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Title: Mycelial Politics: Radical Ecology & Renewal in the Anthropocene

Abstract: This paper introduces mycelial politics as a radical ecological metaphor for imagining a post-capitalist renewal of social and ecological systems in the Anthropocene. Building on eco-Marxism, eco-anarchism, and Indigenous ecologies, it argues that mycelial networks—capable of breaking down decaying matter, redistributing nutrients, and healing ecosystems—illustrate how communities might respond to ecocatastrophe by dissolving hierarchical epistemologies of social and ecological domination, adopting principles and praxes of interspecies mutual aid, and regenerating damaged environments. Moving beyond Deleuze and Guattari's rhizome, mycelial processes subsist through intimate place-based relations of interspecies reciprocity and a circular, post-scarcity gift economy, offering a prefigurative model for resilient and adaptive transformation toward an ecological democracy.

Keywords: Radical Ecology, Anthropocene, Post-Capitalism, Environmental Political Theory

Introducing Mycelium: An Ecological Metaphor Against the Anthropocene

In March 2024, the International Union of Geological Sciences (IUGS) declined to formally designate the Anthropocene as an epoch. Still, they acknowledged its enduring utility as “an invaluable descriptor” (2) for describing how human activity drives ecological disruption under contemporary anti-ecological productivist economies. This notion of human agency shaping planetary conditions demands reimagining our political thought, social institutions, and strategies for confronting the Anthropocene's cascading ecocatastrophes.

Anti-ecological regimes—capitalist or state-socialist—have propelled ecocide (Finzi 2014; Whyte 2020), driving multiple planetary boundaries beyond their limits (Rockström et al. 2009; Richardson et al. 2023). From chemical pollution to atmospheric carbon overload and biodiversity collapse, these disruptions facilitate a potential sixth mass extinction (Cardinale 2012; Ceballos and Ehrlich 2018; Kolbert 2014). They confirm the vital and multiplex entanglements and interdependencies between human sociopolitical institutions, political economy, and the Earth's life-support systems.

To counter anthropogenic ecocatastrophe, one must imagine a post-capitalist transformation grounded in adaptability, resilience, and renewal. This calls for resisting extractivist and productivist illogics and dismantling the social and ecological dominations that sustain them. From these ruins, the task is to reassemble the pieces into a non-hierarchical symbiosis—or interspecies mutualism—that democratically links human and non-human life in participatory and regenerative ways.

Drawing on radical ecology, Indigenous theory, and mycology, this paper develops *mycelial* politics—an ecological metaphor grounded in fungal processes of decomposition, interspecies linkage, and renewal. By modeling political networks on fungal hyphae, one may envision a dialectical process that concomitantly breaks down and decomposes anti-ecological structures as it reconstitutes them into life-affirming forms. This framework highlights circular, post-scarcity economics and interspecies mutual aid, pointing toward a post-capitalist transition where communities regenerate damaged environments and redistribute resources and power in non-hierarchical and liberatory networks.

From Principles to Praxis: Translating Ecological Metaphors into Human Action

Ecological metaphors bridge imagination to action, offering ways to apply natural processes to sociopolitical change (Keulartz 2007; Lidström & Garrard 2014; Mey 2017). For instance, Syma Ebbin's *lichen* shows how environmental governance can be cooperative rather than top-down: lichens are composite organisms formed by a fungal and algal symbiosis, suggesting interdependent relationships among institutions at various scales. This approach contrasts coercive institutional procedures of environmental governance with more flexible and participatory democratic networks (2005).

Radical ecologists have deployed Deleuze and Guattari's *rhizome* as a metaphor for non-hierarchical organization (1987, 1–25). A rhizome is an underground stem that grows “from the middle” (23), distributing nutrients horizontally rather than through a single root, thus representing a decentralized, multiplex, and interconnected network (Guo et al. 2021). Guattari's ecosophy (2000) extends the rhizome into an “ethico-political” framework, integrating the three domains of the environment, social relations, and subjectivity (Antonioli 2018, 73). Unlike “arborescent” (1987, 33) hierarchies, rhizomatic structures resist linearity, dissolve dualisms of human vs. nature, and embrace relational ethics rooted in mutualism and co-creation (240). Rhizomatic epistemics do not “dichotomize” but construct “a higher unity” in the heterogeneity and multiplicity of social and ecological life (6).

Potawatomi environmental scientist Robin Wall Kimmerer illustrates “a democracy of species” (2013, 173) through everyday acts like picking strawberries or harvesting maple syrup. Her conception of an ecological “gift economy” (24) involves taking only what is needed and reciprocating care, respecting ancestral lands and the responsibility to future generations. “When my kids were in school,” she writes, “they had to memorize the Bill of Rights, but I would venture to guess that maple seedlings would be schooled instead in the Bill of Responsibilities” (173). Kimmerer's ecological metaphors thus highlight how mutual ecocentric responsibilities—rather than narrow frameworks of anthropocentric rights—engender sustainable and liberatory human–nature relationships.

Recent Indigenous social movements—such as the women water protectors opposing the Dakota Access and Keystone oil pipeline—demonstrate how interspecies mutual aid extends agency to non-human entities like rivers and mountains (Dennis and Bell 2020; Jewett and Garavan 2019; LaDuke 2020; Valandra 2019). Māori legal scholar Jacinta Ruru, for instance,

deployed Indigenous knowledge to successfully advocate for the personality and personhood of New Zealand's (Aotearoa) Whanganui River (Morris and Ruru 2010; Ruru 2018). In this way, Indigenous epistemologies challenge anti-ecological regimes and spotlight alternative modes of place-based and non-state governance grounded in an intimate relation to place or *grounded normativity* (Coulthard 2014, 13-14; Coulthard and Simpson 2016, 254), emancipatory sovereignty, and participatory interspecies democracy.

In this context of accelerating ecological degradation, mycelial networks offer a potent ecological metaphor. While rhizomes reject hierarchy, mycelia add a transformative capacity: fungal hyphae decompose detritus, redistribute nutrients, and support new life in a circular economy (Stamets 2019). It goes beyond a redistributive horizontalism by actualizing processes of interspecies regeneration and renewal.

Prefiguring the Post-Capitalist: Eco-Marxist, Eco-Anarchist, and Indigenous Ecologies

Contemporary radical ecologies critique anthropocentrism and anthropogenic ecocatastrophe, yet they often miss two pressing challenges: first, the need to decompose and redistribute resources to avert collapse; second, an interspecies model of community and ecological democracy that is neither anthropocentric nor misanthropic (Garrard 2023, 27-35). Though eco-Marxism, eco-anarchism, and Indigenous thought differ in origins and context, mycelial politics acknowledges their incommensurabilities while drawing on their complementarities. Eco-Marxism stresses systemic redistribution and radical egalitarianism, while social ecology (a branch of eco-anarchism) and Indigenous frameworks expand non-hierarchical, non-state principles and forms of place-based, relational governance.

Eco-Marxist Thought: Critiques of Anti-Ecological Capitalist Political Economy

American economist James O'Connor's critique of the capital-nature nexus launched today's debates on capitalism's ecological contradictions (1988; 1991; 1998). More recently, Kohei Saito has expanded eco-Marxism to address ecological collapse through state-based interventions that address inequality without the neurotic conception of economic growth as the sole measure of progress (2017; 2020; 2023; 2024). Together, they spotlight how critiques of capitalism's relentless drive for resources and asset appreciation, concomitantly degrading labor and life-supporting ecosystems, generate visions of alternative, sustainable socialist modes of production and forms of sociopolitical organization.

To 'ecologize' Marxism, O'Connor identifies a dialectic between *first* nature (the material environment) and *second* nature (human social relations). As capitalist production intensifies, a "specifically capitalist" second nature emerges, characterized by "patterns of consumption and waste" (1998, 59-60). The privatization of first nature for profiteering for plunder and profit produces a second nature that is "commodified and valorized at the same time as it is being degraded" (244). This process severs reciprocal ties between communities and ecosystems, mirroring the original enclosures of the commons.

Developing a view of this dialectic through historical materialism (Foster 2022), O'Connor highlights two contradictions. The first contradiction follows classical Marxism: as capital expands productivity, it also exploits workers and depresses wages, triggering overproduction and economic crises. This tension between forces and relations of production destabilizes the system and sows the seeds of potential socialist reorganization (158).

O'Connor's second, ecological contradiction arises from capitalism's "self-destructive appropriation" of labor, space, and nature (O'Connor 1998, 177). Real-world examples abound: La Oroya, Peru, where metallurgical firms left extreme chemical pollution (Valencia 2014); the Navajo Nation, irradiated and scarred by decades of uranium mining and milling (Voyles 2015); or Cancer Alley near petrochemical activities in Louisiana (Castellón 2021) and the Athabasca tar sands of Alberta (Huseman and Short 2012; Preston 2013). Capitalism prefigures socioenvironmental collapse through these processes of "slow industrial genocide" (Huseman and Short 2012, 228) waged on lands and bodies.

Kohei Saito extends eco-Marxism by proposing a degrowth approach under state socialism (2023; 2024). He argues that Marx's late writings rejected productivism and Eurocentrism, envisioning a post-scarcity socialist society aligned with ecological stability rather than endless economic output and expansion: "Marx completely abandoned productivism and Eurocentrism" (2023, 209). For example, Saito notes that "the radical abundance of 'communal/common wealth' (*genossenschaftlicher Reichtum*) in the *Critique of the Gotha Programme*" (a posthumous work of Marx published in 1891) "signifies a non-consumerist way of life in a post-scarcity economy which realizes a safe and just society in the face of global ecological crisis in the Anthropocene" (8).

Saito's notes that Marx observed a "metabolic rift" (237) in the process of alienation, a fundamental separation in the relationship between human society and its non-human life supporting systems that intensifies as more of first nature winds up in the privatized and commodified realm of capitalist second nature. Saito's solution "to avoid ecological breakdown" is to implement a state-planned degrowth scheme: a "steady-state economy," he claims, is "the source of power to resist capitalism" (208). Utilizing the State to turn politico-economic institutions from notions of progress concretized in GDP, his "degrowth communism" (2024, 174) prioritizes noneconomic progress in the distribution and quality of public goods like "sufficient food" (59) or "education, social security, and the arts" (81).

While Saito's formulation of degrowth communism is, in his view, the more valid interpretation of Marx's theories, questions remain about how a centralized state can administer and endure through to the end of the degrowth objective. Eventually, decentralized networks of sub-state units—local, bioregional communities—will better manage the transition to post-scarcity (Chertkovskaya 2022; Sale 2017; Savini 2023). A gradual devolution of power through the decomposition of top-down models would enable autonomous and adaptive place-based solutions to socioenvironmental challenges.

First Principles: Eco-Marxism

The above discussion captures the general essence of the eco-Marxist position and its proposed remedies. It follows that some of the core principles of the eco-Marxist position may be enumerated as follows. This list is not intended to be exhaustive. Instead, it lays the first theoretical foundations for the mycelial metaphor.

The Second Contradiction – Beyond class struggle, capitalism concomitantly accelerates economic crises and ecocatastrophe, constituting a second “ecological” contradiction.

First/Second Nature Dialectic – Human activity reshapes the material environment (*first nature*) to sustain developments in culture, society, politics, and economy (*second nature*). Capitalist second nature privatizes and degrades first nature for a commodified second nature.

Metabolic Rift – Capital alienates human society from its non-human life-supporting systems by severing sustainable relationships with nature.

State as a Vehicle for Ecological Transformation – Eco-Marxism maintains that the State is the chief redistributive force with the capacity to implement and enforce a steady-state economy.

Economic Redistribution as the Primary Solution – Shifting control of production to the working class can reduce environmental harm if metrics of progress move beyond productivism to noneconomic targets concerning public goods.

A state-centric strategy underpins many eco-Marxist visions, from Saito’s degrowth communism to eco-Leninist proposals wherein State power becomes the vehicle for an “eco-dictatorship” of the proletariat (Downes 2024, 2). But relying on centralized authority in an anti-ecological nation-state model to construct a liberatory ecological society remains questionable as a matter of scale and as a matter of intent if the aim is to prefigure genuinely democratic, bottom-up ecological transformations.

Eco-Marxism’s conviction to radical egalitarianism and redistribution often assumes state power is a necessary lever, risking tension with socialist variants that outright reject centralized State coercion. For example, *The Red Deal* (2021) written by the Indigenous ‘red’ socialists of the Red Nation poses an epistemic challenge to settler-state socialist frameworks, pointing to land rematriation and place-based principles and forms of environmental sovereignty and restorative praxis. “The best forms of environmental policy,” they claim, “come from the bottom up, and momentous change only happens with the might of a people’s move behind it” (27).

Instead of the materialist outlook, Indigenous eco-socialists see “land as a living thing to be cared for and respected” (127), formulating a liberatory socialist framework centered on the multiplex interrelations and responsibilities shared by human and non-human life. Their eco-socialist approach thus reframes socialist discourse beyond state-centric or economic

solutions. Still, O'Connor's overarching question remains central for imagining a post-capitalist, mycelial politics: "How can a theory of capitalism be constructed that would help us think clearly about global environmental destruction?" (1998, 127).

Eco-Anarchy (or Social Ecology): Non-State Solutions to Avert Climate Catastrophe

Anarchism constitutes another radical current in Euro-settler subversive thought. Eco-anarchism builds on the ecological insights of anarchist geographers like Élisée Reclus and Pyotr Kropotkin. For instance, anarcho-primitivist ecologist Kirkpatrick Sale highlights how Reclus' nineteen-volume magnum opus—*Universal Geography* (1875–94/2013)—conveyed "a picture of human-nature interaction" tantamount to contemporary conceptions of bioregionalism. "It showed," writes Sale, "how people could properly live in self-regarding and self-determined bioregions without the interference of large and centralized governments that always try to homogenize diverse geographical areas" (2010).

Contemporary social ecology draws heavily on Pyotr Kropotkin's *Mutual Aid* (1902), which argues that cooperation—not competition—is the dominant force in the natural history of evolution: "though a good deal of warfare goes on between different classes of animals, or different species, or even different tribes of the same species, peace and mutual support are the rule within the tribe or the species" (44). From Kropotkin's ecological observations the anarchist derives a conceptualization of natural law and human nature that rejects the Hobbesian claim that "the life of man" is "solitary, poore, nasty, brutish, and short" (1651, ch. XIII). "Man is no exception in nature," Kropotkin declares in the next chapter, "He also is subject to the great principle of Mutual Aid which grants the best chances of survival to those who best support each other in the struggle for life" (1902, 62).

Instead of an adversarial state of nature defined by austerity, Kropotkin identified post-scarcity and non-competitive principles and praxes of mutualism, sharing, cooperation as core to evolution, ecology, and social life. For him, capitalist justifications of hierarchy are untenable, since cooperative and egalitarian structures are biologically and socially advantageous and, at times, necessary for survival: "those species which best know how to combine, and to avoid competition, have the best chances of survival and of a further progressive development. They prosper, while the unsociable species decay" (1902, 44). Accordingly, Kropotkin's naturalistic observations developed into his theories of anarcho-communism, a variant of anarchism that rejects "unsociable" views of the individual and their liberty as necessary contraries to the collective and equality. American anarchist Hippolyte Havel offers the following illustration: "Just as the animal cells, by mutual co-operation, express their latent powers in formation of the complete organism, so does the individual, by co-operative effort with other individuals, attain his highest form of development" (Goldman 1910/2024, 16).

Murray Bookchin builds on Kropotkin's "mutualistic naturalism" (1996, 38) to develop a distinctly eco-anarchic ethics. Kropotkin's key insight—that mutualism is more common than competition—became the philosophical basis for the integration of the philosophy and science of ecology with libertarian social theory. Far from utopian speculation into an ecological

government of angels, social ecology's eco-anarchic position is firmly based in ecological observations the mutualism that binds the total diversity of life. He writes, "Recent data support the applicability of Peter Kropotkin's mutualistic naturalism not only to relationships between species but among complex cellular forms." Furthermore, biologist William Trager "ironically remarked... the 'fittest may be the one that most helps another to survive'" (ibid.).

Bookchin introduced Kropotkin's ecological insights to Marx's materialist spin on Hegel's dialectical method, calling his framework *dialectical naturalism* (Bookchin and McGowan 2022; Heller and Staudenmaier 2024). The dialectical naturalist method treats social and ecological evolution as interlinked throughout natural history, balancing the materialist critique of capital with a non-reductive view of the non-human world (Downes 2024, 3-7). In doing so, Bookchin aimed to move beyond the limits of orthodox Marxism and classical anarchism, both of which he found lacking a coherent philosophy of nature (Brincat and Gerber 2015). In his own words,

What is needed is to free this form of reason from both the quasi-mystical and the narrowly scientific worldviews that in the past have made it remote from the living world; to separate it from Hegel's empyrean, basically antinaturalistic dialectical idealism and the wooden, often scientific dialectical materialism of orthodox Marxists. Shorn of both its idealism and its materialism, dialectical reason may be rendered naturalistic and ecological and conceived as a naturalistic form of thinking (1996, 16).

In practical terms, Bookchin rejects both crude materialism and idealist nature-worship, stressing the interdependence of ecological and social systems. As contributors to *Harbinger* note, he sought to "'ecologize' dialectical materialism" by situating human freedom within an evolving natural history, "from the first organic cellular forms of life through the gradual emergence of a second nature, a human nature, and then on, potentially, to a third or free nature" (Heller and Staudenmaier 2024).

Dialectical naturalism extends Marx's dialectics to include the co-evolution of human and non-human life. Ecological and social changes, Bookchin argues, shape one another: we are neither outside nature nor merely bound to it. "Nature does not 'exist' for us to use, but it makes possible our uniqueness" (1996, 41). Similarly, eco-feminist Donna Haraway notes, "No species, not even our own arrogant one pretending to be good individuals in so-called modern Western scripts, acts alone; assemblages of organic species and of abiotic actors make history" (2015, 159). By situating human development within ecology, dialectical naturalism envisions the liberation of both humans and non-humans.

Unlike anarcho-primitivists who reject technology outright, Bookchin upheld its liberatory potential—provided it serves human needs and human freedom rather than productivism and subordination. This stance distinguishes social ecology from primitivist trends (e.g., Aaltola 2010; Sale 2017; Zerzan 1999) since technology may be applied toward the evolutionary realization of "mutualism, self-organization, freedom, and subjectivity," principles

that are “cohered by social ecology’s principles of unity in diversity, spontaneity, and nonhierarchical relationships” (Bookchin 1996, 41).

Practically, social ecology calls for “institutions free of hierarchy, domination, and egotism” (Bookchin 1982, 268). Bookchin’s libertarian municipalism proposes decentralized, directly democratic assemblies at the municipal and neighborhood scale—seen today in places like Rojava, Zapatista caracoles (Downes 2025, forthcoming), or the idealized New England town meeting (Downes 2024, 6)—to manage resources in face-to-face, human-scaled institutions free from coercive authorities or state interference (Biehl and Bookchin 1998). Instead of a romantic anti-capitalist aesthetic, he envisioned urbanization along the same lines as technological advancement, i.e., sprawling urbanization may be reoriented toward the project of creating networks of democratized cities and municipalities (Bookchin 1990; 2022).

Bookchin distinguishes urbanization—sprawling and self-destructive land use—from cities that are ecologically integrated and participatory. Capitalist urbanization produces enclosed commons, commodification, and subordination to State and corporate power; by contrast, cities imagined by Bookchin as a contemporary form of the medieval city-state support human-scaled democracy, mutual aid, and community stewardship. He aims to reclaim these urban spaces in the revolution towards direct democracy and ecological restoration (2022, 231-86).

A confederation of human-scaled municipalities can cultivate the degrowth economics central to Bookchin’s post-anarchism (1971). Formulated earlier in Kropotkin’s reflections on the Paris Commune in *The Conquest of Bread* (1892), Bookchin envisions localized and decentralized modes production that meets everyone’s basic needs—food, shelter, and more—removing the violent austerity logic of profit and forced scarcity (Cooper and Whyte 2017). This model reorients society toward mutual aid for progress in noneconomic markers, with freedom inseparable from meeting human needs.

Such a post-scarcity vision parallels mycelial processes—circular and regenerative. Resources circulate freely to ensure everyone’s basic needs, echoing Bookchin’s “irreducible minimum.” Rather than being driven by competition and accumulation, economic and social organization is rooted in the well-being the collectivity, wherein individuals’ access to essential resources is not contingent on coercion or conformity but instead guaranteed as an “inalienable right” of existence within the community (1982, 47). In other words, resources and freedom are shared rights rather than a market-driven privilege.

By organizing at the municipal or neighborhood level, eco-anarchist communities pursue direct democracy and post-scarcity economics. They dissolve hierarchical epistemologies of ownership and rule. Freed from productivist imperatives and State coercion, these communities prioritize needs and responsibilities over pecuniary emulation, consumption, and waste. In this manner, social ecology aligns with the critical Indigenous concept of *grounded normativity* (Coulthard 2014, 13-14; Coulthard and Simpson 2016, 254) For instance Michi Saagiig Nishnaabeg scholar Leanne Betasamosake Simpson argues that “the alternative to extractivism is deep reciprocity. It’s respect, it’s relationship, it’s responsibility, and it’s local” (2017, 75).

Eco-anarchism thus critiques not just capitalist but all productivist regimes that devastate ecosystems. From La Oroya to Navajo lands to Namibia’s uranium mines, where foreign firms prioritize extraction over local well-being and environmental quality (Agius et al. 2023). Regardless of political labels, these regimes reflect the same anti-ecological productivist illogic—converting communities and ecosystems into sites of sacrifice for perpetual economic growth.

An Eco-Anarchic Metaphor: The ‘Rhizome’

Gilles Deleuze and Félix Guattari of the post-structuralist and post-Marxist line of thought introduced the *rhizome* as a metaphor for imagining non-hierarchical forms of social organization and decentralized ways of knowing and being (1987, 1–25). Their critique of domination parallels Bookchin’s socioecological theories, but the rhizome’s abstract framework poses questions about its practical applicability to ecocatastrophes. Examining its strengths and limitations helps clarify how the mycelial metaphor extends—or departs from—Deleuze and Guattari’s ideas.

Deleuze and Guattari contrast rhizomatic organization with *arborescent* structures—hierarchical, tree-like systems sprouting from a single root “with centers of significance and subjectification, central automata like organized memories” (16). The metaphor is principally directed at advancing a nomadic post-structuralist critique against so-called official thought that attempts to monopolize claims to the truth, but arborescence also characterizes top-down institutions like nation-states or corporations that prioritize measurable outputs and conformism to fixed roles and pathways of authority over autonomy, individuality, mutual respect, and collegiality.

By contrast, a rhizome spreads laterally, dispensing with fixed origins in favor of a structure that subsists through heterogeneity, multiplicity, and decentralized relationships, “a dissolution of forms” (109) that enables adaptive interconnections between the diverse constituents of the rhizomatic network: “to be rhizomorphic is to produce stems and filaments that seem to be roots, or better yet connect with them by penetrating the trunk, but put them to strange new uses” (15).

Deleuze and Guattari outline the six key principles of the rhizome, which further elucidate its function as a model of redistributive and non-hierarchical forms of social organization (7-17).

Connectivity — Any point can link to any other, promoting free-flowing exchanges of resources, ideas, and power.

Heterogeneity — The rhizome accommodates diverse inputs—no single identity dominates such that multiplex combinations can interact without being forced into conformity.

Multiplicity — A rhizome is open-ended and constantly growing in multiple directions, creating new lines and connections without a central origin, uniform procedure, or linear and stratified path.

Assignifying Rupture — Breaking a rhizome does not destroy it; it regrows new paths.

Cartography — Rhizomes function like maps, not tracings: tracings reproduce ossified hierarchical structures, while maps enable experimentation and change.

Decalcomania — Each rhizome is unique and cannot be exactly replicated, emerging out of and adapting to local conditions instead of adhering to standardized templates.

The rhizome is invoked frequently in contemporary theories of critical ecology (Finzi 2024; Rocheleau 2015), emphasizing the possibility of decentralized and anti-hierarchical alternatives to social and ecological domination. It is also clearly evocative of anarchist themes—spontaneity, mutual aid, and collaboration—de-ossifying entrenched and stratified power structures.

Still, the rhizome’s abstract nature poses challenges in toxic, real-world landscapes. It outlines an ethical and aesthetic critique of human-non-human relations, but it offers few strategies for transforming or metabolizing ecological crises beyond the prescriptions of psychoanalysis. Here, the mycelial metaphor goes further: it demonstrates decomposition, renewal, and interspecies democracy—critical for a post-capitalist transition that is definitively ex-Anthropocene.

First Principles: Eco-Anarchism

Building on the naturalistic and philosophical roots of eco-anarchy, one can distill six core principles that define the libertarian socialist approach to radical ecology.

Mutual Aid as a Natural and Social Principle — Cooperation, not competition, underpins both nature and society. Mutual aid promotes survival across species and dissolves hierarchical epistemologies of ownership and rule.

Rejection of Hierarchy, Domination, and the State — All forms of domination and coercion—capitalist, statist, racial, patriarchal, ecological, or otherwise—must be replaced by autonomous, decentralized, egalitarian communities rooted in direct democracy and post-scarcity economies.

Unity in Diversity — Because diversity strengthens resilience, eco-anarchism values pluralism, multiplicity, and the imbrications of the social and ecological realms. This approach rejects uniformity and rigid roles and cultivates collaboration and participation.

The Irreducible Minimum — A community is a whole constituted of individuals who are equally complete: everyone deserves the material and social essentials for a dignified life—ensuring that no one is forced to live without basic needs or freedoms.

An Ecological Ethics — Eco-anarchism views human societies as fully embedded in ecological systems, affirming the uniqueness of humanity emphasizing at the same time as it respects non-human life. Rather than reducing nature to inert material and explaining its importance in economic terminology, it aims for a balance between human freedom and ecological responsibility.

Post-Scarcity Economics (Degrowth and Decentralization) — Eco-anarchism aspires to a society where advancements in technology and the evolution of modes of production end artificial scarcity. Degrowth reorients resources towards the satisfaction of human needs, guided by sharing and regeneration rather than accumulation-driven exploitation.

Eco-anarchism moves beyond critiquing the state-capital nexus and offers a constructive blueprint for ecological harmony and mutual aid. It champions unity in diversity, reciprocal care and responsibility, and freedom over exploitation or domination. The next challenge is extending these principles into genuinely interspecies forms of cooperation, forging regenerative projects that uphold cooperation, autonomy, and accountability to non-human life.

Indigenous Ecologies: Unsettling Radical Ecological Discourse

Indigenous philosophies of ecology invite radical ecologists to move beyond settler-radical critiques. These critical longstanding traditions often precede and challenge the boundaries of both eco-Marxism and eco-anarchism. Notably, even Deleuze and Guattari drew upon Apsáalooke and Hopi knowledge (1987, 113), reflecting the transformative potential of Indigenous insights.

Indigenous traditions emphasize reciprocal, interspecies relations that treat humans as one among many co-equal participants in a shared environment (Barker and Pickerill 2015; Wildcat and Voth 2023). Grounded in an “intimate relationship to place” (Coulthard and Simpson 2016, 254), these perspectives counter Eurocentric deep ecology’s occasional misanthropy (Garrard 2023, 33-36, 45; Levesque 2016) by promoting reverence for human and non-human life alike. Rather than viewing ecosystems as inert material backdrops, Indigenous epistemologies and ontologies are place-based—what Coulthard and Simpson term *grounded normativity* (2016, 254; Coulthard 2014, 13-14)—that demands ethical ecological and emancipatory or “resurgent” (Coulthard 2014, 18) engagement at local scales.

Potawatomi scientist Robin Wall Kimmerer illustrates how an interspecies conception of citizenship can guide ecological transformation. She envisions a “democracy of species, not a tyranny of one” (2013, 80) anchored in “gift economies,” where humans take only what they need and reciprocate in return (47). As an example of grounded normativity, Kimmerer’s ideas pose an epistemic challenge to capitalist notions of private property and extraction, illustrating a participatory web of interspecies care and responsibility.

From the viewpoint of a private property economy, the ‘gift’ is deemed to be ‘free’ because we obtain it free of charge, at no cost. But in the gift economy, gifts are not free. The essence of the gift is that it creates a set of relationships. The currency of a gift economy is, at its root, reciprocity. In Western thinking, private land is understood to be a ‘bundle of rights,’ whereas in a gift economy property has a ‘bundle of responsibilities’ attached.” (40)

Although Kimmerer shares anarchist critiques of property, she grounds her approach in Great Lakes thought, viewing the non-human as an active participant rather than a resource or second-class being. Drawing on both scientific training and “traditional ecological knowledge” (Whyte 2013), she articulates a radical conception of natural law on the basis of her intimate relationship to place, i.e., grounded normativity.

She writes, “If good citizens agree to uphold the laws of the nation, then I choose natural law, the law of reciprocity, of regeneration, of mutual flourishing” (2013, 212). These are “the dictates of the *real* government: the democracy of species, the laws of Mother Nature” (193). Later, she argues, “We continue to embrace economic systems that prescribe infinite growth on a finite planet, as if somehow the universe had repealed the laws of thermodynamics on our behalf. Perpetual growth is simply not compatible with natural law” (371).

A similar “bundle of responsibilities,” a form of interspecies mutual aid, resonates across Indigenous communities. For example, one may point out the “water protectors” and “land defenders” (The Red Nation 2021, 108) of the Great Plains Sioux who mobilized and placed their bodies at risk during the Dakota Access and Keystone oil pipeline protests (TallBear 2019; Valandra 2019). Movements for Native sovereignty and emancipation have also reshaped legal frameworks by recognizing non-human rights and environmental personhood. For instance, Māori legal scholar Jacinta Ruru helped secure the Whanganui River’s legal status as an ancestor, with its own personality, rights, and Native guardians (Morris and Ruru 2010; Kramm 2020; Ruru 2018).

Bolivia’s 2010 Law of the Rights of Mother Earth (Ley de Derechos de la Madre Tierra) informed by Quechua and Aymara principles grants nature legal standing to exist, regenerate, and maintain its diversity of life (Calzadilla and Kotzé 2018). Ecuador’s 2008 Constitution similarly enshrines the rights of Pachamama (Earth Mother), recognizing non-human agency and personhood (Gutman 2021; Humphreys 2017). These constitutional and statutory mark a fundamental challenge to the settler-colonial capitalist view of nature as mere property, embracing instead an ethic of ecological care. This codification of relational ethics marks a decisive shift from seeing nature as property to acknowledging it as a rights-bearing entity.

These ecocentric legal reforms, while still entangled with state power, reflect Indigenous epistemics that attest to an alternative human–non-human relations that integrates ecology and democracy. By challenging the anthropocentric binary, they gesture toward a radical ecological ethic and bolster Native environmental sovereignty. Yet their impact hinges on effective

enforcement—a perennial hurdle in state-based systems. Mycelial politics emerges here as both a complement and a critique: it insists that transformation must unfold within and beyond formal structures, decomposing anti-ecological institutions and envisioning post-capitalist alternatives where land and life coexist symbiotically.

Mycelial Politics: An Ecological Metaphor for the Present Moment

Building on radical ecology and non-Western insights from Indigenous critical theory, this section develops *mycelial politics* as a prefigurative, insurgent, and restorative framework for an ecological transition in a post-capitalist future. Inspired by anthropologist Anna Tsing’s *The Mushroom at the End of the World* (2015), which portrays the matsutake mushroom as a symbol of survival amid capitalist collapse, fungi emerge vital ecological agents—despite often being “(in Western thought) as either harbingers of disease or degradation” (Finzi 2024, 1). In reality, “mycorrhizal linkages,” on account of their faculty to decompose, constitute networks of renewal, “explosions of lines of flight” (Finzi 2024, 12), that unsettle rigid human-non-human hierarchies.

A closer look at fungal ecologies reveals what some call “mycological ontology”—an “ecologically mindful” way of perceiving and navigating the world (Tsing 2015, 5). While mycelial networks share the rhizome’s decentralized structure and “multidimensional multiplicity” (13), they go further by facilitating decomposition and renewal through an interspecies linkage. Tsing tracks how matsutake mushrooms, commodified as “objects of exchange,” still flourish in “fugitive commons” (2015, 121, 271) and hence offer “possibilities of coexistence within environmental disturbance” (4). In resisting enclosure, the matsutake embodies resilience and mutual adaptation, intimating alternative forms of community that thrive amid capitalist ruins.

In short, mycelium persists in the cracks of devastation, forging fugitive paths of survival within and outside capitalist enclosures. This reading sets the stage for a prefigurative and insurgent politics—one rooted in ecological renewal and operationalized through decentralized actions, interspecies mutualism, and collective adaptability. To deepen this metaphor, it is now appropriate to move from sociological critique to the science of mycology, exploring how fungal networks can reshape our understanding of political transformation.

Mycologist Paul Stamets calls mycelial networks the planet’s “neurological hardware” (2019, 154). They run underground, detoxifying habitats, nourish plant roots and rhizomes, communicating through the *lingua natura* of carbon to construct networks of interspecies symbiosis. By decomposing waste and sharing nutrients, mycorrhizal fungi form an infrastructure of resilience and regeneration. Stamets, for instance, describes how mycelial networks support the Mother Trees of forest communities.

A mycorrhizal fungus is a special type of organism that forms a symbiotic relationship with the tree. It wraps its fungal body around soil particles, extracting nutrients and water that it then brings to the roots of the tree. In return for this

precious nourishment, the tree obliges the fungus by providing it with the sugars that the fungus needs to survive... These mycorrhizal fungi form a network of threads that bond with the roots of other trees in the neighborhood and connect them all, no matter the species, like underground telephone wires (20).

Stamets notes that mycorrhizal fungi envelop soil particles to extract nutrients and water, delivering them to a tree's roots in exchange for sugars—a mutualism connecting entire forests “like underground telephone wires” (2019, 20). This goes beyond rhizomatic connectivity, constituting a form of decomposition, redistribution, and renewal that “holds all life together” (11).

Unlike Ebbin's stable lichen, mycelial networks actively mediate competition among diverse species, providing reciprocal nourishment in a natural mode of circular economy: “decaying all of the organic detritus on the forest floor, recycling dead material and beginning the renewal of life” (19). As Stamets puts it, fungi herald “a new story about the planet's ability to heal itself” (17). Extending these principles to human action, he envisions applies the example of mycorrhizal fungi to the image of “a grassroots network of local groups and individuals that share mycological information both with each other and within their respective communities” (175).

Two fungi—*Cladosporium sphaerospermum* and *Pestalotiopsis microspora*—highlight how mycelial principles function even in the planet's most extreme environments. Both can reclaim toxic or degraded sites and transform them into spaces capable of nurturing new life. This insight pushes eco-critics to imagine a *constructive decomposition*, i.e., the dissolution of anti-ecological institutions in ways that recycle their remnants into life-affirming systems, thereby advancing a post-capitalist future where human freedom and ecological integrity coexist.

Cladosporium sphaerospermum & Pestalotiopsis microspora

In the irradiated Chernobyl Exclusion Zone, *Cladosporium sphaerospermum* thrives where most organisms perish (Averesch, Skunk, and Kern 2022; Zhdanova et al. 2000). Uniquely, this melanized, radiotrophic fungus harnesses gamma radiation as a source of biochemical energy (Dadachova and Casadevall 2008). Studies show it not only survives but grows more robust under radiation (Tugay et al. 2006; Zhdanova et al. 2003; 2004), converting radioactive exposure into cellular fuel through melanin-based processes akin to photosynthesis. This radiosynthesis exemplifies life's capacity to adapt—even in the harshest conditions—and underscores the transformative potential of ecological resilience.

C. sphaerospermum offers more than a biological curiosity; it is a metaphor for human institutions in dire conditions. By “feeding” on what's harmful, societies can reorient resources to dismantle exploitative infrastructures and reassemble the components into regenerative alternatives. A mycelial politics takes these lessons to heart, guiding community-led land stewardship, circular gift economies, and decentralized urban planning that restores rather than depletes. Land becomes an active participant, woven into a relational process where humanity is

neither master nor bystander, but part of nature's adaptive web. A Mycelial politics would prefigure the dismantling of extractive productivist political economies, reorienting resources towards the bioremediation of toxic sites, and reimagining urban planning and land use through decentralized, restorative models that mimic the communicative and regenerative activity of mycelial networks (Tibolla and Fischer 2025).

Meanwhile, *Pestalotiopsis microspora*, discovered in the Amazon, takes on synthetic plastic by metabolizing polyurethane—one of the most widespread and polluting materials (Russell et al. 2011). Its capacity to break down plastic in both aerobic and anaerobic conditions make it a potent ally for bioremediation, particularly given plastic's notorious resistance to decomposition (Egger, Sulu-Gambari, and Lebreton 2020; Lebreton et al. 2018). This fungus thus embodies circularity and restoration, transforming toxic, productivist waste into life-affirming possibilities. Together, *C. sphaerospermum* and *P. microspora* underscore fungi's spontaneous, decentralized drive for restorative praxis—a guiding imaginary for post-capitalist ecologies. As the Red Nation asserts, “human restoration depends upon the health of the land” (126). Restoring land must therefore be an integral component of any liberatory socialist project.

P. microspora suggests how communities might adopt fungal decomposition strategies in localized waste management. Rather than funneling trash into landfills or incinerators, municipalities can deploy fungal bioreactors (or composting innovations) that break down plastics on-site, channeling nutrients back into the environment. This resonates with a degrowth ethos: meeting human needs without capitulating to large-scale, extractive economies. Such autonomous remediation projects, whether off-grid communes or municipal composting programs, reduce reliance on corporate or state-managed disposal and underscore the mycelial principle of transforming waste into renewed life. In this manner, mycelium accords with the Red Nation's Indigenous socialist charge “to work with, take care of, restore, and heal the land” (29)

Mycelial Principles

By actively decomposing, detoxifying, and regenerating extreme habitats through interspecies linkages, mycelial networks evoke the principles and demonstrate the praxes for transforming ecocidal sites of sacrifice into sites of renewal. This offers a potent metaphor for reshaping sociopolitical institutions amid the Anthropocene's ecocatastrophes. Now, one may distill the core principles of *mycelial politics*—highlighting decomposition, circularity, interspecies mutual aid, and fugitive resilience—as guiding lights for post-capitalist transformation.

Mycelial politics draws on eco-Marxist, eco-anarchist, and Indigenous insights, departing from Deleuze and Guattari's rhizome by considering the praxical implications of critical ecological theory for the most extreme anthropogenic conditions. Unlike rhizomes, mycelial networks metabolize decay and transfigure inhospitable wastelands into diverse ecologies. These biological processes inform a post-capitalist transition towards an ex-Anthropocene future.

Deleuze and Guattari set out six rhizomatic principles; here, mycelial politics crystallizes into five. Each integrates radical ecology and Indigenous perspectives, mapping a grounded path

to post-capitalist futures. Mycelial principles are connected to their corresponding mycelial praxes, i.e., practical steps towards ecological renewal.

1) *Constructive Decomposition*: Mycelial networks break down dead or toxic matter—be it organic detritus or plastic. Their power lies in transforming harmful waste into fertile material, an insurgent form of place-based fugitivity, paralleling the call for radical ecology to dismantle exploitative systems and repurpose their remnants. In short, resisting productivist structures means more than toppling them; it requires rebuilding regenerative alternatives on the very rubble of the old.

2) *Interspecies Mutual Aid* and 3) *Circularity*: In mycelial webs, fungi cooperate with plants, bacteria, and other species to share nutrients across a non-hierarchical ecosystem. This echoes Indigenous gift economies, where resources flow to support the whole rather than enrich a few. Likewise, circularity replaces linear “take-make-waste” models with recycling and reuse, constructing an interspecies democracy around the shared responsibilities of an ecological community.

4) *Decentralized and Communicative Networks*: Fungal webs form horizontal networks without a single control center, mirroring the best of rhizomatic thought. Yet mycelium goes further: it connects species, exchanges biochemical signals, and simultaneously decomposes and replenishes. This constructive interaction underscores a decentralized model that heals as it links—offering a blueprint for non-hierarchical governance constructed out of adaptable and transformative networks.

5) *Place-based Fugitivity*: From *C. sphaerospermum* enduring radiation to *P. microspora* devouring plastics, fungi display resilience through a place-based fugitivity—they escape toxic enclosures by turning their decaying surroundings into resources. In contrast to extractive systems, mycelial networks regenerate ruins into habitats. For radical ecology, this means reclaiming spaces amid capitalist collapse, not out of an appeal to romanticism, but as a strategic path to build symbiotic alternatives here and now.

Mycelial Praxes

1) *Bioremediation (Constructive Decomposition)* — Mirroring *C. sphaerospermum* and *P. microspora*, communities can reclaim brownfields, abandoned sites, and polluted waterways through grassroots remediation. Local ‘cleanup brigades’ might use fungal inoculants (or bacterial consortia) to break down toxins on-site, while regional coalitions exchange skills and resources, linking like mycelial strands. By confederating place-based initiatives into bioregional efforts, communities can expand capacities to metabolize socioenvironmental damage and foster collective resilience.

2) *Interspecies Mutual Aid* — Just as fungi share nutrients with countless organisms, communities can construct themselves around interspecies obligations. At the

neighborhood level, this might mean pollinator-friendly gardens or water-protector initiatives that safeguard watersheds. Following Indigenous models of reciprocity, larger multi-assembly alliances would treat non-human life not as extractable resource but as co-participants in the shared environment.

3) *Circularity*: Replacing the linear take-make-waste model with fungal-like circular loops means repurposing materials continuously. Community composting, repair cafés, or seed-sharing programs thrive at local scales, while regional coalitions can coordinate waste-exchange networks or pursue zero-waste goals. The success of decentralized, place-based efforts underscores that circularity flourishes without rigid top-down mandates.

4) *Decentralized and Communicative Networks*: Mycelial webs interconnect species without central oversight. Likewise, directly democratic assemblies—from neighborhood councils to bioregional confederations—can manage resources horizontally. Smaller face-to-face gatherings address local needs (e.g., water distribution, communal gardens), while larger federations tackle broader challenges like flood control or disaster relief. By mirroring the mycelial ethos, these assemblies counter doubts about direct democracy's responsiveness and scalability.

5) *Place-based Fugitivity*: Fungi flourish in radiation or plastic-laden zones, showing that life can persist—and even thrive—in the cracks of failing capitalist structures. Embracing place-based fugitivity means communities reclaim abandoned lots, experiment with off-grid infrastructures, and nurture multi-species sanctuaries instead of awaiting top-down fixes. This fugitive ethic goes beyond mere survival, actively transforming ruins into habitats for renewal.

Taken together, these five mycelial principles and praxes ground environmental movements in everyday transformations that can scale organically through decentralized solidarity. From constructive decomposition to place-based fugitivity, each aims to remediate devastation, regenerate common life, and rejects productivist logics in favor of circular, post-scarcity futures. Mycelial politics can reorient our human–non-human relationships to think globally but act locally for liberation, reciprocity, and communal flourishing against intensifying planetary ecocatastrophe.

Conclusion: A Mycelial Imaginary for the Post-Capitalist Transition

In this paper, I have argued that mycelial politics offers more than a provocative metaphor; it provides a model for transforming socioecological relations in the Anthropocene. Rather than stopping at crisis diagnosis, it emphasizes decomposition, renewal, and active reciprocity across human and non-human communities, showing how degrowth, mutual aid, and horizontal governance can reorient our political imagination.

Mycelial politics reconceives social and ecological relations altogether. It goes beyond rhizomatic connectivity by emphasizing decomposition—breaking down toxic remnants of productivist excess to make room for new life. Mycelial networks show that Anthropocene survival demands metabolizing decay into renewal, forging mutualism across species, and dismantling harmful institutions. Rather than simply resisting ecological catastrophe, the mycelial imaginary cultivates regenerative forms of being and organizing, rejecting exploitation in favor of reciprocity.

The mycelial metaphor has practical, real-world implications. The bioremediation feats of *Cladosporium sphaerospermum*, *Pestalotiopsis microspora*, and other fungi demonstrate how decentralized networks can transform even the most toxic sites into spaces for life. Their resilience under nuclear radiation and plastic pollution highlights our need for human institutions that can also metabolize catastrophe into opportunity—not through top-down dictates, but via place-based, cooperative, and restorative praxes with the capacity to communicate at varying scales across shared geographies. Mycelial politics is thus a prefigurative imaginary for liberatory socioecological change, from mutual aid and land defense to grassroots ecological restoration and the bottom-up dismantling of anti-ecological regimes.

This ecological imaginary also underscores the need to expand radical thought beyond Euro-settler frameworks. Indigenous ecological knowledge elucidates how human and non-human need not be separated but engaged as interdependent participants in a democracy of species. In conversation with these traditions, the mycelial metaphor reorients politics toward a multispecies perspective, treating land, water, and non-human life not as resources but as sovereign entities with their own rights and roles in shaping our collective future.

Mycelial politics is both deconstructive and generative: it demands dismantling capitalist logics of accumulation and ecological harm, while nourishing alternative economies rooted in post-scarcity, redistribution, and flourishing. It offers no single blueprint, but rather a plurality of locally adapted strategies. Far from a fixed formula, this is an emergent politics—a living process of collective experimentation, adaptation, and renewal.

Mycelial networks are thus more than metaphor—they are a survival guide and call to action. They show that collapse need not be an ending but a transformation, revealing how life reorganizes and flourishes in devastated spaces. An ex-Anthropocene future cannot arise through the same institutions that cause ecocatastrophe; it emerges from decentralized, regenerative, and insurgent approaches inspired by the non-human world. In this sense, mycelial politics is not a detached theory, but an invitation to collectively imagine, create, and inhabit futures grounded in the radical promise of the natural world.

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