency on the other, whether human or natural, leads to a truncated rationality and to the illusion of autonomy that underlies both ecological and social domination" (Ecofeminist, 1993, 68).

These interventions destabilized the modern subject and suggested an ethics attentive to embodied interdependence—intellectual work that new materialists subsequently extend and reframe in explicitly ontological terms. Through an ecofeminist lens, MacGregor (2021) has described new materialism as a "project of developing a philosophy of immanence," revolving around the rejection of modernist dualism and the reconfiguration of "interrelations with the material" (pp. 9-10). In a social context, it reminds the theorists that it is not only "language and discourse" that matter (p. 7), but "matters matter" too (Barad, 2003, 187). Accordingly, Barad deems it necessary to employ a "*performative* understanding of discursive practices" as it can dismantle the representational belief in the

power of words to present preexisting entities (Barad, 2003, 188). and replaces reflective reading patterns with diffractive ones, whose main aim is to illuminate the "indefinite nature of boundaries" (Barad, 2003, 189). and to entail "a reworking of the familiar notions of discursive practices, materialization, agency, and causality, among others" (Barad, 2003, 196).

3. Posthumanist/New-Materialist Ecology as a Working Solution

From the early 2000s onward, feminist science studies, process philosophy, and the environmental humanities converged to challenge the passivity of matter and the ontological exceptionalism of the human. Karen Barad's *Meeting the Universe Halfway* (2007) introduced intra-action, the mutual constitution of entities through relational practices, and relocated knowing, being, and ethical responsibility within the same entangled field. Jane Bennett's *Vibrant Matter* (2010) demonstrated the political efficacy of "thing-power": the capacity of nonhuman bodies and assemblages to act and produce effects. Rosi Braidotti (2013) shifted ethical attention from anthropocentric bios to *zoe*—life as impersonal, generative vitality—advancing an affirmative posthuman ethics of co-becoming. Stacy Alaimo's trans-corporeality (2010, 2016) materialized these insights in flesh and water, revealing human bodies as porous sites where toxins, isotopes, and data flow across the imagined boundary between "society" and "environment." Together, these interventions perform an ontological inversion, "valorizing *zoe* and embodiment as the ontological sites of interrogation" (Braidotti & Hlavajova, 2018, 98).

Any claim to a universal posthuman ecology must immediately confront its own locatedness. Indigenous scholars have long insisted that relational ontologies are not a twenty-first-century discovery (Todd, 2016; TallBear, 2017). Métis scholar Zoe Todd argues that the "ontological turn" in Euro-Western theory often erases or commodifies Indigenous cosmologies that have practiced more-than-human kinship for millennia (2016, 7). Kathryn Yusoff reveals how the concept of "a billion black Anthropocenes" exposes the racialized geologies and grammars of extraction that new materialist celebrations of matter's vitality frequently obscure (Yusoff ,2019, 66–68). Recent work by Brito (2025) further demonstrates that matter's presumed neutrality frequently reinscribes whiteness unless colonial histories of extraction and dispossession are made explicit. These interventions do not reject entanglement; they demand that it be historicized, racialized, and situated. A posthuman ecology that ignores these correctives risks becoming yet another extractive universalism.

From the historical trajectory traced above, three distinct ecological paradigms can be distinguished. Classical systems ecology conceives ecosystems as networks of preformed, bounded entities linked by energy flows and feedback loops; agency belongs primarily to the human observer-manager who stands outside the system in order to map and steer it, ethics remains instrumental or preservationist, and knowledge is representational and external (Odum, 1953, 3–5; Capra, 1996, 214–216). Deep ecology decenters the human

morally rather than ontologically: organisms and ecosystems are still separate beings that merely happen to be interdependent; agency is widened through an enlarged "ecological self," yet it remains located in the human subject who recognizes and protects the intrinsic value of nonhuman life; knowledge is observational, carried out from within an expanded circle of identification, but the subject–object divide persists (Naess, 1973, 95–97; Devall & Sessions, 1985). Posthuman new-materialist ecology, by contrast, performs a genuine ontological inversion: relations, intra-actions and entanglements, are primary, and apparently discrete entities (human bodies, rivers, microbes, plastic molecules, climate patterns) only emerge through those relations; agency is therefore distributed, emergent, and never possessed in advance; ethics can no longer be a set of prescriptions issued by a sovereign human subject but becomes an immanent "response-ability" enacted within the phenomena themselves; and knowledge ceases to be representational, becoming instead participatory and material-discursive (Barad, 2007, 149–150; Bennett, 2010, 10–12; Braidotti, 2013, 51–53). The remainder of the paper tests and develops this third paradigm, showing how the shift from interaction among pre-existing beings to intra-action within a shared ontological field fundamentally transforms both the theory and the practice of ecology.

4. Methodology and Meta-Theoretical Orientation

This study employs a comparative, genealogical, and critically situated theoretical approach to trace the reconfiguration of agency and entanglement across three major ecological paradigms: classical systems ecology, deep ecology, and posthuman new materialism. Rather than empirical fieldwork or quantitative modelling, the analysis operates at the level of conceptual ontology, examining how differing constructions of matter, relation, and responsibility produce distinct modes of ecological thought and practice.

The argument proceeds through three interrelated strategies. First, a systematic comparative analysis treats the three paradigms not as successive stages but as competing ontological models: systems ecology as relationality without genuine entanglement; deep ecology as ethical decentering that retains metaphysical discreteness; and new materialism as an inversion in which relations are ontologically primary and agency is distributed across material-discursive assemblages. Second, a genealogical reading tracks the historical displacement and re-articulation of key concepts—agency, relation, matter, responsibility—from representational epistemologies and external interaction to performative ontologies and intra-action. Third, the analysis remains critically situated through sustained engagement with feminist, decolonial, and Indigenous scholarship (Todd, 2016; TallBear, 2017; Yusoff, 2019; Brito, 2025), refusing to treat entanglement as a neutral or universal condition and instead foregrounding its historical, racialized, and geopolitical asymmetries.

The core theoretical constellation, Barad (agential realism and intra-action), Bennett (vibrant matter and thing-power), Braidotti (*zoe*-centred posthuman ethics), and Alaimo

(trans-corporeality), is selected because each illuminates a distinct dimension of posthuman ecology (ontological, political, ethical, and material-political, respectively). Rather than forcing synthesis, the paper stages these thinkers in productive tension. Ultimately, the methodology is theory-driven and reflexive, privileging conceptual clarity and political attentiveness over predictive modelling. Like the posthuman ecology it analyzes, it rejects the fantasy of an external vantage point: theory, critique, and responsibility are themselves entangled practices performed within the phenomena they seek to describe. Methodologically, the paper is also shaped by a deliberate refusal of the explanatory hierarchy between ontology and ethics that dominates much policy-oriented environmental research. Rather than assuming that ethical frameworks are applied to a pre-given world, the analysis proceeds from the new materialist claim that ethical responsibility emerges from ontological entanglement itself. This entails treating ethics not as a normative overlay but as a material practice enacted within ecological intra-actions. Responsibility is therefore analyzed not as a function of sovereign intention but as a distributed and immanent process of response-ability.

5. Theoretical Framework: Principles of New Materialism

The following subsections present the selected thinkers who form the central theoretical scaffolding of posthuman ecology in this paper. Rather than treating these as a unified school, the analysis stages them in productive tension, showing how each illuminates a distinct register, ontological, political, ethical, and material-political, of the shift from anthropocentric to distributed and entangled ecological thought.

Karen Barad's agential realism introduces *intra-action* as distinct from interaction: entities emerge through entangled relations not prior to them (Barad, 2007, 139). In ecological terms, humans are not ethical overseers but participants co-constituted with nonhuman agencies, from soil microbes to climate systems (Barad, 2007, 151). Barad decisively relocates ethicality itself: responsibility is owed not only by humans and not through deliberate intention, but through the ontological entanglements that materiality continually produces. Ethics is therefore "responsibility and accountability for the lively relationalities of becoming of which we are a part," an immanent practice enacted within phenomena rather than a correct response to a radically exterior other (Barad, 2007, 393).

Complementing Barad's quantum-informed ontology, Jane Bennett's vibrant matter emphasizes the vitality and agency inherent in all material assemblages (Bennett, 2010, 4–6). Bennett's notion of thing-power posits that, objects, ranging from urban infrastructure to ecological systems, exert causal and ethical influence (Bennett, 2010, 6). For instance, a river's flow, a power grid, or a crop field can constrain or enable human and nonhuman actions, demanding attentiveness from participants (Bennett, 2010, 12–13). This reorientation highlights distributed agency, where humans are part of a network of vibrant materialities, rather than privileged controllers of inert matter (Bennett, 2010, 10–11).

Bennett's framework foregrounds the political and ethical implications of material vitality, showing that responsibility involves recognizing and negotiating the agency of things as well as living beings (Bennett, 2010, 36–38). Bennett stresses that agency always emerges from the collaboration, cooperation, or interference of many bodies and forces; once nonhumans are treated as actors rather than as mere social constructions, and humans themselves are seen as vital materialities rather than sovereign autonyms, the very concept of agency is profoundly transformed (Bennett, 2010, 21).

Rosi Braidotti extends new materialist thought into explicitly posthumanist ethical terrain. In *The Posthuman* (2013), she emphasizes *zoe*-centered ethics, which foregrounds life in its broader biological-material sense, beyond species-specific concerns (Braidotti, 2013, 60–61). Human subjectivity, for Braidotti, is not exceptional but entangled with other forms of vitality (Braidotti, 2013, 51). Her affirmative ethics proposes joy and creativity as ethical responses to entanglement, rather than guilt or mastery (Braidotti, 2013, 132–134). Regarding ecological thought, this approach emphasizes co-becoming and relational flourishing: humans act in concert with the world, acknowledging that ethical agency is shared across human and nonhuman life (Braidotti, 2013, 136–137). Braidotti positions posthumanism as the historical moment that both registers the decline of Enlightenment humanism — with its faith in progress, reason, and the perfectibility of "Man" — and affirmatively explores non-exceptionalist, processual, and relational conceptualizations of subjectivity beyond the crisis discourse of anti-humanism (Braidotti, 2013, 37).

Alaimo's trans-corporeality (Alaimo, 2010, 2016) bridges Barad's intra-activity with the visceral realities of environmental injustice. Matter moves through bodies—PFAS in blood, microplastics in placentas—producing "material memoirs" that are simultaneously ontological and political (Alaimo, 2016, 112). Agency here is not only distributed but exposed: "the traffic in toxins… places the burden of proof on the body" (Alaimo, 2010, 28). Trans-corporeal ecologies thus demand a posthuman accountability that tracks isotopes and narratives, refusing the fantasy of a bounded human subject. Her framework insists that human corporeality is always already ecological, enmeshed in dynamic, intra-active flows with nonhuman agents—chemicals, marine organisms, geological forces. Toxins move across skin, revealing human vulnerability as ontological condition (Alaimo, 2010, 20). This decentralizes the liberal humanist subject, redistributing agency to vibrant matter (Bennett, 2010) and agential realism (Barad, 2007). Alaimo's later work develops Anthropoceanic thinking, merging new materialism and feminist posthumanism with decolonial ecologies and rejecting salvational narratives in favor of compositional worlding (2016).

Recent studies have extended these theoretical frameworks. For example, Neimanis (2017) explores watery embodiment, showing how intra-actions with aquatic environments produce ethical and epistemological responsibility (Neimanis, 2017, 37–42). Skiveren (2023) situates new materialism within eco-Marxist debates, analyzing how material vitality

interacts with social and economic power structures (Skiveren, 2023, 185–187). Brito (2025) critically examines the racialized politics of matter in new materialist frameworks, noting that entanglement is never neutral (Brito, 2025, 138–140). These contributions underscore the ongoing necessity of situating new materialist ontology within broader political, ecological, and cultural contexts.

6. Agency Reimagined: Towards Trans-Corporeal Entanglements and Its Applications

While classical ecological frameworks and deep ecology's belief in humans as either observers and regulators of natural systems or as ethical agents responsible for recognizing the intrinsic value of life broadened ecological responsibility, they largely assume that nonhuman entities are passive recipients of ethical attention or systemic influence (Odum, 1953, 3–5; Naess, 1973, 95–96; Capra, 1996, 214–216). This creates a hierarchical model of agency: humans act; Nature responds. By contrast, new materialist theorists reconceptualize agency as distributed, emergent, and entangled (Barad, 2007, 139–140; Bennett, 2010, 10–11), which is not something possessed but something enacted through intra-action (Barad, 2007, 33) and showcases the inseparability of human actions from the material responses of ecosystems as ethical responsibility arises from participation within entangled systems rather than oversight from a privileged position (pp. 149–150). Bennett emphasizes that even ostensibly "inert" entities exhibit agency: soil, water, energy systems, and infrastructure all participate in shaping outcomes, creating a distributed network of co-agency (Bennett 2010, 12–13, 20–21).

Barad, Bennett, Braidotti, and Alaimo converge on a relational, posthuman ontology yet accentuate complementary dimensions. Barad supplies the ontological foundation: entities and agencies emerge only through intra-action, making ethics an immanent feature of material-discursive practices (Barad, 2007,139–150). Bennett politicizes this vitality by tracing the distributive agency of things, insisting that ethical and political negotiation must include nonhuman actants—though critics note that unqualified thing-power can sometimes echo neoliberal resilience narratives (Barad, 2010,10–38; Washick et al., 2015). Braidotti adds an affirmative ethical layer, centering *zoe* as generative, nomadic life and advocating creative, joy-oriented practices of becoming-with (Braidotti, 2013, 50–60, 131–137). Alaimo grounds the entire framework in trans-corporeal reality: human bodies are porous interfaces where toxins, isotopes, and power relations continuously intra-act, rendering environmental justice inseparable from ontological entanglement (Alaimo, 2010; 2016, 112–117). Together they dismantle sovereign human agency. Agency becomes emergent and distributed; responsibility is enacted within entangled phenomena rather than projected onto them; ecological knowledge is participatory and situated (Neimanis, 2017, 54–56).

Entanglement lies at the heart of new materialist posthuman ecology, representing both an ontological claim and an ethical orientation (Barad, 2007, 139–140; Bennett, 2010, 10–

11). Barad's concept of intra-action demonstrates that entities do not pre-exist their relational engagements; rather, they emerge through entangled material-discursive processes (Barad, 2007, 33). In ecological terms, this challenges the notion of discrete species, systems, or "natural objects" as pre-formed entities, suggesting instead that the boundaries of organisms, habitats, and ecosystems are relationally constituted (Barad, 2007, 51–152). Entanglement therefore provides a framework for understanding ecological systems as dynamic assemblages in which ethical and epistemic responsibilities are inseparable from material realities.

Entanglement reshapes ecological ethics by shifting responsibility from a pre-given human subject to a distributed, emergent phenomenon (Braidotti, 2013, 51–53; Alaimo, 2016, 112–114). In this framework, ethical action involves responsiveness to the co-constitutive agencies present within ecological networks. For example, anthropogenic climate change cannot be addressed solely through human-centered policies; it demands attention to the emergent effects of material agents (carbon, ice, flora, fauna) and their intra-actions with human sociopolitical structures (Alaimo, 2016, 115–117). Braidotti (2013) extends this argument by proposing *zoe*-centered ethics, which emphasizes the flourishing of all life forms as a central concern (pp. 60–61). Ethical engagement becomes a practice of navigating entangled networks, attending to vulnerabilities, and recognizing that agency is shared across human and nonhuman forms of life (Braidotti, 2010, 136–137). In Bennett's terms, recognizing the vibrancy of matter allows humans to see nonhuman entities as active participants whose capacities and resistances must inform ecological practice (Braidotti , 2010, 12–13).

The Anthropocene, as a geohistorical epoch defined by human-induced planetary transformations, foregrounds the need for an ethics of entanglement. The epoch's challenges—climate instability, biodiversity loss, environmental injustice—cannot be understood solely as the consequences of human action; they emerge from entangled intra-actions of socio-material forces (Yusoff, 2019, 17–19; Olsson, 2021, 232–234). Recognizing entanglement entails accepting shared responsibility, where humans are neither masters nor sole moral authorities but participants in ongoing ecological processes. Recent scholarship emphasizes that entanglement is always politically and materially situated. Brito (2025) critiques universalized formulations of intra-action for overlooking the racialized and colonial dimensions of ecological crises (Brito, 2025, 138–140). Skiveren (2023) similarly situates new materialist theory in broader socio-political contexts, arguing that vitality and agency must be understood in relation to structures of inequality and exploitation (Skiveren, 2023 185–187). These interventions underscore that entanglement involves negotiating ethical, political, and material asymmetries in ecological networks.

Entanglement becomes ethically urgent when bodies are the medium. Alaimo's "anthropocene seas" (2016) show how oceanic plastics intra-act with endocrine systems,

producing deviant anatomies that are both evidence and indictment. Citizen-science projects in which fishers' thyroid biopsies become data for policy exemplify material activism (Alaimo, 2016, 145). Responsibility is no longer a moral stance but a bodily enactment within toxic assemblages. Posthuman ecology, as emergent from the preceding analysis, represents an ontologically relational, ethically immanent, and politically attentive approach to environmental thought. Several key implications emerge from a posthuman ecological perspective: epistemic humility recognizes that knowledge is always situated within entangled phenomena and renders human understanding partial, responsive, and inherently relational (Barad, 2007, 87–88); agency is distributed across human and nonhuman actors alike, subverting the sovereignty of humans (Bennett, 2010, 10–11); ethical responsibility is immanent, arising through ongoing ecological intra-actions and participation instead of abstract prescription (Braidotti, 2013, 132–134; and political attentiveness demands that these entanglements be historicized and contextualized, acknowledging the structural inequities of colonialism, extractivism, and environmental racism that differentially shape them (Brito, 2025, 138–140; Yusoff, 2019, 17–19), yet this very universal framing of entanglement risks overwriting Indigenous relational ontologies that have long enacted posthuman care, insisting that any viable posthuman ecology remain radically situated (Todd, 2016).

Although this paper focuses on theoretical comparison rather than empirical cases, the implications of posthuman ecology extend across environmental policy, literature, and activism. For example, eco-critics may apply entanglement-based frameworks to literature to reveal relationality between humans, animals, and environments (Neimanis, 2017, 54–56; Olsson, 2021, 232–234). Environmental governance might integrate the distributed agency of matter into infrastructure planning, emphasizing co-creation rather than control. In all domains, posthuman ecology foregrounds relationality, vibrancy, and intra-active ethical practice. In policy, trans-corporeal frameworks reorient risk assessment: instead of modeling ecosystems externally, regulators must incorporate biomonitoring data from human and nonhuman bodies (Alaimo, 2016, 112–114). In activism, citizen-science projects and material activism co-produce new publics that enact response-ability through shared flesh and data (Alaimo, 2016; Neimanis, 2017).

Few phenomena make the ontological claims of posthuman ecology more viscerally evident than the discovery of microplastics in human placental tissue (Ragusa et al., 2021). Far from simply adding another data point to pollution science, this finding registers as an ontological event: industrial waste intra-acts with the very tissues of human reproduction, collapsing the modern boundaries between body and environment, inside and outside, exposure and constitution. Classical systems ecology treats microplastics as external disturbances circulating through biogeochemical cycles, objects to be tracked and managed by human regulators (Odum, 1953). Deep ecology condemns them as moral violations of

Nature's intrinsic value, yet still positions plastics as substances that act upon discrete beings rather than co-constitute them (Naess, 1973). In both paradigms, agency remains human-centered and responsibility is exercised from a position of exteriority.

Posthuman ecology disrupts this framing entirely. Through Barad's (2007) agential realism, placental tissue and plastic particles do not pre-exist their encounter; they emerge together through chemical, industrial, oceanic, nutritional, and metabolic intra-actions. Plastic is not an invader of a bounded body but a material participant in the becoming of human embodiment. Agency is distributed across polymer chains, endocrine systems, ocean currents, and petrochemical capitalism.

Alaimo's trans-corporeality (2010, 2016) gives this process its sharpest political edge: microplastics traverse seawater, fish tissue, bloodstreams, and embryonic interfaces, revealing the human body as a porous node in planetary circulation systems. The placenta—formerly imagined as a protective threshold—becomes a site of ecological inscription where industrial matter writes itself into the conditions of life. Exposure is not accidental; it is ontological.

Bennett's vibrant matter (2010) further reveals microplastics as exemplars of molecular thing-power. These particles adsorb toxins, alter hormonal signaling, and potentially modify gene expression, not through intention, but through the capacity to impede, enable, and transform living systems. Agency here circulates between organic and synthetic matter, undermining any story in which humans alone act while matter merely reacts.

Yet posthuman ecology refuses to celebrate this vitality in the abstract. Yusoff (2019) and Brito (2025) insist that toxic circulation cannot be detached from colonial histories of extraction, racialized geology, and global waste trade. Microplastics do not distribute themselves evenly; they accumulate disproportionately in the bodies of coastal, Global South, and economically marginalized communities. Trans-corporeality is therefore the mechanism through which structural inequality is materially reproduced inside human tissue.

Responsibility, in consequence, can no longer be framed as regulatory compliance, consumer virtue, or moral condemnation. It becomes Barad's response-ability: the obligation to respond within entangled conditions we did not fully choose and cannot fully master. Once plastic is embedded in reproductive tissue, the fantasy of external remediation collapses. There is no "clean" outside from which to extract pollution without simultaneously altering life itself. Damage is generational as well as spatial: future bodies are bound to past industrial decisions.

The placenta thus functions as a posthuman archive and a material memoir (Alaimo, 2016), a cellular record of fossil capitalism's reach. It stores not only nutrients but the residues of refineries, ocean gyres, and global shipping routes. Humans are not simply agents who damage a world that later responds; they are materially re-formed by the waste

of their own infrastructures. Plastic is not a consequence of action—it is a co-author of biological becoming.

The microplastics case therefore demonstrates, with bodily force, the core claims of posthuman ecology: agency is not possessed; entanglement is not metaphorical; ethics is immanent. The placenta, once imagined as the threshold of protected human life, emerges instead as an ecological interface where industrial matter, capitalist production, and biological generation converge. Posthuman ecology offers no redemption from this condition, only the difficult labor of learning to intervene within irreversible entanglement.

7. The Limits of Responsibility: Distributed Agency, Political Urgency, and the Problem of Intervention

While posthuman ecology powerfully reconceptualizes agency as distributed and responsibility as immanent, this ontological framework raises a fundamental philosophical difficulty that cannot be overlooked: How can political accountability and urgent ecological intervention be grounded when no single subject fully "controls" causal chains? If agency is everywhere, is responsibility nowhere? If all beings are entangled, how do we avoid ethical dilution, paralysis, or the evacuation of culpability?

This tension marks the central philosophical limit of posthuman ecology. On the one hand, the dissolution of sovereign human agency is precisely what allows new materialism to escape the managerial fantasies of control that characterized both systems ecology and technocratic environmental governance. On the other hand, environmental catastrophe unfolds under conditions of extreme urgency, climate breakdown, species extinction, toxic exposure, where failure to act decisively is itself a political decision. The philosophical challenge, then, is how to think intervention without sovereignty, accountability without mastery, and action without exteriority.

Barad's concept of response-ability offers one influential answer. Responsibility, in this framework, is not a property of a moral subject but an ongoing capacity to respond within entangled material conditions. It emerges through intra-action, not through detached judgment. This reconceptualization avoids the fantasy that ethical clarity precedes entanglement. We are not first subjects who then encounter ecological crisis as an external moral problem; rather, we are always already implicated in the very phenomena we seek to critique. Ethical obligation does not arrive from outside; it crystallizes from within material participation.

Yet this very immanence creates a philosophical pressure point. If responsibility is everywhere enacted through distributed relations, it risks becoming ontologically diffuse and politically indeterminate. Who, then, is to be held accountable for petrochemical toxicity in placentas, for atmospheric carbon accumulation, for slow violence in poisoned landscapes? Distributed responsibility can easily slide into a form of distributed innocence,

where blame evaporates into infrastructural complexity. This is precisely where posthuman ecology must resist its own potential depoliticization. Critics such as Skiveren warn that without a sustained account of political economy, new materialist accounts of vitality risk aligning uncomfortably with neoliberal resilience narratives, where systems adapt, circulate, and self-organize while responsibility for structural violence remains unassigned. If everything is agentic, then no one appears answerable.

Posthuman ecology therefore faces a double philosophical demand:

1. To avoid reverting to sovereign human mastery, and
2. To avoid dissolving responsibility into ontological abstraction

This tension cannot be resolved by simply reasserting human moral authority, nor by abandoning the concept of accountability altogether. Instead, it requires a reconceptualization of accountability as structurally located within distributed assemblages, not outside of them.

Here, Yusoff's critique of the Anthropocene becomes crucial. By revealing geology itself as racialized and extractive, Yusoff demonstrates that distributed material agency does not unfold on a neutral ontological field. Planetary circulation is asymmetrically organized through colonialism, fossil capital, militarized logistics, and global waste trades. Entanglement, then, is not a flat network of mutual influence but a historically stratified field of power. Some bodies, racialized, gendered, colonized, are made disproportionately available to toxicity, dispossession, and exposure. From this perspective, distributed agency does not abolish accountability; it repositions it at the level of infrastructures, supply chains, and institutionalized violence. Posthuman responsibility must therefore operate on two simultaneous registers:

1. An ontological register, where agency is emergent and shared across material assemblages; and
2. A political-economic register, where responsibility concentrates around extractive systems, regulatory failures, and regimes of profit.

This dual structure prevents distributed agency from collapsing into moral vaporization.

A similar tension emerges in Braidotti's affirmative posthuman ethics. Her emphasis on *zoe*-centered becoming, joy, and creative transformation offers a vital alternative to apocalyptic paralysis and moral puritanism. Yet critics have noted that affirmation alone cannot bear the full weight of ecological catastrophe. When entire populations are rendered disposable through toxic exposure, joyful becoming risks reading as aesthetic compensation for structural violence. The task, then, is not to abandon affirmative ethics, but to bind it to conditions of material injury, slow death, and historical injustice.

Alaimo's trans-corporeal framework performs precisely this binding. By tracking how toxins intra-act with vulnerable bodies, trans-corporeality prevents ethics from drifting into

celebration detached from exposure. It insists that responsibility is not an abstract orientation toward life in general but an obligation that passes through bodies unevenly. Response-ability, in this sense, is always a contested distribution of vulnerability.

The philosophical stakes become sharpest when posthuman ecology confronts the problem of irreversible damage. Unlike classical environmental ethics, which often presupposed a world that could be restored to equilibrium through proper management, posthuman ecology begins from irreversibility. Plastic does not decay into innocence. Carbon does not simply circulate without climatic memory. Extinct species do not return. In such conditions, responsibility can no longer be framed primarily as prevention. It becomes, instead, a matter of how to act within ruined conditions without the promise of restoration. This marks a fundamental shift in ecological ethics: not "How do we fix the world?" but "How do we intervene within worlds that cannot be unbroken?"

Posthuman ecology therefore abandons the salvational structure that still haunts both systems ecology and deep ecology. It refuses the fantasy of external repair. Instead, it theorizes a form of compositional ethics: a practice of assembling livable relations within damaged ontologies. Intervention becomes not an act of mastery over a broken system, but a situated negotiation between heterogeneous forces that exceed any singular will.

This also reframes political urgency itself. Under classical models, urgency demanded faster, more efficient control. Under posthuman ecology, urgency demands more careful modes of intra-active participation, where intervention is understood as a material negotiation rather than a command. This does not weaken political resolve; it thickens it. Action now requires attention to unintended consequences, feedback effects, infrastructural inertia, and nonhuman resistance.

Crucially, this philosophical shift does not entail quietism. To refuse sovereignty is not to refuse struggle. Rather, it transforms struggle from a battle against passive matter into a contested choreography among active forces. Political action becomes less about domination and more about repatterning material relations—supply chains, production regimes, waste routes, legal imaginaries, affective economies.

From this vantage, posthuman ecology exposes the inadequacy of both traditional environmental governance and purely moral environmentalism. Regulation without ontological entanglement reproduces managerial distance. Ethical condemnation without infrastructural transformation remains symbolically potent but materially weak. What is required instead is a politics of entangled accountability, where agency is distributed, but responsibility becomes structurally intensified, not dissolved. This also clarifies the philosophical limit of universal entanglement. Todd's intervention is decisive here: relationality cannot be invoked as a newly discovered universal truth without reproducing colonial epistemic extraction. Many Indigenous ontologies have never assumed a separation

between humans and the more-than-human world. What differs is not merely ontological orientation but relations of power over whose relationality counts as knowledge.

Posthuman ecology, if it is to avoid renewing colonial erasures under the banner of entanglement, must therefore accept a final philosophical constraint: entanglement is not a single condition but a multiplicity of historically differentiated relational worlds. There is no universal "we" of planetary becoming. There are only unevenly exposed bodies, asymmetrically empowered infrastructures, and contested modes of living-with damage. From this perspective, the true philosophical contribution of posthuman ecology is not that it dissolves responsibility into complexity, but that it redefines responsibility as the difficult labor of acting from within impurity. There is no innocent position from which to intervene. There is only the ongoing task of assuming responsibility for relations one did not choose yet continues to inhabit. Thus, the limit of posthuman responsibility is also its philosophical strength.

By refusing both sovereign mastery and moral absolution, posthuman ecology compels ecological thought to remain permanently unfinished, permanently contested, and permanently entangled with the worlds it seeks to transform. Responsibility, in this sense, is no longer the burden of a heroic human subject. It is the distributed, asymmetrical, and often involuntary condition of living on in damaged worlds where action remains necessary, intervention remains risky, and innocence remains unavailable.

Conclusion

This paper has traced the historical evolution from classical systems ecology and deep ecology to a posthuman, new materialist perspective on ecological thought. Comparative analysis demonstrates that new materialism reconfigures agency as distributed, emergent, and relational, while entanglement reframes ecological ethics as immanent, situated, and intra-active. By integrating the work of Barad, Bennett, Braidotti, and Alaimo with recent scholarship (Neimanis, Skiveren, Brito, Yusoff), the analysis establishes a conceptual framework: an approach that dissolves human exceptionalism, recognizes the vibrancy of matter, and positions responsibility within ongoing intra-actions rather than pre-given human prerogatives. The theoretical shift has profound implications.

Production of knowledge, ethical decision-making, and ecological praxis must now reckon with the distributed agency of nonhuman actors and the relational ontologies that constitute ecological phenomena. Posthuman ecology, in this sense, is not only a descriptive lens but also an ethical and political orientation, urging scholars, policymakers, and practitioners to recognize their embeddedness within entangled networks of life and matter.

Similarly, it is not simply one more paradigm among others; it is the first ecological imaginary within the Euro-Western tradition that refuses in principle the fantasy of a sovereign knower who could stand outside the ruin to save or manage it. Rather than

presenting posthuman ecology as a wholly novel paradigm, we might more accurately describe it as a belated Euro-Western recognition—often extractive and still incomplete—of relational ontologies that many Indigenous, Afro-diasporic, and non-Western cosmologies have never abandoned. What it demands—and what no previous paradigm in that same tradition could—is a simultaneous ontological humility and political audacity: to accept that we are materially co-constituted with the very messes we inherit, and yet to insist that response-ability remains an open, contested, and fiercely situated practice of composing liveable worlds amid irreversible damage. Only by holding these two imperatives together—radical entanglement and radical situatedness—can ecological thought finally abandon the last vestiges of human exceptionalism and begin the collective labour of learning to become, at last, earthly.

References

Alaimo, S. (2010). *Bodily Natures: Science, Environment, and The Material Self*. USA: Indiana University Press.

Alaimo, S. (2016). *Exposed: Environmental Politics and Pleasures in Posthuman Times*. London: University of Minnesota Press.

Barad, K., (2003). Posthumanist performativity: toward an understanding of how matter comes to matter. *Signs*, 28 (3), 801–831. https://doi:10.1086/345321

Barad, K. (2007). *Meeting the Universe Halfway: Quantum Physics and The Entanglement of Matter and Meaning*. London: Duke University Press.

Bennett, J. (2010). *Vibrant Matter: A Political Ecology of Things*. London: Duke University Press.

Braidotti, R. (2013). *The Posthuman*. UK: Polity Press.

Braidotti, R., & Hlavajova, S. (Eds.). (2018). *Posthuman Glossary*. London: Bloomsburry.

Brito, T. (2025). New materialism, whiteness and the politics of vitality: Rethinking activity/passivity in critical security studies. *Security Dialogue*, 56(2), 133–151. https://doi.org/10.1177/09670106241306967

Capra, F. (1996). *The Web of Life: A New Scientific Understanding of Living Systems*. London: Anchor Books.

Coole, D., & Frost, S. (Eds.). (2010). *New Materialisms: Ontology, Agency, and Politics*. London: Duke University Press.

Crutzen, P. J. (2002). Geology of mankind. *Nature*, 415(6867), 23. https://doi.org/10.1038/415023a

Devall, B., & Sessions, G. (1985). *Deep Ecology: Living As If Nature Mattered*. Utah: Gibbs Smith.

Dolphijn, R. & Tuin, I. v. d. (Eds.) (2012). *New Materialism: Interviews & Cartographies*. Anne Arbour: Open Humanities Press.

Ferrando, F. (2019). *Philosophical Posthumanism*. London: Bloomsbury.

Latour, B. (2005). *Reassembling The Social: An Introduction to Actor-Network-Theory*. New York: Oxford University Press.

Latour, B. (2018). *Down to Earth: Politics in The New Climatic Regime* (C. Porter, Trans.). UK: Polity Press.

MacGregor, S. (2021). Making matter great again? Ecofeminism, new materialism and the everyday turn in environmental politics. *Environmental Politics*, 30(1–2), 41–60. https://doi.org/10.1080/09644016.2020.1846954

Merleau-Ponty, M. (1968). *The Visible and The Invisible* (A. Lingis, Trans.; C. Lefort, Ed.). USA: Northwestern University Press.

Merleau-Ponty, M. (2002). *Phenomenology of Perception*. London: Routledge Classics.

Naess, A. (1973). The shallow and the deep, long-range ecology movement: A summary. *Inquiry*, 16(1–4), 95–100. https://doi.org/10.1080/00201747308601682

Neimanis, A. (2017). *Bodies of Water: Posthuman Feminist Phenomenology*. London: Bloomsbury Academic.

Odum, E. P. (1953). *Fundamentals of Ecology*. Philadelphia: W. B. Saunders.

Olsson, J. (2021). Shifting scales, inventive intermediations: Figurations of posthuman ecologies in contemporary poetry. *Environmental Humanities*, 13(2), 232–254. https://doi.org/10.1215/22011919329847

Plumwood, V. (1993). *Feminism and The Mastery of Nature*. London: Routledge.

Ragusa, A., Svelato, A., Santacroce, C., Catalano, P., Notarstefano, V., Carnevali, O., Papa, F., Rongioletti, M. C. A., Baiocco, F., Draghi, S., D'Amore, E., Rinaldo, D., Matta, M., & Giorgini, E. (2021). Plasticenta: First evidence of microplastics in human placenta. *Environment International*, 146, Article 106274. https://doi.org/10.1016/j.envint.2020.106274

Skiveren, T. (2023). New materialism and the eco-Marxist challenge. *Environmental Humanities*, 15(2), 181–200. https://doi.org/10.1215/22011919-10484996

TallBear, K. (2017). Beyond the life/not-life binary: A Feminist-Indigenous reading of cryopreservation, interspecies thinking and the new materialisms. In J. Radin & E. Kowal (Eds.), *Cryopolitics: Frozen Life in a Melting World* (pp. 179–202). Cambridge: MIT Press.

Taylor, C. (2023). New materialisms. *The Year's Work in Critical & Cultural Theory*, 31, 152- 173. https://doi.org/10.1093/ywcct/mbad009

Todd, Z. (2016). An Indigenous feminist's take on the ontological turn: "Ontology" is just another word for colonialism. *Journal of Historical Sociology*, 29(1), 4–22. https://doi.org/10.1111/johs.12124

Washick, B., Wingrove, E., Ferguson, K. E., & Bennett, J. (2015). Politics that matter: Thinking about power and justice with the new materialists. *Contemporary Political Theory*, 14(1), 63–89. https://doi.org/10.1057/cpt.2014.15

Yusoff, K. (2019). *A Billion Black Anthropocenes or None*. Minneapolis: University of Minnesota Press.