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Exploring Complexities of Political Ecology in the Research and Practice of Environmental Education

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Abstract

This paper explores educational fallout from the realisation that the world system has planetary boundaries as limits that are real and that require different thinking and governance concerning how human beings ought to inhabit the planet. It will be difficult to have billions of people think about global concerns when they are focused on their own well-being. And so it comes to governance, locally, with bigger things in mind. Environmental education rhetoric has already begun to expand thinking to engage world systems as groundings for the politics that underpins decision-making above and beyond levels of theory/praxis. The educational challenge will be to lay out background theory and guidelines as we find ways to engage politically the problems amidst the power and control of the people that we elect as "leaders" at each level of educational and political systems. However, the challenge has been taken up and environmental education has created openings for exploring complexities of political ecology within environmental education.

Introduction

Considering discussions of what environmental education can or should or could do to transform and re-prioritise curriculum, it has become apparent over many years that educational provision must engage with the political ecology of socio-economic transformation as a genuine legitimation crisis of democracy. It is necessary because there is a "glass ceiling" of socio-economic transformation within the larger, more encompassing legitimation crisis of democracy. Arguably, the political prospects of socio-ecological or sustainability transformations have been subsumed by priorities, given to economic growth at the expense of environmental, climate-related and social justice commitments. So, what kind of governance and what kind of education could anticipate the challenges ahead? While state governance continues to be an irreducible element of responsible environmental (transformative) politics the educational transfer remains to be developed. The fact that human futures would have to reverse the steady expansion of assaults on "nature" makes sustainability transition inevitable for long-term survival. While seemingly impossible within historical dynamics, there is no doubt that educational change will require new modes of thinking environmental politics to lay the foundation for transition towards educational praxis for planetary health.

By 2050 world population will approach 10 billion and is projected to accelerate and to underpin many human problems including resource distribution issues and food insecurity, biodiversity loss, pandemics and social ills. As well, internal and international conflicts in relation

to, for example, fossil fuel competition and questions of "development," and agricultural demands rob from future generations, that is, if climate, pollution, protection of nature and food demands are not overriden by climate change. The common denominator is political impotence when things exceed reasonable "limits" such as carrying capacity and increasing conflict in a more crowded world. As Bradshaw et al. (2021) surmise, as population approaches global environmental carrying capacity, growth becomes an issue, rather than as a universal mode of self preservation and planetary protection that ought to transcend political tribalism. Perhaps it is time to listen to the experts, whether we like it or not?

Hausknost and Hammond (2020), for example, explore how democratic states have variously responded to environmental challenges of rapid growth and industrialisation through investments in environmental management and educational research, public participation and certain national goals. They lay out speculative arguments and strategic questions concerning how "state" structures could accommodate a sustainability imperative, given its role as a foundation of representative government. Hausknost and Hammond surmise that environmental politics, as a venue for critical discussion, might be a reasonable place to engage transformational options within democracies. These growing conceptual arenas for scholarly publication are signs of the evolution of thinking in environmental politics.

Such serious engagement, as more directly political, has challenged our general awareness of power and politics in the construction of a critical and political attitude amongst an increasing range of political actions conditioned by power relationships. And a proliferation of journal content illustrates the increasingly variable ways of thinking about politics and the political beyond the well known traditional or formal critical and political processes. We might say that becoming critical, as well as becoming political, has the potential to bring the unfamiliar and the hidden power relations into clearer focus as political acts. It is the politics of power beyond the formal acts of government that are becoming more transparent and as such have the potential for change with environment in mind and for exposing power relations in society.

If we can imagine an evolution of thinking within the current field of environmental education, having evolved through notions of conservation education, nature study, outdoor and eco-environmental education and more recently, expanding within education for sustainable development, what emerges is an increasingly visible politics implicated within an evolving Anthropocene. Engaging seriously in such thinking, educational scholars and practitioners face new challenges concerning the substance of environmental education within general educational provision. And while the literature has become increasingly complex and more obviously political, it now seems incumbent on educators to explore potential groundings for inevitable debates concerning how to justify young people's engagement in educational experiences that incorporate political perspectives.

Now imagine that even within recent developments concerning planetary boundaries, a number of background ideas have been proposed as stimuli for rethinking education for the environment as political. For example, the concept "planetary limits" implicates new groundings that engage concepts such as sustainable futures, climate change, population growth, green growth and degrowth that transcend particular (perhaps local) contexts, as questions that are fundamentally political (Gabrielson et al., 2016). Arias-Maldonado and Trachtenberg (2019) suggest that complex, contested concepts such as these cannot be understood in the absence of normative content, which is often subject to debate. This assumes some understanding of political inquiry which assumes some understanding of political theory. Thus, inquiries must engage contested concepts across levels as well as political differences. For example, words such as "environment" or "nature" implicate deeper meanings as they become the subject/object of complex networks of relations such as planetary boundaries or global environmental governance.

Environmental political theory works from the central notion of socio-natural relations conceived as the object of society's politics and the researcher's critical judgments regarding, for example, socio-natural relations and commitments. As Arias-Maldonado and Trachtenberg (2019) indicate, it is then a small step for the field of environmental politics and for environmental

educators to take up the notion that the planet is transitioning in different ways, in different places. For example, the Dandora garbage dump[1] (Nairobi, Kenya) where people live and make a living for their entire lives offers critical Anthropocentric reflections on evolving real-world socio-natural relations.

Historical realities: Back to the future

Despite decades of international environmental assessment reports that range from self-limitation to planetary boundaries, there remains a profound societal crisis of political governance (Orr, 2020). Fifty years after the Stockholm Conference on the Human Environment, that environmental policy paradigm, based in Anthropocene politics, is no longer defensible (Death, 2014). The time has come for environmental education research to engage, more seriously, within political dimensions. We all know this; visible human impacts and population growth are changing Anthropocentric global systems. Politics, policy and political philosophy have become crucial grounds for the core of environmental and sustainability education. And, following Orr (2023), fundamental political challenges implicate governance and the need to expand our educational reach to professional fields such as engineering, business, law, economics and the geopolitics of ecological scarcity. In many cases we have abrogated our educational responsibility to address the hard realities of the rapidly accelerating environmental crisis. This is part of a massive failure of institutions and governments to take responsibility and to confront environmental challenges. Preservation of an habitable earth directly implicates improved democracies, including systemic educational provision (Orr, 2023). It is therefore not a big leap to also take up the notion that life on the planet must soon transition to a different state within and beyond the Anthropocene (Arias-Maldonado & Trachtenberg, 2019) that respects planetary boundaries.

Where do we go from here?

In 2015, Teresa Lloro-Bidart developed a political ecology framework for education by searching for a conceptual lens capable of examining how to reconceptualise human-nature relationships within contexts that included complex political factors. The paper speculated on the usefulness of such a conceptual lens in understanding how traditional educational theories might obscure complex relationships. A new political ecology of education might address this issue in a variety of ways as community-based, participatory as based on new notions of an actionable worldview only too aware of such complexities as, for example, post-carbon social theory, and Indigenous modes of thought within ecofeminist and posthumanist perspectives. Lloro-Bidart (2015) identified such problems within the current school science curriculum "framework" beyond technocentric and managerialist curriculum framings. As a way forward it was suggested that background in ecofeminist and posthumanist literature had the potential to challenge current practice, human exceptionism and current educational provision with "explorations" of nature-culture divides, and the dynamics of local-global articulations as more advanced political ecology of education.

In 2017, Meek and Lloro-Bidart extended their challenge by engaging readers in political ecology that explores relationships between environmental change and political, economic and social processes that must be addressed within a framing of a political ecology of education. Their intention was to explore new perspectives on ontological implications of Anthropocene debates that appear to function as and through technologies of power (Schultz, 2017). Common to these perspectives is the realisation that a fundamental shift in the Earth system (i.e., the Anthropocene concept) requires a fundamental shift in our understanding of the human condition as it intersects with society, technology and nature. In essence this is a political commitment to engage power relations rooted within the hegemonic rationality of modernity.

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[1]https://www.blind-magazine.com/stories/the-waste-pickers-of-dandora/

Such circumstances also serve to question how environmental education at various levels could engage the ethics of global politics more visibly as complexities and responsibilities of mutual reciprocal connections across viewpoints. This becomes the locus of political agency and responsibility for engaging critically with Anthropocene conditions as they evolve, intensify, accelerate and become global. It exemplifies how education could work within new concepts, formations and processes such as neoliberal capitalism, the objectification of others, things, nature and international human relations. So the question becomes, how can education, at various levels find ways to engage the political within texts such as Haraway's *Staying with the Trouble*, Jagodzinski's *Interrogating the* Anthropocene, Moore's (2016) Anthropocene or Capitalocence, Stengers' (2010) cosmopolitics, and Tulloch and Neilson's (2014) focus on the neoliberalisation of sustainability?

The Education for Sustainable Development literature portrays an integral part of this evolution of the political as promoted through, for example, the Rio process (Berryman & Sauvé, 2013) and subsequent international proclamations which "refined" the sustainability concept in ways consistent with the neoliberal agenda and the globalisation of market capitalism. Following the 1960s, a period of relative economic and social stability and steady growth evolved amongst developed capitalist economies, new industrialism and uncritical consumerism, without much attention to ecosystem deconstruction. By the 1970s, Green movements had emerged in response to Fordist capitalism whilst select scientists (e.g., Carson, Hardin, Ehrlich) and grassroots movements generated public concern about industrial and economic development and population growth (e.g., *The Population Bomb*, Ehrlich, 1968). The Club of Rome sponsored the study of *Limits to Growth* (Meadows, Randers & Behrens 1972) which, along with Hardin's lifeboat ethics, *The Tragedy of the Commons*, focused on the dominant ideology of "growth." Most interesting, arguably, was the deep ecologist critical focus on capitalism (e.g., Bookchin's social ecology and early rejection of capitalism) which has foreshadowed the current story.

In hindsight, Tulloch and Neilson (2014) surmised that a diversity of positions concerning sustainability discourse during the 1960s–1970s were based on an underlying consensus that industrial (economic) growth directly conflicted with ecological sustainability. And although there were various perspectives on anti-growth discourse, these discourses of the 1960s–1970s gradually dissipated in subsequent decades within the rising tide of neoliberalism where global expansion, economic (industrial) growth, and corporatisation superseded sustainability discourses on several fronts of depolitication including the Rio process, and subsequent conferences culminating in the World Summit (Rio + 10) and the UN Summit on Sustainable Development (Rio + 20) in 2012.

Environmental educators have participated in various ways in these background conferences and as close observers of the potential of this process for educational sanction of environmental education. Sustainable development processes, presented as a main thrust of international interactions among academia, politicians and business, were arguably betrayed by the strategic positioning of economic development as the critical issue. In the end sustainable development only implicitly and indirectly acknowledged ecological sustainability. The processes underlying the increasingly modified conceptualisations of sustainable development served to depoliticise sustainability such that the Rio Declaration in 1992 and Agenda 21 created a chain of reconciliation of ecological issues with economic growth as the heart of the strategy. The action plan privileged industrial growth which was strategically positioned as being "in sync" with the "deep green" movement: the environment was something that could be managed. This Capitalocentric vision of sustainable development inflicts the social and environmental agenda with the ongoing neoliberal Agenda 21 where market expansion is crucial for a dynamic yet stable global economy. Jessop (2012) calls this focus on a green economy a solution to environmental destruction and social poverty — a Green New Deal.

Political ecologists and a wide range of thinkers, and more recently world system thinkers, implicate neoliberal capitalism within the process of planetary destruction. They direct sustainability discourse toward modes of economic regulation beyond neoliberal capitalism

and toward stable maintenance of the natural ecology. This tendency subsumes economic and ecological dimensions beyond extant sustainability discourse and within a new literature concerning "planetary limits" as viable, ecologically sustainable projections of living within sustainable planetary boundaries. This move anticipates much debate concerning such alternative development models within redesigned industrial paradigms, alternative technologies and innovative regulation which could be summarised as reconfigurations of political ecology discourse.

Implications for a political ecology of environmental education

Within contexts of teacher education futures in times of politically driven ecological challenges such as climate change and social injustice, social and educational research are evolving. Transgressive post-qualitative inquiry has created openings for critical discussion of educational research structures and systems "in transition" in ways that challenge Anthropocene discourses and dominant forms of educational and social research. Amongst these discourses is the need for transgression of educational protocols for environmental education within teacher education. The notion of transgression inspired by Temper et al. (2019) and by Lotz-Sisitka et al. (2016) was intended to create openings for transformative critical thinking concerning environmental education futures within teacher education. Challenges for those aspects of environmental education research in teacher education Implicate structures of privilege and hegemonies of power that contribute to systemic dysfunction and inhibit movement toward social/environmental justice.

This new focus is intended to engage aspects of political ecology that explore transgressive pathways that move beyond extant integrative problems as challenges for environmental education research. What is needed, as inquiry with transformative potential, is inquiry that addresses political ecological concerns of concepts such as limits, climates of capital and issues of growth, grounded within a variety of new imaginaries such as integral ecologies and planetary boundaries. Such pathways are necessarily implicated in earth systems, governance and crucial issues of power and politics concerning liveable futures and planetary boundaries beyond the Anthropocene. Given concepts such as planetary boundaries, it becomes incumbent on educators to engage new background theory and philosophy as groundings for problems requiring methodological solutions. As Winter and Schlosberg (2023) surmise, what matters within planet-wide unravellings, is focus on ethical, moral and political obligations embedded within foundational ontologies driving environmental change. Required is critical engagement with the subject of planetary justice as inclusive, plural and sustainable.

Engaging the debates

The road to change and adaptation is never smooth. Critics have their ideas which make authors think again and to consider legitimate concerns from different starting points. As Harris and Santos (2023) speculate, one of political ecology's main strengths is openness to experimental and speculative political ecologies directly within larger research agendas. They view speculating (i.e., problematising) as a tool for creating conditions for a "future that is now," always in motion and always political. Political ecology engages critique in several ways, but most interestingly as speculative inquiry tuned, for example, to pre-empting fallout from capitalist development. Harris and Santos (2023) provide insights from scholars such as Gibson-Graham (2008) and Tsing (2016) who inadvertently have long been engaging the politics of speculation using notions of prefigurative politics to create possibilities for life after capitalism that focus on politics as a matter of analysis not to be avoided.

Many creative examples obtain from speculative and experimental approaches to the degree that engagement with realities of complex problems may provide background for educational

experimentation as insightful and critical of the absence of political, ecological and economic dimensions of everyday educational possibility where ecological experiment is simultaneously a political experiment. By enacting such political experimentation, they are fashioning, epistemologically and materially, ways of thinking and acting, in relation to what publics are and how they emerge, and opening new questions about politics and power relations that engage young people, and potentially future adults, in experimenting (participating) with political ecology.

However, critique of political ecology has emerged which implicates ontology and the nature of reality. Important elements of this scholarship include concerns in relation to nonhuman agency, dismantling binaries and respect for the onto-epistemic worlds of Indigenous peoples. According to Blaser (2013), political critique is becoming an increasingly visible part of political ecology. Drawing from Latour, de Castro, Descola and Mol, with the central premise that different peoples may view and enact a single world differently, political ontology has been revitalised by certain debates and contestations such that research studies have broadened attitudes within environmental education concerning ways that different actors view and shape their worlds ontologically (Blaser, 2013).

Political ecology has, in this sense, re-engaged debates that question how different cultures, societies and actors view and shape the world ontologically. In re-opening specific topics such as conservation as hegemonic discourse, critical scholars have identified conflicting views on how neoliberal conservative interpretations confuse environmentalist thinking by making difficult such transformations of many environmental concerns in relation to political rhetoric. Such rhetoric, ranging from capitalism to green growth and degrowth theory seems to have been obfuscated by false hopes, projected to actually operate to impact systems change. Thus, environmental education, within such discourses in transition, must admit impediments within theory and practice.

A similar occurrence plagued Wallerstein's development of critical world theory in the 1970s and 1980s. In 2021, John Agnew (2021) argued that one of the "major innovations" in what he called the "modern world system" was the idea of a progressively global capitalist world economy, attributed to Immanual Wallerstein. According to Agnew and others (e.g., Collins, 2023; Moghadam, 2023; Rusca et al., 2023), it was William Robinson who presented a critical appraisal of Wallerstein's sociology, followed by Medved (2018) who attempted a combined argument beyond Wallerstein.

Initially this model had global reach and proved attractive as it was inspired by the need to account for the empirical realities of an uneven and unequal world. The Wallerstein framework, as a changing world systems framework was, and arguably continues to be, the subject of critique within critical human geography, as a backdrop for studies of agricultural decision-making within a changing world economy with an increasingly critical view of the political (i.e., for a world-system analysis within Anglo-American political geography). However, Wallerstein forced a serious rethinking of European and North American social science over several decades (prior to 2010) with certain parts of the frame, and perhaps not as much the overall framework, providing a reflection of how the world has changed within the last half-century.

Beginning from the 1970s, what Wallerstein (2011) called the modern world system (i.e., a progressively capitalist world economy) proceeded to deconstruct thinking of the orthodox social sciences as "world system analysis" to keep pace with a progressively global capitalist world economy. Initially the model proved attractive to geographers as a kind of radical approach with global aspirations. It provided a framework for deconstructing orthodoxy within the social sciences, a kind of geographisation of social theory that had influence in human geography. While this theory may have relevance as redeveloped within geography education, it was primarily a geographical-structural account of how capitalism developed within many European countries including Britain and France. Interestingly, his descriptive approach evolved into discussions of what it would take to undermine capitalist world economy to the benefit of an overwhelming majority of the world's population — as Wallerstein's "modern world system."

The very empirical ambition and theoretical eclecticism, however, led inevitably to criticisms across a variety of issues ranging among its down-playing of history, its ambiguity concerning geographical influence and local history, its focus on capitalist rationality and capitalist economic positions across world differences. This was the era of the post-1970s, within the increasingly transnational character of global production/geographical zoning with different labour processes, where power is viewed as domination rather than attuned to cultural difference. However universal theories simply don't work even amidst Eurocentric ideas of how the world works. Of course, there can be no clearly worked out political agenda for a future non-capitalist world system, whether Wallerstein was able to conceive a non-capitalist world system or not.

Perhaps it is the case that "grand theories" suffer from conceptual overreach. In his time, Wallerstein forced a serious rethinking of European and North American social science. The focus was global and critical in challenging taken-for-granted thought and anti-systemic politics and provided impetus for thinking globally within world system framing. However, such grand theories often suffer from conceptual overreach and operational limits, within Agnew (2021) referred to as a "rotten party-political system" and hollowed out federal government, almost universally corrupted by corporate lobbying and the ideological dominance of small government conservatives and anti-federalists (Gardels, 2020; King, 2020). Subsequently the task for environmental education within such political framings is to expose such political-economics, locally and globally. For, as Bradshaw et al. (2021) contend, in problematising political and world systems, the common denominator is, in fact, political impotence where carrying capacities and matters of continuous growth exceed reasonable limits.

It could be argued that, with the introduction of critical environmental politics, research in environmental education has become part of a broader transpositional process (Braidotti, 2006). This transition has proceeded on a somewhat broken front as witnessed by increasingly critical and diverse publication practices within journals such as *Political Ecology, Environmental Politics, Environmental Values, Millennium,* and *New Formations.* This process was deemed necessary in changing times through, for example, reconceptualisation of Anthropocene propositions. What has become clear is that the human factor has expanded as a geological force. In respect of environmental education, such reckonings have dispelled prevalent myths of technoscientific optimism and linear economic progress as matters of politics. And although current sustainability discourses illustrate a variety of perspectives on changes required in society (and therefore in education) to secure and ensure longer-term planetary well-being, agreements on how to proceed have become increasingly political.

What is equally concerning in recent debates beyond sustainability education is the separation between conceptualisations of science in relation to the political (Dalby, 2016). Critical interdisciplinary engagements are needed concerning differences among core social concepts such as agency, power, assemblage thinking or social cartography in characterising collective human actions as geological force. Although it is encouraging that wide-ranging debates are intensifying across disciplines from natural science to environmental and social sciences, there is concern about how (environmental) education should address issues of politics of human condition with longer-term planetary conditions or boundaries in mind. Because these debates increasingly implicate complexities of contested political ecologies, such reckonings call for a fundamental rethinking of the nature and goals of the future of environmental education research and praxis amidst the agency of political and economic structures that underpin them. Such reckoning has created conditions that compel environmental educators to engage more seriously in discussions that appropriately implicate environmental politics.

Amidst these "stirrings" within environmental and educational research, journals have increasingly created special issues for articles that offer provocations related to their engagements with political inquiry. Such provocations focus on unpacking of global issues such as boundary politics, as implicated within new thinking on issues such as population, planetary boundaries and the growth debates. Another provocation implicates the place of critical feminist perspectives

within educational discussions and to clarify how political inquiry is engaged in terms of ethical and political difference. Because there are pressing political imperatives to explore power, politics and ethics through engagement with new theory, healthy scepticism of those studies warrants important political and ethical considerations. This refocus engages ethical and political responsibilities of the bigger (global) picture to think "possible worlds" in terms of complexity, ecologism and posthuman politics beyond Anthropocentrism (e.g., Cudworth & Hobden, 2013).

As it happens, the literature on the biopolitical turn in educational theory has expanded. For example, a recent issue of *Educational Philosophy and Theory* included discussion of the biopolitical turn in educational theory in relation to Hardt and Negri's theorisation of "Empire" and the possibility of a radical political project in educational theory against capitalism, a project that has generated much discussion amongst education theorists and practitioners (Bourassa & Slater, 2020).

One could speculate that such activity creates educational openings for active engagement in political ecology. For example, Sean Phelan (2021) goes directly to Oliver Marchart's (2018) "Thinking Antagonism" to explore the nature of political thought and to reframe social activity as inescapably political. In this case, the concept "political" signifies recognition of the inherently antagonistic and conflictual nature of social life grounded, often unconsciously, within familiar and long-standing presuppositions about educational responsibilities. Phelan (2021) sees thought itself as inherently political as conceived within the micropolitics of social discourses and actions. The distinction is between "political" (thinking, often individualist) and "politics" (action, often of a collective nature), implies that such thinking should be voiced and practiced collectively with a strategic view to achieve what might be called broader hegemonic formations, traversed by larger and more strident lines of (public) conflict (of ideas and actions). Laclau and Mouffe's (2001) work, amongst others, is characteristic of this recognition of the complexities of mutual entanglements of thought within politics.

Increasing numbers of Anthropocene stories have become icons for tragic operating spaces for humanity and signals of environmental issues in need of fundamental, large-scale change. Post-Anthropocene politics is intended as operating space for reconsidering what constitutes socially and environmentally just living conditions and for politically based changes of type and scale approached within increasingly compromised local political contexts. Many complex intertwined issues continue to reflect social fragmentation as political crises that are rapidly increasing in size and scale and contribute to stress on earth/ecological systems.

Recent debates about moving beyond Anthropocene thinking have generated increasing interest in how education might work to seriously engage young people as situated within living environmentally as part of their material existence. The question becomes how might exploring such complexities of political focus, that range across dynamics of environmental education, engage teachers and students at levels that discuss, for example, ontological implications of the Anthropocene? Such conversations/critical essays and research explorations have expanded beyond finding age-appropriate ways of introducing, for example, new materialist ideas/concepts to rethink onto-epistemic being versus epistemological knowing in relation to dimensions of human/nature. Given these inevitabilities, it remains a task for environmental education/environmental education research to critically engage in educational inquiries capable of exploring not only ecological or applied science concerns about dimensions of human/environment relations, but also in generating critical discourse and critical inquiry. The goal of post-Anthropocene thinking thus implicates politics of the planet, from geological/ecological negotiation to cultural transformation. Arguably, environmental education is well positioned to bridge the science-environment-education gap through new ways of knowing and being within a politics of transformative adaptation (see Schulz & Siriwardane, 2015; Steffen et al. 2015).

Speculative ethics: Educational challenges

There is a growing concern in the field of environmental education about the need to move beyond the conceptual limitations and apolitical tendencies of the science of ecology. Apolitical and unsustainable patterns of thinking that seemingly implicate business as usual in environmental education and environmental education research can be characterised as humanist politics engaged at the level of earth ethics. The intellectual project of challenging human-centered ways of thinking (as posthumanism advocates) is to think more profoundly about humanity's responsibilities within the context of a wider set of relations with the rest of the natural world. Posthumanism's new materialisms encourage inquiries that engage new empirics and environmental ethics as individual and institutional concerns (beyond immediate, local concerns) of the embedded character of phenomena. However, the local-global dilemma also implicates philosophy of the embedded (i.e., political) nature of phenomena with the additional caveat that, ultimately our concerns should be at a planetary level (Cudworth & Hobden, 2015). Such a focus acknowledges that there remain many things beyond our comprehension that warrant serious attention, their political dimension being one.

Are different framings possible?

Lövbrand et al. (2020) described how Anthropocene debates have unfolded as an accelerating human imprint on the global environment (which has undergone dramatic shifts) and how they may reconfigure Earth as political space. Profound material implications of a transformed global environment are central to such thinking. Now seems the time to reconsider and to actively debate what kind of political (i.e., policy) spaces are required to approach the Anthropocene as a discursive event, actively involved in rewriting spaces for global politics. The planetary nature of the challenge is unique and demands global scale responses that transcend national boundaries and cultural divides to prevent collapse of large parts of human (political) systems. Given the reality of geographical imbalances, it is the aggregated "human effect" (the Anthropocene) that is of primary concern. That is, international cooperation and policy are crucial to avoid the complexities of collective collapse and military solutions.

As a "human effect" the Anthropocene cannot be reversed, but can, as a voiced discourse or philosophical framing, facilitate rethinking (the conceptual) frameworks, with focus on global politics. For example, consider Haraway's (2016) concepts of Capitalocene and Chthulucene as transformative beyond Anthropocene and Stenger's (2010) "becoming with" as ideas we can use to think "other ideas" (Roncancio et al., 2019). With geopolitical imagination, we also find new ways to impose order and meaning within global politics. A new world of global flows becomes new framings for understanding the character of global life as conveyed by new concepts of global environmental studies and potentially for mechanisms of governance. These concepts imply new ways of thinking about how to engage ways of understanding, for example, what is behind extreme melting of glaciers, rising sea levels and extreme weather as climate-induced instabilities and conflict.

Biermann and Lövbrand (2019) and Lövbrand (2020) rely on critical political scholars such as Agnew, Dalby (2016), Chandler, Cudworth and Steffen (2018) in the search for new language required to understand how the world works and what now challenges global politics in the aftermath of economic globalisation and binaries of political space. Many academic papers now speculate on new, realistic challenges that accompany environmental politics. Implications for environmental education should challenge educators to find ways to integrate these "new" basics at age-appropriate levels as new curriculum materials are developed, particularly as geopolitical ideas are increasingly part of the daily news.

This framing of global politics increasingly engages speculative realist conceptualising of information, finance and people in a world of global relations within academic/political searches

for order in responding to a growing sense of ecological interdependence and urgency. Such necessary speculation often becomes substance for the relatively new field of global environmental governance studies that work across traditional political boundaries in ways that defy conventional thinking concerning international relations. Global (life) thinking becomes characterised by new types of agency, new mechanisms and levels of governance. Such geopolitical thinking and foreign policy praxis seem crucial in addressing new geographies of international responsibility in relation to incidents of melting glaciers, rising sea levels and extreme weather. Such re-territorialisations of global affairs act to mobilise "extended" Anthropocene concepts and environmental politics to redefine global spaces across emerging environmental realities.

Blühdorn and Deflorian (2021), for example, extend politicisation beyond post-politics and the reconfiguration of political discourse in academic debates concerning transformative politics. They consider what this might mean for a reconfiguration of public discourse and social activism as post-politics, or what Lövbrand et al. (2020) call "rewriting Earth as political space" as new challenges for transformation of consumer societies. Such re-politicisation calls for new "conceptual" tools and "theoretical approaches." It also calls for deeper study of the contingent character of the established social order, and how prefigurative power and transformative capacity have affected these movements and forms of activism. The search is for "new reality" thinking and praxis, beyond development, with the best of intentions in mind.

It is now time for environmental education to engage global political thinking concerning the hard issues such as capitalism, continuous growth, the entire ecological context, including the population issue and problems of production or reconstructing the geo-degraded lands and waters, in rewriting the entire Earth story as political space (Dalby, 2014). Over a decade ago Foster, Clark and York (2010) in *The Ecological Rift*: *Capitalism's War on the Earth* quoted James Hansen, a world authority on global warming, who stated that "Planet Earth . . . is in immanent peril due to exploitation of fossil fuels." Subsequently, of nine planetary boundaries, three — climate change, biodiversity and the nitrogen cycle — have already been crossed, while others such as ocean acidification and fresh water use are emerging planetary rifts. This, and an economy near overshooting planetary boundaries and tearing apart biogeochemical cycles of the planet, amongst other troubling trends, have inspired degrowth conferences in Paris (2008) and Barcelona (2010). Thus, almost half a century has passed since the Club of Rome raised the issue of limits to growth, now associated with Latouche's (2004) "degrowth economics."

What Foster (2011) described as a major European movement for ecological sustainability following the Degrowth Declaration in Barcelona, as well as the Green New Deal, has become part of a longer story where such changes would allow the economic system to shrink while keeping the underlying structure of capital accumulation intact. Raising larger questions of system change was beyond what degrowth theorists seemed willing to acknowledge. The entire story offered in Foster, Clark and York (2010) was that economic growth, as the main driver of planet ecological degradation, requires critique of capital accumulation as part of a transition to a more sustainable order which engages serious critique of ecologically destructive growth. Socialism is useful as a beginning wrote Schumacher (1973) in *Small is Beautiful*, precisely because the possibilities it creates for overcoming the religion of economics.

Where can we go from here?

During the 1960s and 1970s reducing human numbers was embraced as integral to radical social transformation, then shunned amidst political debates concerning changing ideological and geopolitical contexts and shifting power relations. Discourses documented within reports from intergovernmental population and development conferences in 1974 (Bucharest), 1984 (Mexico

City) and 1994 (Cairo) and in various ways relevant to sustainability issues which Pellizzoni et al. (2022) have gradually merged as COP 24 and arguably have progressively weakened.

Coole (2016), despite denials from the political right, entered this "treacherous ethical field" with legitimate questions concerning the sheer biophysical capacity of the planet to support 11+ billion bodies at a respectable material level and with the environmental and existential costs to ensure a quality of life amidst a toxic environment of political differences. This work followed from perspectives such as E. F. Schumacher's (1973) *Small is Beautiful* and James Lovelock's (1979) *Gaia, A New Look at Life on Earth*. It was not the "Limits to Growth" paradigm but the Club of Rome that had framed many discussions in which ecological sensitivities, combined with critical analysis of late capitalism and biophysical planetary limits, set a beguiling vision of post-industrial futures. This was in contrast to prevailing socio-economic structures of a world headed for catastrophe. Combined with the application of critical theory and the critique of consumer capitalism, this new sensibility that, among other things, presupposed reduction of future population was not taken up by most countries and China's one-child policy was withdrawn in 2016.

Recently, the idea that population matters has resurfaced amidst prognoses of systems collapse and changes in the politics of governance among "major immanent challenges" of degrowth in relation to global change such as warming and more specific sustainability indicators such as greenhouse gas emissions. Initially various reports refrained from adding demographic remedies and, in particular, reductions in material consumption as economic possibilities for "green growth." In any case, population projections gave little succour to complacency as UN reports revised growth totals continue to move upward. The implication is that without further reductions to fertility, world population by 2100 could increase nearly six times from an expected 11 billion in 2030.

Few political issues have provoked greater acrimony than calls to limit human numbers. In a genealogical study of the toxification of population discourse, Coole (2021) suggested framing future debates differently, as political issues of race and immigration. Such influences have affected environmental priorities as refracted through complex geopolitical antagonisms. Recent articles from, for example, Maynard (2021) and Marquardt et al. (2022) refer to issues of "over population denial syndrome," and the politicising of climate change in times of populism as a polite way of silencing discourses. These issues have become more prevalent in academic commentary concerning green growth and degrowth. Implicated are issues concerning immigration and the movements of people around the globe (migration). This is a crucial but challenging topic given sensitivities and polarised arguments as temporal, spatial and global. Redistribution and polarisation on border control/illegal entry is becoming a seriously political, polarising election issue in certain countries which foreshadows many political issues, not to mention the planet's carrying capacity (Fenner & Harcourt, 2023).

Exposure to such struggles and statistics is crucial in building decolonised futures, but also socially just futures that demand forward thinking and decision-making. Haraway et al. (2015) have attempted to provoke imaginations as political, as have ecofeminists such as Bird-Rose (2013) and Plumwood (1993). Indigenous writers and environmental humanities scholars such as Moreton-Robinson (2000) challenge us to anticipate needs such as care and "understanding otherwise," and to move to more responsible thinking with the bigger picture in mind, for example, Chthulucene[2] as alternative to Anthropocene (Haraway, 2016, 2018).

"I don't like it but I guess things happen that way"

According to Pellizzoni (2021), fifty years after *The Limits to Growth* (Meadows et al., 1972), the time has come for reclaiming limits as grounds for environmental politics. From limits has emerged material limits, as in, for example, generating concepts such as sustainable development

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[2]**Chthulucene** is a neologism created by Donna Haraway and critiques the term Anthropocene to describe the Earth's current age.

as established grounds for political discourse. More pointedly, research focused on "growth" has extended inquiry into forms of power and political domination (e.g., Hammond, 2021; Schultz, 2017) that actively promote critical and post-Anthropocene thinking with potential to open new perspectives within ecologies of politics and power. Pellizzoni (2021) argues that sustainable development has become a barrier to the case for limits to growth, as it continues to feed the "growth of limits" which implicates a politics of limits as the technological gamble continues and as capitalism continues to extend the boundaries of limits, which, in effect, becomes a politics of limits.

The construction of the political dimensions of these issues is crucial because people do have limited choices, now more overtly tied to the politics of limits as well as to questions of how environmental education can open up politically. Such discussions implicate lifestyle decisions within contexts of material limits to growth in many arenas as ethical, and, along lines of thinking about futures, lifestyles and values. Each of these is political and requires serious debate ranging from limits to growth versus the growth of limits, increasingly in relation to storylines such as green growth and degrowth. These discussions become more complex when embedded within larger issues of limits to, for example, planetary boundaries and capitalism as well as the role of government at various levels, as interpretive questions of growth and self-limitation. These perspectives, as carefully planned and managed, become crucial educational subjects for a reconceptualised environmental education.

Recently, Hammond (2021) and others such as Pellizzoni (2021) and Schultz (2017) invite research study as ideology critique in relation to forms of power and political domination. Hammond (2021) argues that journals focused on environmental politics have a responsibility to promote critical and post-Anthropocene thinking with potential to open new perspectives within the ecology of politics and power. Such thinking has enhanced critical political thinking across many taken-for-granted groundings for environmental education. Within a rapidly growing literature of political ecology, Pellizzoni (2021) speculates that sustainable development has become a barrier to the case for limits to growth as it continues to expand the growth of limits. This renewed attention to "limits," (for example, capitalism keeps moving the boundary of limits) entails, inevitably, a "politics of limits" wherein the construction of political dimensions is crucial.

Pellizzoni (2021) proposes the notion of "form of life," as an alternative to lifestyle politics. The idea of the individual as free, autonomous agent and "reality as progress" become questions in tension with an ontology of limits as more and obligational. This focus inevitably becomes a tension of ontological positions of being and so-called progress. Everyone nods politely at the notion of limits (from limits to growth to the growth of limits), as long as each one of them gets to do what they want, as is necessary for capitalism. Within such a given slate of social forces and relations and the idea of no real limits to profitability, limits to growth is always somewhere off in the future. Meanwhile growth becomes the "growth of limits" as an invisible hidden mechanism of capitalism.

Within this framework, material limits are simply environmental issues that become economic opportunities pushed forward, and capitalism becomes more than an economic system. In effect, it becomes a social order for justifying extant economic conditions — private property, cheap labour — while keeping the boundaries in flux, for production.

This attitude drives:

- Hardening of categories, between human (spiritual, sociocultural, historical) and nonhuman (material, exploitable);
- Biotechnology advances as nature is subsumed to capital which impacts efficiencies of extraction and use;
- Critics of capitalism who work in/with ambiguities and particulars without connecting wishful thinking to the realities of the bigger picture;

- Ontological divides that favour "developers" and renders government powerless as "ontological blurring" favours business-as-usual;
- Capitalism's case for growth of limits which has fed the Anthropocene politics to the degree that in order for the virtually accomplished socialisation of nature to be reversed would require reclaiming the limits to growth seriously, as degrowth, with over planetary limits and form-of-life or paradigms of conduct which implicates an imperative of continuous growth.

Pellizzoni (2021) argues that, in fact, we do have choices, but these are tied to a politics of limits which goes to values which connects to educational choices of how to engage young people in the conversations/dilemmas. His concern is that education owes it to the public to engage these discussions about choices and limitations through basic education that has a role in facilitating these discussions of choice and affect. This implies educational responsibility to consider the options as well as to look back at choices that have already been made for us by our elected representatives at all levels (municipal to federal) of government. Decisions do need to be made at several levels concerning educational space to open up such discussions, at least within democracies. For example, how prepared are teachers to build such exercises into curriculum at appropriate levels with "politics for environment?" This would involve decisions about hohw teachers are prepared to engage notions such as material limits to growth and Anthropocene politics as self-restrictive. This must be different from our parents' education, for good reason.

How we engage students at many different levels in "realist" education remains, amidst agential realist groundings, ethics and working with concepts such as diffraction, affects, cartography, rhizomatic thinking, desire, figurations, assemblages, intra-action, refrain, immanence, lines of flight and affects. Choices are required with forms of life(style) in mind, as prefigurative mobilisations. All of this is, of course, political and begs the question of how prepared teachers are to teach, how to debate and how to consider values and choices? What then is the role of teacher education in engaging such environmental education as environmental education politics?

"Limits" to environmental education? Theory into practice: Back to the future

What could "limits" theory mean for environmental education practice? First, "environment" is a concept where knowledge and power are deeply intertwined in critique of instituted forms of conventional politics as responsible for the current socio-ecological crisis. Political ecology, since the 1970s, has followed critical theory in challenging the capitalist bias of production and consumption at the expense, through displacement/denial, of real socio-ecological processes by means of a politics of unsustainability. Ecopolitics itself has been reduced to techno-managerial issues such as green finance, commodification of nature, the circular economy and reliance on nuclear energy and fossil gas ultimately in support of further economic growth, in essence, as a "new" political condition (Pellizzoni et al., 2022).

Initially, as "political" aspects of the environmental educational story unfolded, the educational interest was to engage environmental educators in "becoming critical" discussions concerning educational possibilities for decolonising environmental politics at various levels of educational provision. For example, *Limits to Growth* (Meadows et al., 1972) outlined implications for the beginning of what was later to be "planetary boundaries" (Rockström et al. 2009). Much has happened in the interim including *Beyond the Limits* (Meadows et al., 2004) which sustained the political issues of sustainability as matters for more serious debate and critique (e.g., Daly, 1995). There were also questions about rethinking democracy (Eckersley, 2004), rethinking prosperity without growth (Jackson, 2009), and engaging green political thought (Dobson, 2007). This was followed by an evolution of levels of thought or "the politics of post-growth" (Dobson, 2014) and questions of limits to limits (Dobson, 2016), as well as debates that remain in the present within increasing interest in new journals/periodicals related to political ecology and environmental values.

This renewed focus on the politics of limits, given the impossibility of infinite growth within a finite system, is manifest in recent debates concerning degrowth and green growth has expanded and become more complex, as often coupled with population growth and questions of global concern, including industrialisation, depletion of non-renewable resources, deteriorating environments, systems collapse and the necessities of social change. Increasingly, educators are challenged to think beyond sustainability and, more recently, beyond capitalist systems as the glass ceiling of socio-ecological transformation embedded within planet politics (Foster & Clark, 2020; Hausknost, 2020).

Blühdorn and Deflorian (2021), amongst an increasingly diverse academy, continue to question the prefigurative power and transformative capacity of transitional movements engaged in supporting desired forms of social action and activism that challenge the logic of privatisation, unlimited growth and social inequality (MacGregor, 2021). For social movement research this remains a formidable challenge given the complexities and ambiguities of attempts at re-politicisation as prefigurative politics (of collective action). Blühdorn (2023) comments on such recreational experimentalism at the abyss in reference to sustainability that has managed to retain the status of an eco-political frame (Brand et al., 2010) that does not require any real commitment to structural change. Subsequently, Brand et al. (2021) refer to "Collectively Defined Self Limitation" and Hausknost (2020) the "glass ceiling of social transformation" (Blühdorn, 2023). The underlying problem is capitalist realism and the overwhelming literature of "alternative facts" in combination with recession of democracies (and so-called "leaders") with their own agendas, particularly in those countries with "power" (2020b, Blühdorn, 2020a).

Currently we seem to have come to an abyss — planetary boundaries that may provide guidance for safe operating space for humanity, contingent on malleable social norms (Brand et al., 2021) and what becomes the crisis of capitalism and an accompanied growth-based/growth-dependent economic system which, at the planetary boundaries, cannot be sustained amongst growth-driven, deep-seated contradictions of capitalism (Fraser, 2015, 2017, 2019; Fraser & Monticelli, 2021; Hausknost, 2020; Jackson, 2021; Kallis, 2019) which have foreshadowed imaginaries of hope, within a politics of change.

Working our way into complexities of a politics of change across many levels

Garret Hardin (1968), following Malthus, argued that neither human population growth nor the economy could expand indefinitely on a finite planet. This has become fundamental to environmentalism (Kallis, 2019; Meadows et al., 1972). Yet after this high point in the 1970s, and despite support from science, the notion of "limits" remained unpopular politically within affluent societies through the 1980s-1990s, only to resurge in the 21st century within new notions of planetary boundaries, peak oil, post-growth and degrowth, notions that created major ontological and ideological divides across disciplines and, in particular, among green growth and degrowth advocates.

In the 1980s, The Brundtland Report (WCED, 1987) established "sustainable development" as the new guiding principle. In essence it has provided real solutions to environmental decline, advancing new theories on green growth and degrowth or even in decoupling economic expansion from environmental impacts through technologies of resource efficiency. Subsequently, new concepts of green growth and "sustainable degrowth" have gained momentum in ideas such as post-development (Escobar, 2007), planetary boundaries (Rockström et al., 2009) and degrowth (D'Alisa et al., 2014) within revitalised academic debates (e.g., Kallis, 2019; Pellizzoni, 2021; Robbins, 2020;).

In recent papers Blühdorn (2022, 2023) explores the reconfiguration of political discourse within academic debates that implicate transformative politics. Such re-politicisations raise new hopes for socio-ecological transformation of capitalist consumer societies. As Blühdorn &

Deflorian (2019, 2021) observe, academics are advocating for new forms of democratisation within socially and ecologically pacified societies, that is, beyond the present order of sustainability. Such distinctive features as re-politicisation include claims that scientific evidence renders a socio-ecological transformation of capitalist consumer societies as imperative and as a priority. Following Blühdorn (2022), implications of such re-politicisation are based on many perspectives including critiques of capitalist power relations that bewilder democratic activity and what counts as "legitimacy" when portrayed as the "glass ceiling" to the environmental state's efforts to achieve socio-ecological transformation.

Blühdorn's long-standing concern — the emancipatory dysfunctionality of democracy — implicates a societal value and culture shift as a key parameter in explaining the sustained unsustainability that currently impacts eco-political debates about, for example, capitalism, the nature of eco-political discourse, cultural norms, post-materialist values, quality of life issues and underlying causes of environmental issues that can't be addressed within frames of capitalist economies. Such economics, inherently based on the principles of continuous growth, exploitation of resources and the externalisation of social and ecological costs implicate the failures of UN reports such as Brundtland (WCED, 1987) that explicitly recommended the capitalist economy. Not only does the logic of capitalist-based growth remain unchanged, but the affluent consumer societies of the global North have become more entrenched than ever before.

The political game base has, however, evolved significantly as those such as Blühdorn (2022) and Pellizzoni (2021) explore ways forward with new theories including, for example, planetary boundaries and societal boundaries, as "conceptual" ways of thinking about emancipatory politics in terms of socio-ecological transformation. Significantly, Blühdorn (2023) creates openings for rethinking notions of the sustainability crisis in light of boundaries thinking outside of established understandings of "experimental politics." Blühdorn's concern about radical departures is reconfigured in Fraser's (2017, 2019) and Fraser and Monticelli's (2021) "progressive liberalism" because, quite simple, we have no realistic alternative "at the edge of the abyss" (Blühdorn, 2023; Steffen et al. 2018).

Thus, Blühdorn's (2023) latest projection of environmental politics is less concerned with prefiguring socio-ecological transformation as with practices of adaptation and resilience to conditions unlikely to be reversed, steered, or substantially slowed (Steffen et al., 2018) than with realistic coping strategies based within the established order of unsustainability, critical reason and the power of "better" argument! The idea is to come to terms with the post-apocalyptic realisation that another worldview may not be possible, nor a new politics of precaution, to come to terms with incompatibilities of values and the irreconcilable contractions and transformative disability of later modern politics. This strategy retains the improbable possibility of holding on to the ethos and narratives of transformation toward a post-capitalist society. As Blühdorn (2023) concludes, it is about time that narratives of experimental politics, pioneering social ecological transformation, are supplemented by critical realist interpretations that more closely reflect realities of the late-modern condition. In other words, the political prospects of socio-ecological (or)sustainability transformations have been subsumed by new priorities given to economic growth at the expense of environmental, climate-related and social justice commitments and investment in environmental education.

So, what kind of state and what kind of democracy could live up to the challenge ahead (Hausknost & Hammond, 2020)? The state continues to be an irreducible element of environmental (transformation) politics (Johnstone & Newell, 2018). The fact that human history would have to reverse the steady expansion of assaults on nature makes a sustainability transition inevitable for long-term survival, yet seemingly impossible within historical dynamics. Change requires new models of environmental politics. National governments have little political appetite for anything but modest change as global warming, resource extraction, biodiversity loss ... continues to worsen, unabated. Environmentalism had failed to reduce, even remotely, human impact on the earth. Yet the sustainability concept remains prominent within environmental education as a deeply embedded part of the problem (Foster, 2015).

Hope for the future?

The document *Transforming Our World: The 2030 Agenda for Sustainable Development* (UN, 2015) restated the commitment to achieving genuine transformation, on a global scale. In the wake of debates about a new geological epoch, the Anthropocene (Crutzen, 2002), the 2030 Agenda for Sustainable Development, given the mood of the international organisations (e.g., the EU and even the UN itself), pre-occupied with the COVID-19 pandemic, remained focused on re-stabilisation of the consumer capitalist issue and of economic stability.

However, given political machinations currently visible in many countries, concerns are growing about consumer capitalism amidst renewed doubt that the central pillars of sustainability paradigm — the idea that by means of technological innovation, economic growth may be decoupled from increasing resource exploitation and ecosystem "events" — are proving untenable. Whether new Green Growth or Degrowth scenarios can mitigate these pitfalls remains to be seen. However, critical commentators such as Blühdorn (2022) remain concerned that current dysfunctionalities in democratic regimes have diminished public trust in democratic problem-solving and science and evidence-based problem-solving, both across and within countries.

Conceptual transformation?

Although the questions around foundations of the sustainability paradigm remain, and critical observers posit, optimistically, that increased public awareness of social, economic, political and ecological vulnerabilities of consumer capitalist societies may evolve, new concepts are required. New normals beyond sustainable unsustainability are evolving as is environmental and social political savvy concerning possibilities that will not come easily but also will not come at all without serious exploration of potentially promising alternatives.

Tyfield (2022) concisely lays out the problem: transform our prevailing modes of life globally so they remain within planetary boundaries (or die!). He suggests a just transition from a political economy based in capitalism to a cultural political economy of research and innovation, focused on how socio-economic structures may function in ecologically sustainable ways. Which takes us to the heart of the problem — growth economics as the Achilles heel of contemporary capitalism (i.e., Bateson's (1982) "double blind"). Tyfield et al. (2022) regards the lack of clarity on this dilemma as the significant problem — the growth paradox — which remains complex and perhaps most confounding precisely because it is political and as such perspectival, and a complexity that can never be resolved by a majority (vote) consensus.

Nothing can or will change until the "thinking" does. The comprehensive change required remains daunting, seemingly impossible — demanding unprecedented transformation where, as Blühdorn (2023) says, it is the form of democracy that inhibits sociological transformation (i.e., the legitimation crisis of democracy) which, in fact, is the glass ceiling of democracy. Within the new literature of political ecology, it would appear that the entire era of sustainable development has achieved very little in solving the problems of systemic unsustainability. And so, Hausknost and others have moved on to discussions on Green Growth and Degrowth.

Green growth versus degrowth, as highly volatile and highly contested concepts

Recent literature, which includes many perspectives, opens up the commentary and controversy on green growth and degrowth in relation to environmental justice and participation in post-growth movements inspired by similar concepts not unrelated to social justice. These remain as contested concepts subject to diverse political viewpoints.

Green growth, generally, refers to a strategy of economic growth decoupled from resource use and adverse environmental impacts in ways that can be environmentally sustainable. The focus is on transitioning toward sustainable energy, green agriculture, sustainable forestry. The idea and

subsequent literature have tended to focus on experiences of eastern countries such as China, Japan and South Korea where employment is a priority. The assumption that economic growth and development can continue while associated negative impacts, including climate change, are reduced, as within "limits to growth." Hausknost (2020) appears in reference to many such activities as does Kallis (2021), who also may be considered as somewhat sympathetic critics who also think beyond green growth (e.g., Hickel & Kallis, 2020; O'Neill, 2020) who question whether or how green growth is possible. Perhaps these discussions concerning green growth (Fremaux, 2019) are missing the point. It could be argued that, in contrast, the anti-colonial politics of degrowth perhaps goes back to "limits" after many years.

Degrowth as a concept is embedded within theory from a range of perspectives, including political ecology, authors critical of assumptions of infinite growth and, in particular, continuous economic growth, arguing that infinite economic expansion is contradictory to a finite planet. Evidence has grown exponentially concerning Anthropocentric issues, ranging from multiple dimensions of decoupling, resource depletion, ecological footprint and new ideas relating sustainability to degrowth. Within areas of finite limits to technological drivers and economic growth caused by capitalism, sustained by economic growth, the circle simple can't be broken! As the planet heats, no one individual or group can seem to penetrate the juggernaut of the economic growth syndrome, not even the multiple international conferences on degrowth, from Paris (2008) to Brussels (2018). It would seem to be a situation that can be identified but not resolved. Ideas such as green growth and degrowth remain foundering within global capitalism as the best road to hell. So, we think that we know what needs to be done but also that we can't do it . . . yet!

Power and politics

Following from contestations concerning "growth" within sustainability discourse, green growth and degrowth informed by conceptualisations of planetary boundaries, come questions concerning the role of power in social change (i.e., "power over," "power to" and "power with"). In effect, the "limits" of modern democracies, become limits to sustainability (Blühdorn, 2020a), immanent within recent arguments for a geopolitical democracy (Eckersley, 2017) and for green republicanism (Fremaux, 2019). If we assume that such exercises of power are possible (Partzsch, 2017) and that environmental regulation is possible, it is underpinned by visible, hidden, invisible and even unconscious political power, linked to sustainability issues, that can prevent constituencies from choosing systems that allow for greater environmental sustainability and social justice (e.g., alternative solar and wind generation) (Blühdorn, 2020a; Eckersley, 2017).

In consequence of these realities, if we want to understand how agents can enable change towards greater sustainability, we need to understand and actively engage power perspectives that allow for more self-determined agency where power allows for processes of developing shared values and bringing about change cooperatively. Finding common ground and engaging collective strength and joint action within the public sphere can lead to mutual learning and questioning of self-perceptions, building new awareness and re-evaluating common societal norms.

A first response, given the complexities of these issues, might be that "it depends." Thinking forward politically with planetary boundaries and climate activism in mind, a recurring theme is found within the crisis of representative democracy (Knops & DeVydt, 2023), or as Blühdorn (2013) wrote a decade prior on "the governance of unsustainability," or Felicetti (2020) on "systemic unsustainability as a threat to democracy," or Eckersley (2020) on "the rise and decline of liberal democracy," or Fraser (2021) "for a trans-environmental eco-socialism." These theoretical distinctions concerning environmental and ecological democracy is demand for reform and for transformation within and in contrast to existing political systems (i.e., the fool's bargain). What remains chronically understudied is the extent to which these political attitudes also entail a critique of capitalism which has been increasingly recognised as both a root cause of climate

change and of democratic decay (Fraser, 2021). This missing link creates irreconcilable tension between democratic ideals and environmental objectives (Foster et al., 2010; Fraser, 2021).

Improving the political ecology of environmental education futures: Thinking beyond the dominant economic growth paradigm

Trantas (2021) introduces a paradox through Paulson's (2017) reference to consequences of continuous economic growth through systems of culture and power. The challenge, according to Trantas (2021) and an increasing number of commentators, persist within basic tenets of capitalism in games of compromise, within limits of heavily contested concepts such as degrowth. Degrowth, in contrast to green growth or sustainable development, challenges some of the basic tenets of capitalism and thus has potential to deconstruct growth hegemony at political levels, particularly where such business-as-usual human activity can be shown to exercise a dominant influence on climate change. Thus, degrowth is considered radical while sustainable development and green growth that are not threatening capitalism are dominating the green political economy discourse.

These discussions have evolved, over several years, from earlier "limits to growth" to a search for alternate forms of degrowth that now implicate multiple streams of thought. For example, Rockström et al. (2009) support calls for new economics, new politics of limits and, indirectly, planetary boundaries, societal boundaries and collective self-limitation (Blühdorn, 2022; Brand et al., 2021). These activities have challenged the vocabulary and representation of global environmental issues, the capitalist form of society, and thus new "global" forms of eco-political debates. The upshot is that politicisation beyond post-politics, new social activism and reconfigurations of political discourse represent a different kind of emancipation, from lifestyle to "form of life" (Blühdorn & Deflorian, 2021; Pellizzoni, 2022), or after Hausknost's (2020) the "glass ceiling of planetary politics."

The problem is what Foster and Clark (2020) describe as no small matter in that the elongating ecological revolution requires a break into the existing social order that implicates global issues of climate change, ocean acidification, species extinction, violent weather episodes and massive forest fires. The idea of planetary boundaries, thus complicates the "carry on regardless" scenario and returns us to the hard eventualities of limits, a problem that seems intractable for capitalism. Yet some folks are committed to "staying with the trouble."

According to Schultz (2017) and others, what is clear is that the proclamation of the Anthropocene has vividly dispelled prevalent optimism and the future of linear economic progress. Debates to understand such complex entanglements, in the face of the politicised notion of looming climate change, become politicised because what remains unclear is our entire future. In response to the conceptual limitations and apolitical tendencies of such a future, scholars have engaged in exploring and debating alternatives in areas such as taken-for-granted patterns of industrialised production and consumption, as contested political ecology. Fundamental shifts in earth systems require/demand fundamental shifts in understanding of the human condition, that is, political ecology.

Many critical questions arise concerning: the concept of responsibilities of humanity as an eco-geological force (Dalby, 2016); capitalism as an economic and political force; inequalities within and beyond human species; western industrialisation implicating biosocial relations beyond geographics and economics. Critical questions make for complexities among many commentators, each with their own (political) theories that define and then question, for example, meanings of culture, labour, relations (intersubjective and cultural/intercultural) that are influenced by psychological and existential perceptions and perspectives across the complex and diverse field of political ecology.

The diverse and complex field of political ecology must be troubled, studied and engaged because, as Schultz (2017) argues, subjugated knowledges are implicated in ecological, economic,

cultural-cognitive, spiritual and critical decolonisation of both geo-political and body-political positions of subjects. This means that such knowledge becomes key points of reference for a decolonial option in the Anthropocene (Schultz, 2017). Decoloniality becomes a political commitment as political ecology expands, regardless of the internal dynamics of its Western origins and internal complexities. Thus global political ecology puts behind its locus political agency and responsibility for the conditions of the Anthropocene. It does so by engaging potential turning points of politics such as intensification, acceleration and globalisation of neoliberal politics, emphasising our manifold entanglements with nonhuman processes (Coole, 2013; Rekret, 2016).

As political ecology has evolved as a way of exploring alternatives and pluralist ways of being-in-the-world, it can, in strong critiques of aspects of modernity and educational provision, become a rationale for deconstructing research designs, social structures and cultural imaginaries. These act as material formations to engage multiple forces, processes and properties of complexities, as simpler notions rooted in partitioning borders between humans, nature and technology.

Questions thus arise concerning "becoming political," beyond the universalising of Western-centric sciences and philosophy, in constructing pluriveral dialogues in respect of multiple entangled decolonial-ecological and social/ecological transformation in the very places that power functions, as Schultz (2017) says, to "cast is own spell," as a political ecology that can naturally ground education for changing times.

Politics of growth, growth as political: Reconfiguring the problem

Recently, Naudé (2023), amongst others, has written of the "The Futility of Green Growth and Degrowth, and the Inevitability of Societal Collapse." The argument is about the indefinite prospects for economic growth and the speculation that neither green growth nor degrowth will stop overshooting the limits to inevitable societal collapse. Naudé's (2023) speculation is that managing such a collapse may help to minimise the effects and perhaps find ways to ground transition to a new kind of economy with planetary boundaries in mind (Rockström et al., 2009; Steffen et al., 2015). It also provides arguments or perhaps devastating critiques of economic growth, green growth and degrowth scenarios. And, as degrowth proponents themselves acknowledge, political parties that put forward green growth or degrowth ideas have received little support.

Naudé (2023) concludes with several scenarios that define possible societal collapse with reference to complexity, particularly in relation to possible degrowth and green growth scenarios. Although highly speculative, some green growthers hope that economic growth could be decoupled from the environment so a form of reduced economic growth can continue without exhausting resources or contributing to global warming if renewable, non-carbon energy sources can be found to substitute for the phasing out of fossil fuels, something perhaps akin to green growth but different and able to stop ecological overshoot? Others reject this idea and present a degrowth agenda that places limits on economic activity, but this would be likely to worsen the environment. Each of these scenarios represents a political agenda that, if not feasible, may lead to other scenarios where some degrees of societal collapse are inevitable, but some form(s) of rebound may be possible. "Meanwhile it seems crucial to find ways of slowing economic growth, and fossil fuels (use) in order to soften the inevitable collapse, given that the risks of stasis are far more troubling and getting off the roller coaster mid-ride is not an option" (paraphrasing Naudé, 2023).

The problem: Planetary politics

While many academics, including ecologists and educators (including environmental educators), have tended to shy away from questions of "capitalism and the ecological rift," recent literature is becoming more forthright concerning certain socio-ecological transformations that are increasingly

crucial for critical environmental politics (Blühdorn, 2022) and critical realism in political ecology (Forsyth, 2023; Knudsen, 2023). But it was Foster and Clark (2020) whose book *The Robbery of Nature: Capitalism and the Ecological Rift* expanded in the multiplicities and complexities of what they call "The long ecological revolution" that traces arguments for ecological criticism of unbridled industrialism.

And yet "the beat goes on" . . . nuclear power as the solution to climate change; no direct objection to commodification of nature, labour and society under capitalism; no real concern about existing structures of production and consumption. Instead, the future lies entirely with new machines and increasing the scale of biogeochemical processes where the goal — the control of nature through new science and technology — gives new meaning and emphasis to terms such as sustainable development and the eco-modernist manifesto. Foster and Clark's (2020) sleuthing gives new meaning to the words "know thine enemy." And there appears to be a significant conglomerate of global political and financial leaders who are investing in so-called "green capitalism" which means essentially, business as usual or full speed ahead. In fact, socialism in these terms becomes barely indistinguishable from capitalism and the cost of such compromise is the conception of an alternative future. It would appear that we cannot seem to escape the long-term consequences of capitalist development.

As Foster and Clark (2020) have said, exponential economic growth is no longer possible for any length of time. But because there is no such thing as absolute decoupling of economic growth from the throughput of energy and materials such growth must cease. This attitude has many implications including the world economy weaning itself from fossil fuels (as the energy source). Thus, the ecological problem is in fact intractable for capitalism (Foster & Clark, 2020). The trouble is that we are approaching the Earth's limits and must remain serious about "staying with the trouble" (Haraway, 2016). If we don't radically transform our economic systems and our relations with the planet, environmental episodes (sea and land) will continue to approach points of no return across planetary boundaries (i.e., climate change, species extinction/biodiversity reduction and ocean acidification). Global population increase remains out of control, and we remain subject to the laws of capitalism — the ceaseless drive for amassing greater wealth, requiring more throughput of energy and resources, resulting in more waste at one level and threats to fundamental planetary geochemical processes at another. Ecological analysis confirms that we are approaching the earth's limits. So, the question is how to reduce the ecological footprint of the world economy, as an ecological problem that is intractable for capitalism. Science tells us that we have at most a generation in which to carry out a radical transformation of our economic relations (Foster & Clark, 2020) after which climate change will have advanced and will be irreversible (Solomon et al., 2009). The challenge from the ecological emphasis on sustainability, co-evolution and interconnection, followed by the reality of planetary boundaries and, as Moore (2016) says, is pushing the boundaries to the realities of a "real" crisis should be enough to make us "think again" with questions of culture and politics at centre stage as the planetary moment of truth.

The educator's dilemma: Educational translation of complexities of political ecology

Each of the dimensions addressed within educational studies of ecology and environment implicate human relations across political, economic and social perspectives and issues. These dimensions, within political ecology, come together as theories or issues of power and politics. Yet even as recently as 2018, Svarstad and colleagues described a lack of theoretical elaboration focused on how "power" may be understood within political ecology. What understandings we do have come from examples of studies of societies and of earth dynamics that focus on political, economic and social power relations including those that examine the political dynamics surrounding material/discursive struggles over environmental issues, locally and globally. Political

ecology emerged as research-based explorations within the politics of linkages and changes in ecological/environmental systems with explicit consideration of relations of power. Interpreting these changes within power perspectives has been one of political ecology's strengths (Svarstad et al., 2018).

What "Anthropocene," or culmination of human domination over nature, reveals is our dependency on natural ecosystems, not for economic/technological management of the planet, but for radical re-invention of our societies, in essence, a withdrawal of the capitalist "technosphere." Whether we like it or not, a new economic paradigm is needed to replace the unsustainable capitalist logic of growth by some form of an ecologically stable democracy that fosters environmental justice, that acknowledges our biological social embeddedness as central elements of human existence. This is what Fremaux calls "green republicanism" as transition that does not require more technology or economic growth but more socially progressive political innovation. That is, more democratic participation and active citizen participation in community, public, political and democratic participation against capitalist control of society. This is what I would call education in defence of ecospheric rehabilitation.

Endpoints . . . Transition points . . . Pedagogical grounding points for renewal of environmental education

Contestations continue over production, consumption and mitigation of global ecological challenges, often with genuine concern about exceeding planetary boundaries (Stoknes & Rockström, 2018). Following an assessment of Schmelzer et al. (2022) on the future beyond capitalism, Trantas (2022) attempts a critical review of the merits of the degrowth agenda whose merits, he suggests, are not to be underestimated:

1. The politisation of the debate on sustainability and development which he associates with the critique on green growth and the belief that science and technology will solve all problems given the way that the capitalist system works, provides conceptual grounding for critique of economic growth as an hegemonic ideology.
2. The problem of economic growth as an hegemonic ideology within the mess of extant systems, ranging from the ecological critique of socio-economics, cultural assumptions and capitalist growth systems (industrialism). Degrowth is essentially a push-back against the economic dominance through reconfiguration of current power relations.
3. A kind of degrowth that essentially seeks to move beyond capitalist modernity through reconfiguring power with political relations, comes what I describe not as definite solutions (the world is too complex) but perhaps crucial decision points from many concerned thinkers, exemplified below within a spectrum of concerns and challenges. Boston (2022) refers to these decision points as living with biophysical limits across vigorous debates concerning the legitimation crisis of democracy within the "glass ceiling" of socio-ecological transformation (Blühdorn, 2020a).

Perhaps the consistency of scholarship on these matters over several decades illustrates the reconfiguration of political discourse as well as any of the myriad of academic debates concerning prefigurative and transformative politics. In 2017, Blühdorn argued that the exhaustion of the paradigm of sustainability, increasingly regarded as a spent force, was perhaps a take-off point for more radical (at the time) currents of eco-political thought such as liberation from capitalism, consumerism and unencumbered growth as "the politics of unsustainability" might contain new hope.

Perhaps the democratic legitimation imperative as the "glass ceiling" to socio-ecological transformation of democracy and the significance of new forms of participation, as well as the

conceptual framing of new forms of post-democracy, given that extant liberal democratic institutions were ill-suited to manage the increasing boundless character of world risks (Eckersley, 2017).

Perhaps when the critique of the logic and rationality of capitalism, and extant cultural norms and the capitalist principle of continuous growth, now regarded as an irretrievably misconceived framework/empty signifier, was more a part of the problem than the solution (Blüdhorn, 2021).

1. Perhaps the concept of sustainability which remains prominent within the UN's *Transforming our world: The 2030 agenda for sustainable development* (2015) and which restates a commitment to genuine transformation of sustainability creates a dilemma which cannot easily be resolved and which leaves environmental education with fundamental contradictions. According to Trantas (2021), the sustainable development discourse, including the modern green growth version, remains a top-down reform project directed by governments driven by the logic of capital can be managed to remain within limits which neutralise potential threats to political power and challenges to basic tenets of capitalism.
2. Perhaps the value in Trantas' (2021) argument lies in the exploration of the political ecology of education futures in thinking beyond the dominant economics growth paradigm, challenging basic tenets of capitalism but within the contestations of a variety of reasonably well conceived concepts such as green growth and degrowth where economic growth is decoupled from resource use by 2050.
3. Perhaps the bottom line includes the reality that decoupling GDP growth from resource use, material goods and energy production is impossible, and time is running out on the ultimate stage as the focus is now determined to be placed on the political dimension in the form of degrowth challenges of not only sustainable development but also on the very foundations of capitalism. Infinite economic growth and steadily increasing population on a finite planet is simply impossible.

Perhaps, depending on political manoeuvring and an economic crisis of capitalism, the ideology of degrowth transition as coupled with the regenerative capacities of ecosystems within a very different ecological economics can return to the limits of growth and a new, coherent political platform.

1. As the climate crisis becomes more threatening, alternative political underpinnings in degrowth will require more complexities of thought as well as grassroots participation based in more prominent environmental education priorities of the education system, if change is ever to occur. Perhaps this will challenge fundament underpinnings to societies and create a new political process. Of course we wonder how badly global systems need to deteriorate before new, radical degrowth-based political systems begin to function in order for new, "radical" proposals to gain traction.
2. Perhaps, as Susan Baker (2022) sees the democracy dilemma, the new emphasis in degrowth includes identifying new forms of democratic institutions that can make a degrowth transition possible, through challenging growth arguments advanced by strong sustainable development. The emphasis shifts in degrowth toward identifying new forms of democratic institutions and practices, including re-appropriating technology and market monetary exchange.

The complexities of political ecology directly implicate theory and practice within environmental education. The transition stands on certain principles beyond mere limits to growth and begins with active political debates on the relationships between economy, ecology and societies very different. The focus, however, remains on "growth," including population growth, the issue being ultimate limits given finite resources and what has now come to be termed

as "planetary boundaries." Such new "educational boundaries" could also be described as "no small matter!"

The educational dilemma within what Foster and Clark (2020) describe as no small matter cannot not be political. The long ecological revolution requires changes in the existing social order which implicates educational provision. Foster and Clark do not mince their words in that the elongating ecological revolution requires a break into the existing social order impending climate change, ocean acidification, species extinction, violent weather episodes and massive forest fires. These have not yet fundamentally changed the economies of capital and economic growth, but they will and cannot not be material for academic debate and appropriate educational discussion. The idea of planetary boundaries complicates the "carry on regardless" scenario and returns us to the hard eventualities of limits, a problem that seems intractable for capitalism. Yet, some folks are willing to "stay with the trouble," including those who have chosen to write papers for this *Australian Journal of Environmental Education* Special Issue, in spite of the challenges that are implicated within the complexities of environmental politics.

Addendum

In the end, discussions of the complexities of political ecology as applied to educational research and practice are fundamentally a discussion of the complexities of power and politics in relation to how we do research and how we represent our findings. At every level, the nature-economy dilemma is political. We cannot understand the ecological dimension of the impending crisis of limits (i.e., planetary boundaries) unless we grasp its intra-actions with the political. Especially problematic is the guiding principle that the environment can be adequately protected without disturbing the institutional framework and structural dynamics of capitalist society (Fraser, 2021). Fraser asks, will our chances to save the planet be squandered by our failure to build an eco-politics that is trans-environmental and anti-capitalist? The current state of these movements is not yet adequate to this task, and they fail to engage deep structures of social systems that increasingly threaten or cross planetary well-being.

According to Fraser (2021), what is needed is to resolve the present cacophony of opinion into eco-political common sense, to identify exactly what, within society must be changed to stop global warming. A new "common sense" must transcend "what is" by addressing all major facets of education for the environment, including challenges of "becoming political." If deep structural transformation that can avoid head-on confrontation with sufficient intellectual savvy and with ideas for workable alternatives that can resonate with sufficient numbers to save the planet without disabling of some core defining features of our social order is not possible, then the "path ahead" remains obscure.

The task ahead, beyond the kind of governance and the kind of education that exposes the challenges ahead, rests with educational change that requires new modes of thinking and environmental politics to lay the foundation for transition to a new kind of education for a new kind of society. Obscure? Yes, but there are always openings for new modes of thinking which will occur as living conditions deteriorate

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