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Peace Studies and the Limits to Growth

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Scientists have issued increasingly dire warnings about the present and future danger posed by ecological overshoot. Peace scholars' entrée into this discourse is often through a concern over extractive politics, a central locus for how conflicts are bound up in environmental destruction at the hands of the same industries responsible for ecological decline. Policy and practical responses to the urgent need to scale down production lag behind reality, however, and a global growth-based economy continues to prevail. Here, I explore the dilemmas faced by peace studies scholars who may want to take these limits to growth seriously. Reviewing interdisciplinary literatures on extractive politics, conflict and peacebuilding, I identify epistemological and pragmatic path dependencies in solutions-based scholarship that has developed within a growth-based paradigm, shaped also by psychological and cultural barriers to accepting a future of environmental decline and escalating conflict. I conclude by considering the kinds of questions scholars might raise if we are to reorient the field toward an acceptance of and engagement with a limits to growth understanding.

Keywords: ecofeminism; ecological overshoot; environmental peacebuilding; extractive politics; limits to growth; peace studies; political ecology

Economist, social scientist, and peace activist Kenneth Boulding is often quoted as saying that “anyone who believes in indefinite growth . . . in a physically finite planet is either mad or an economist.” Boulding’s contributions to general systems theory and ecological economics were foundational to the field of peace studies, but this discipline often side-steps the limits-to-growth conversation, focusing instead on the pragmatic concerns of peacebuilding on the ground, addressing the exigencies of conflict, war, and suffering and, the long-term basis of lasting structural peace. In this essay, I review three disciplinary perspectives on the nexus of extractive politics, conflict, and peacebuilding to explore the potential for applying a limits-to-growth framework to peace studies. Research which addresses inequities, conflict resolution, and peacebuilding strategies within a growth-based economy continues to be prioritized within peace studies, however, posing a challenge to the application of new frameworks. These include both epistemological path dependencies constraining scholarly understandings of the scope of the causes of conflicts and violence, and practical path dependencies constraining imagined best responses that have led to a prioritization of conflict resolution and peacebuilding strategies that work to further a growth-based economy. I conclude by generating new questions to frame new possibilities for peace studies’ engagement with planetary limits to growth.

The Limits to Growth in Science and in Policy

The seminal 1972 *Limits to Growth* report, in which Donella Meadows and her team of researchers at the Massachusetts Institute of Technology modeled exponential population and consumption growth, is now over fifty years old. Commissioned by industrialists and world leaders concerned about the future ecological ramifications of global industrialization, this research study was the first to globally project the interacting effects of accelerated industrialization, rapid population growth, malnutrition and food shortages, the depletion of nonrenewable resources, and ecological decline. The outcome of these models was dire. Even

when the models were rerun with the most optimistic scenarios imaginable—reducing pollution and doubling available resources, agricultural yields, nuclear energy, and slower population growth—the results were damning to human life in the future (Visser, 2009). The authors concluded that,

The application of technology to apparent problems of resource depletion or pollution or food shortage has no impact on the essential problem, which is exponential growth in a finite and complex system. Our attempts to use even the most optimistic estimates of the benefits of technology in the model did not prevent the ultimate decline of population and industry, and in fact did not postpone the collapse beyond the year 2100.

A long history of global responses followed the study's publication, including the development of a global environmental movement that would emphasize conservation and a range of international policy measures intended to slow environmental decline.ⁱ Nonetheless, states have done little to curb the exponential growth of global carbon emissions and industrial expansion. In fact, emissions have increased by 90 percent since the 1970s (EPA, 2022a), increasing 45 percent from 1990 to 2019 (EPA, 2022b). The EPA estimates that fossil fuel combustion and industrial processing has caused approximately 78 percent of this increase, with the remainder resulting from secondary contributors such as agriculture and deforestation (EPA, 2022b). In 2009, Johan Rockström led a group of 28 international scientists in issuing a statement on how limitless growth threatened nine planetary boundaries, including atmospheric climate change brought about by excessive greenhouse gas production, human industrial infringement resulting in terrestrial and marine biodiversity loss, interference with the balance of nitrogen and phosphorus cycles, stratospheric ozone depletion, ocean acidification, global freshwater use, changes in land use, chemical pollution, and atmospheric aerosol loading. At that time of first publication, the authors concluded that humanity had already surpassed humanity's survival thresholds for three planetary boundaries: climate change, biodiversity loss, and a balanced nitrogen/phosphorus cycle.ⁱⁱ By the time of my writing, the Stockholm Resilience Centre has declared two additional boundaries to have been crossed: land use and chemical pollution.

In response, a growing climate and environmental lobby has begun to call for greater acknowledgment of the limits to growth on a finite planet. Scientists of multiple and intersecting disciplines have repeatedly signed on to urgent warning letters (Barnard et al., 2021; Ripple et al., 2020) calling for world leaders to take the threat of human and animal extinction seriously (Greenfield, 2022; Kolbert, 2014). In conscious or unconscious disregard for the limits-to-growth thesis, many global policymakers remain focused on technological fixes that are ironically dependent upon the continued expansion of industrial extraction. At the 2021 United Nations Climate Change Conference, also known as the 26th Conference of Parties (COP26), global leaders in politics, economics, and civil society came together to discuss agreements to reduce global carbon emissions. Top among the conference's goals was to "Secure global net zero [carbon emissions] by mid-century and keep 1.5 degrees [of an increase in average global temperatures] within reach."

COP26 set forth the declaration that,

To deliver on these stretching targets, countries will need to:

- accelerate the phase-out of coal
- curtail deforestation
- speed up the switch to electric vehicles and,
- encourage investment in renewables

This agenda's focus on climate change, reducing carbon emissions, and embracing a green transition defined by electric cars and other "renewable" energy technologies follows firmly in the footsteps of the Kyoto Protocol, a neoliberal market approach to climate change. COP27, held in November of 2022, added commitments to increase funds for assisting the most vulnerable countries with recovering from climate disasters and issued a call to reform financial institutions and the global development finance system. Meanwhile, the United Nations Environmental Programme's latest Emissions Gap Report, released at COP27, suggests that the global community would need to drop emissions by 50% in just 8 years to achieve its goal of maintaining a global rise in warming of no greater than 1.5 degrees Celsius (UNEP, 2022).

Further, the meetings themselves are sponsored by some of the world's largest global corporations and financial institutions, which are firmly committed to the growth-based model of global development and see colossal profit potential in these solutions. This factor is particularly concerning for civil society advocates, in part because these technological solutions require ramping up extractive industries that largely source their materials from developing countries. These industries have historically disadvantaged local populations, contributing to often irreparable ecological harm. Many environmental advocates are particularly opposed to the expansion of the electric vehicle industry (Balch, 2020; Cox & Cox, 2022; Deaux, 2022) and generally call into question magical thinking about "renewables" sourced through intensive extractive practices and fossil fuel powered industries (Cox, 2020; Friedemann, 2021; Dyke et al., 2021). Supply chain issues and shortages have long been an "elephant in the room" in the mining industry as well but limiting economic and industrial growth further conflicts with industry interests (Michaux, 2021). Scholars warn that as we approach these very real limits, increased scarcity could lead extractive industries to increase production on every available frontier to gain access to dwindling resources, a trend some refer to as a "new scramble" akin to historical conflicts over colonial expansion (Kurtz, 2022). Extractive industries lie at the heart of all of the issues contributing to ecological overshoot and all of the social ills it may exacerbate.

Within this understanding, there is an awareness that the industrial age's effects have historically disadvantaged poor nations, where the majority of extractive projects are located, in distinct ways. These projects are increasingly correlated with conflicts related to access to water, flooding, falling water tables, land grabs, displacement, pollution, toxic spills, health problems associated with waste and contaminant runoff, and exploitive contracts between multinational corporations and local people (Martínez-Alier, 2021; van Staden, 2022). In addition to the violence resulting from extractive conflicts, the developing world also disproportionately suffers from the effects of extreme climate change. In 2018, the UN Special Rapporteur on extreme poverty and human rights issued a report on how climate change would continue to increasingly harm the global poor. The

report estimates that poor countries would bear 70 to 80 percent of the costs of climate change, which could unravel the last 50 years of work in development, healthcare, and poverty reduction programs. It further predicts that 120 million more people—who are themselves responsible for just a small fraction of emissions—will be pushed into deeper poverty by 2030, at which point nearly two-thirds of the world's population is expected to face serious water shortages. The authors noted that in 2017, 18.8 million people had already been displaced by climate disasters, nearly double the number of those displaced by war. Finally, the authors expressed concerns that receding access to food, water, shelter, and employment could lead to new kinds of conflicts and violence.

Citizens of the developing, postcolonial world relate to industrial growth in different ways, from embracing and welcoming economic opportunities to condemning and repudiating the harm that accompanies them. Those who have spoken out against the role of technological solutions to climate change in the ecological decline of the world's poorest regions point to the lethal mix of environmental pollution and social unrest caused by extractive industries.

That marginalized people continue to suffer disproportionately is of special interest to peace scholars, but adopting a limits to growth perspective means asking deeply difficult questions that, in some respects, challenge the very foundation upon which many peacebuilders' work has been done. Still, it is increasingly understood that not facing the ecological limits to growth or the consequences of environmental destruction may mean allowing a far worse degree of human suffering to occur than necessary. Below, I explore how to have these onerous but urgent conversations and, in particular, how peace studies, which has long been organized around a commitment to mitigating human suffering, can approach extractive conflicts through a limits-to-growth framework.

Extractive Politics, Conflict and Peacebuilding

Intersecting fields of research have addressed extractive politics as a historical legacy of colonialism, the fuel of the postcolonial global economy, and a source of ongoing violence, conflict, and inequities that harm both people and the planet. Political ecology, environmental peacebuilding, and ecofeminism, which has often developed within a tradition of deep ecology, all generate different insights and solutions relevant to peace studies' understanding of extractive politics, conflict, and peacebuilding.

A robust literature of political ecology has developed since the 1970s. This research documents the historic entanglements of colonialism, economic imperialism, and extractive industries, in addition to these industries' detrimental effects on people and the environment. Political ecology is an interdisciplinary field which emerged from critical geography and often forwards a political economy framework, asking who benefits and who suffers from ecological interventions. Early studies traced the interrelation between colonialism and extractive industries in the developing world, and the ongoing disadvantages and accompanying violence nearly a century later (cf. Blaikie, 1985; Bryant, 1998; Bryant & Bailey, 1997; Watts, 1983). Often organized geographically, the field has documented a history of extractive conflict related to seemingly every product we consider a staple of the modern world: all major agricultural products grown on plantations and large-scale farms, including wood and paper; foundational materials in modern building, including steel and concrete; the materials upon which all modern global transportation

relies, including rubber, oil, and gas; and the components of all modern technology, including metals, minerals, plastics, and other synthetics. Even the water harvested for dams and hydropower and the coal and natural gas that powers both industry and our daily lives is part of the story of, often violent, extraction.

Pragmatic application of political ecology often extends an assumption that these industries could be better governed, could implement fairer practices, and could enforce policies that are healthier for the natural environment (Robbins, 2005). Tania Li and Puja Semedi's new book, *Plantation Life: Corporate Occupation in Indonesia's Oil Palm Zone*, for example, provides an in-depth examination of the exploitative experiences common throughout plantation life in a country that now provides approximately 50 percent of the world's palm oil. The negative effects of this industry on Indonesia's forests and soil are unquestionable. The book's cover photo of giant palm oil trees injected with glyphosate starkly depicts this grim reality, although it is a secondary concern to the injuries to human welfare that serve as the humanist focus of the book. The authors end the book with a critical overview of why and how these powerful corporations fail to take better care of the people who sustain their industry. They suggest that the Indonesian government cease corporate expansion and allow indigenous farmers to manage the crops.

Political ecologists have also examined the close connection between extractive industries and war. There are notable trends in the rise of extractive industries in the postcolonial world following the retreat of Cold War funding in the 1990s (Le Billon, 2000; Le Billon, 2001; Le Billon, 2003; Watts, 1999). In recent years, those with an "environmental justice" lens have documented thousands of conflicts around mining sites, large agribusiness projects, and industrial processing zones. A report funded by the European Union, for example, used data compiled by scholars from 23 different academic institutions to identify 3,741 known conflicts regarding economic activities that led to negative environmental and social outcomes across the nuclear, mineral ore mining, forestry, agriculture, fishery, livestock management, waste management, fossil fuel, water, industrial processing, energy production, tourism, and infrastructure industries (Martínez-Alier, 2002; Martínez-Alier, 2012). Some of these are long-standing legal disputes and some are armed conflicts, many involving major multinational corporations that are simultaneously listed on the London Stock Exchange and accused of large numbers of human rights violations (Vidal, 2015). Beyond documented outbreaks of violence at extraction sites, others have recorded the links between exploitative extractive industries and human rights violations of all kinds, from sexual harassment to slavery and ecocide (Bales, 2016). It is generally understood that conflict minerals are essential to the creation of a wide range of modern products enjoyed by consumers across the world.

Environmental peacebuilding scholarship also extensively examines extractive conflicts near war zones and industries' roles in post-war stability or instability with an eye toward conflict resolution and peacebuilding in these communities. A compendium of studies, *High-Value Natural Resources and Post-Conflict Peacebuilding* (Lujala & Rustad, 2012), showcases the importance of this work. Here, contributing authors explore how local political corruption renders fragile nations' vulnerable to deals from which only a few elites will profit. While this volume is careful not to use the term "resource curse" salient among critical development scholars, much of the work

therein draws on longstanding efforts to “reverse the resource curse” of former colonies (in particular, see Humphreys, Sachs, & Stiglitz, 2007). The volume instead opens with a strong statement about the disparity in potential profits versus actual inequities in all of the post-conflict countries addressed by its contributors. Each country in question has relied on extractive industries based in oil, gas, minerals, gemstones, timber, palm oil, and/or cash crops through colonization and conflictual periods into post-conflict waves of deepening inequality and violence. Still, the book’s editors commit to working within the global commodities economy to produce meaningful proposals for equity and peacebuilding in collaboration with existing industries, treated here as potential allies in expanding equity and peace in post-conflict countries. To this end, the volume explores the varied challenges of cutting aggressors off from resource revenues, how corporations manage contracts with communities after war, the roles intergovernmental and international nongovernmental organizations can play in industry governance, obstacles to effective wealth distribution after conflict, and the persistence of inequities and tensions that threaten to erupt into new waves of violence across Afghanistan, Angola, Chad, the Democratic Republic of Congo, Iraq, Liberia, Nepal, the Niger Delta, Sierra Leone, Sudan, and throughout Southeast Asia.

This work has contributed to the active, policy-oriented research agenda of the Environmental Peacebuilding Association, a global think tank that aims to bring together world leaders and scholars. Additional monographs featured by the association include studies on the restoration of natural resources, land management and land rights, water, natural resource livelihoods, and the governance of natural resources, all positioned within the context of post-conflict peacebuilding. In so doing, these scholars take a pragmatic approach to the precarious situations countries often find themselves in after the terrible losses brought about by civil war and state violence. When faced with the prospect of either adding to mounting international debts while taking on more violence, starvation, and extreme poverty or working with existing economic opportunities to build up fragile infrastructure and redistribute wealth, many working in the field of environmental peacebuilding prioritize expedient solutions to pressing human security needs. These tend to center on making agreements fairer for communities on the ground, encouraging processes that are more inclusive of effected communities in decision-making, and demanding industrial practices that leave a lighter impact on the local environment.ⁱⁱⁱ From a sociology of knowledge perspective, there is a strong, if not resigned, but compassionate realpolitik to this approach. The probability of extractive conflicts is high in many countries and industries are powerful actors. The orientation adopted by these scholars and practitioners is therefore to ask how to help those in harm’s way by working within the system that constrains them.

Many of the success stories related to this approach focus on the lives of individuals whose suffering has been alleviated by interventionists, from emboldened and organized local advocates to committed transnational solidarity communities. The recently published *Catholic Peacebuilding and Mining: Integral Peace, Development, and Ecology* documents several moving accounts of religious advocates committed to fighting for what is morally right for people and planet against all odds. Among them are Catholic church members who surveyed and supported communities impacted by mining projects in Colombia and Jesuit leaders who devised more supportive policies for community members in the Democratic Republic of Congo. This work is important to communities that depend on outsiders remaining committed to their cause.

There are also an array of civil society organizations and networks that offer vital support to communities working to stave off unwanted extractive projects. In 2017, a coalition of NGOs from around the world came together to form Yes to Life, No to Mining, which collaborates on campaigns supporting alternative, sustainable futures for those resisting extractive expansion in their homelands. This coalition points to successful cases of holding back gold mining companies in Ireland and Colombia, peat mining industries in Northern Finland, and mega-dam projects in Myanmar as strategic action campaigns that can be replicated elsewhere. Smaller organizations affiliated with the network have also celebrated communities that held onto the rights to their territorial lands in Uganda (NAPE, 2022) and in Romania (MiningWatch, 2021).

In my interviews with Liberian peacebuilders (Gallo-Cruz & Remsburg, 2021), I collected many stories of savvy strategic action. One organizer had facilitated a transnational alliance between Firestone workers in the US and Liberia, which raised the consciousness of the US union workers to the realities faced by those on the extraction end of the commodity chains their work was tied to, inspiring them to share organizing techniques and support. Interviewees who had worked with Global Witness also made clear the invaluable solidarity and organizing power they had provided through the end of the long civil war and beyond. Global Witness put pressure on the UN Security Council, which ultimately contributed to a halt in state violence by cutting former President Charles Taylor off from his timber and arms supply chain, providing post-war advocacy for a free press, supporting democratic land management policies over land grabs, and promoting transparency in concession agreements that had, in the past, benefitted elites while disadvantaging communities. Their work has been profoundly appreciated by local Liberians who may otherwise feel that outsiders are only there for their own profit. Liberian citizens are, however, still fighting Firestone on numerous charges of injustice while working to maintain land rights in the face of expanding extractive projects. The definition of success and the meaning of strategic action, therefore, can vary at different levels of analysis.

A more recent focus in political ecology zeroes in on the extractive politics of green technology. While this continues the longstanding tradition of exploring the relationship between politics, the economy, and the environment, it adds an important new empirical corrective to the abstract solutions offered by green technology movements in the developed world. Solar panels and wind turbines are presented as providing residents of the Global North the ability to maintain their high-energy lifestyles in a more ecologically friendly way. Research has revealed, however, that most of the minerals and metals central to green technologies are derived from unjust commodity chains that disadvantage communities at their extraction sites. This includes everything from lithium mining in Bolivia (Perrault, 2020) to cobalt mining in the Democratic Republic of Congo (Wilson, 2017) and nickel mining in Guatemala (Kassam, 2017). Church and Crawford (2020) have dubbed these “green conflict minerals” because the industry has so strongly benefited from the vulnerability of fragile states. For this reason, some scholars characterize extractive politics as “necro-politics,” alluding to the willingness of powerholders to subject people in colonies, plantations, militarized zones, and, in this case, extractive communities to violence and the risk of death (à la Mbembe, 2003; see also Menton, Navas, & Le Billon, 2021). Some also draw on the concept of “necro-capitalism” (Banerjee, 2008), in which the structure of economic arrangements de facto exposes locals to violence. Menton and Gilbert (2021), for example, scrutinize how large

international NGOs dedicated to conservation have made concessions to major oil and gas companies that have harmed local people. DeBoom (2021) describes how a violent uranium extraction program in Namibia has been legitimated by ecological civilization discourse publicized by Chinese and Namibian state authorities. Holden (2022) follows a string of murders of environmentalists in the Philippines tied to former President Rodrigo Duterte's War on Drugs, which Holden argues is an expansion of authoritarianism that exacerbates climate change's negative effects on the already highly vulnerable country.

Others combine critical analysis with ecofeminism to add an understanding of how systems based in objectification and domination lead to inequities and violence directed at women, the planet, and people in general. While ecofeminism now constitutes an umbrella term encompassing both humanist (and human prioritizing) feminisms as well as more-than-human deep ecological frameworks, both can acknowledge the special harms experienced by women in conflict and at the hands of environmentally destructive industries. Ecofeminist thought has weighed in most heavily on extractive politics through the framework of "embodied materialism," an understanding of the unseen but exploited labors of women. This labor occurs not only within the capitalist system, but also through labor that goes unrecognized in capitalist economies. This includes reproduction itself, as well as caring for children. Through an acknowledgement of the vulnerability of female childbearing and nursing, embodied materialists suggest, one can better understand the dependencies and precarities of life, causing the dualism of man/nature that undergirds a humanistic approach to the environment to lose its significance (Salleh, 1984; Salleh 2017). The embodied materialism approach is at once deeply sociological and biological, analyzing the historical and political economic nature of social relations while also exploring the biological dependence of human life on the living environment that sustains it. This extends the concept of alienation from one's labor to the deep level of biological existence. In Vandana Shiva's book *Staying Alive* (2016), she laid out a number of observations. These include that the local diversity of culture and biological life which human life depends on has been eviscerated by large-scale development projects that have industrialized agriculture and production; that, in the process, the integrity of the forests, water, and land upon which people depend is in serious decline; and that this violence against nature has led to an expansion of violence against women alongside a cultural legitimation of the limitless extraction of natural resources. She argues for a nonviolent movement against corporate greed and unfettered global capitalism, and for supporting women as stewards of local and naturally sustainable movements.

This approach holds constant a limits-to-growth understanding of extractive politics. Sociologist and Native American activist Winona LaDuke has taken on the violence of extractive industries against Native American communities in a number of essays that point to the special harms experienced by Native women. In these essays, LaDuke discusses how uranium mining has threatened Native lands and health (1981); studies that have found alarmingly high levels of pesticides, dioxins, and other industrial chemical residues in the breast milk of Native women who live far away from industrial pollution sources but whose food systems are nonetheless saturated with industrial waste (2000); and how nuclear waste disposal sites are located on and near Native lands (2000b).

Feminist insights are applied in critical analyses of what constitutes human security both during and after war. Extractivism, ecofeminists point out, increases land displacement, which interferes with household and community agriculture (Carreta, Zaragocin, Turley, & Orellana, 2020; Muñoz & Villareal, 2019). Mining disrupts access to hunting, fishing, and potable water. Violence, including sexual violence, often increases around extractive project sites. Research into “conflict diamonds” and other mineral extraction projects in the Democratic Republic of Congo, for example, has shown how the rape of women is used as a weapon in land-grab conflicts with the end-goal of expanding extractive industries (DeVoe, 2011; Trenholm, Olsson, & Ahlberg, 2011). Similarly, ecofeminists link sexual violence to the temporal shifts in norms and power facilitated by extractive industries located in aboriginal communities around the world. In these cases, the uprooting of sustainable ways of living give way to large extractive projects, after which the prostitution industry often expands to meet demand from temporary workers (Tosh & Gislason, 2016).

Post-war security, ecofeminists explain, should take on a preventative stance to ensure an end to everyday conflicts. This should center measures of human health and well-being as well as the maintenance of land rights and smaller-scale economies that empower women and communities to provide for their own basic needs. Carol Cohn and Claire Duncanson (2020), for example, conduct a policy analysis showing how a focus on economic growth as a post-war priority has worsened the security of many citizens in Guatemala, Liberia, and Papua New Guinea. In their analysis, Cohn and Duncanson trace how post-war economic agreements with foreign companies and international financial institutions’ influence on local contracts and laws have benefitted corporate interests rather than the needs of post-war countries. Though in each case some investments were made to improve local infrastructure, neither the projects themselves nor the salaries they provided to local workers met the full needs of the people.^{iv}

Of these three approaches, the first two fields of political ecology and environmental peacebuilding studies share a common framework of analysis for documenting and examining the nature of intrasystemic inequalities. Both bodies of research have embraced a humanist lens that focuses on human interests in a growth-oriented economy, leaving the threat our species poses to the integrity of the ecosystems we depend on largely out of (or as a secondary concern in) their analyses. The field of political ecology reveals often unseen power relations embedded in transnational political and economic spaces that profoundly affect regional realities. These insights are critical to understanding how violence is enabled by institutions. The field of environmental peacebuilding has focused on concrete conflict resolution strategies and generated strategic proposals for structural transformations that can instill a lasting peace in areas devastated by longstanding wars or ongoing violence. These include policy solutions that directly address the roles played by industry, state, and non-state actors. Ecofeminist work, in particular the framework developed as embodied materialism, also enhances the field of peace studies by applying a systemic analysis to the nexus of growth-extractive capitalism and patriarchy that deeply affects the lived realities of those positioned along the complex commodity chains of extractive industry. While several scholars have contemplated the relationship between the ideals of peace studies and a scientific understanding of planetary limits to growth, there has not, as of yet, resulted a substantial enough paradigm shift to reposition this research. Instead, the analytical and pragmatic approaches taken

by political ecology and environmental peacebuilding studies continue to perpetuate epistemological and pragmatic path dependencies that direct scholarship towards relieving suffering by working within the existing extractive-growth system. What follows is a series of considerations I suggest the field must address as we rethink both discrete and systemic conflicts through a limits-to-growth framework in an age of compounding ecological crises.

Peace Studies and Limits to Growth

The Center for Environmental Conflict and Collaboration at my home institution, Syracuse University, offers these statistics on its webpage: “26 years until the end of seafood; 46 years until the end of oil; 78 years until the end of rainforests.” These figures demonstrate a clear and strong recognition of global limits to growth through relevant and compelling calculations. If peace studies were to center a limits-to-growth perspective in its scholarship, what concerns would be invoked and how would that shift the frame of inquiry in our field?

A limits-to-growth perspective may first be defined as the acceptance of ecological limits to the degree of alteration, via the resource extraction and pollution created by industrial production and consumption, that the natural world can tolerate without experiencing “ecological overshoot,” through which our ecosystems lose their ability to sustain life. Scientists have already issued countless warnings about passing critical thresholds in planetary survivability limits accompanied by regional ways of understanding these boundary breaches (Steffan et al., 2015). A limits-to-growth perspective can also be conceptualized globally, putting forth the understanding that industrial extraction processes such as deforestation and mining have definitive planetary limits due to how they impact the atmosphere, water cycle, and food systems on a planetary level. Given that we have surpassed critical tipping points in both resource availability and the delicate balance of interacting ecosystems, we can expect further extraction to expediate the negative effects of climate catastrophe. This breach in growth is reflected through the global warming that accompanies the excess emission of greenhouse gases and other forms of pollution that follow from the over-production of artificial chemicals, fossil fuels, and their by-products, including the microplastics and industrial chemical residues now found in nearly every corner of the world.^v A limits-to-growth perspective can also focus on human population growth as a secondary outcome of the industrial extraction of fossil fuels. While this technology has significantly increased the human life span, it is understood that modern increases in the consumption of materials and commodities, and the emissions that accompany that consumption, are primarily driven by the Global North. A limits-to-growth perspective positions extractive politics, conflict, and peacebuilding within a system of production and consumption that threatens the future of people and the planet.

If we therefore center a limits-to-growth perspective in peace studies, these orienting questions may help organize future scholarly dialogue.

Peace studies addresses the causes and nature of conflicts and violence, both immediate and long-term. As we now understand growth-based economies to fuel these conflicts, how shall we think about the exigencies of violence and ongoing conflict within a limits-to-growth framework?

Scholars have extensively documented the ways in which extractive industries provide a map for ongoing and future conflicts. Beyond emphasizing that real limits to resource extraction mean we can expect these conflicts to become more frequent and intense, a limits-to-growth framework problematizes global extractive capitalism as a cultural phenomenon distinct to modern history bound up in complex social processes, rather than an inevitable part of the linear progression of modern life. It can be understood that our continued investment in a paradigm of growth on a finite planet emanates from a social value for consumption and the flow of commodities unique to the lives of modern humans (Catton, 1980).

The concept of the “resource curse” in development studies, coined by Richard Auty in 1995 and revisited in Sachs and Warner’s (1999) economic assessment of the correlation between resource abundance and poverty, helps to articulate the political economic dynamics of this reality. The values assigned to what is targeted as extractable land (the perception of natural areas as resources to be turned into products for global markets) precedes the motivation to gain access, often by exploitative or violent means. This is vividly illustrated in *The Environmental Justice Atlas*, which has recorded over 3,747 conflicts related to commodity extraction and waste disposal as of January, 2021 (Martínez-Alier, 2021). This phenomenon has long been on the radar of global human rights and environmental organizations whose work focuses on protecting the lands and peoples “cursed” with resources. News journalists have also increasingly been involved in documenting the “dirty secret” of green energy (van Staden, 2022) and how this contributes to the new “scramble for Africa” and other poor countries struggling in a global economy that has historically disadvantaged them (Kurtz, 2022). To this end, some of our tools for assessing the possibility for structural peace in a country, for example the Positive Peace Index, may be outdated and constrained by a pro-growth paradigm. The PPI measures the balance of political rights, social services, and the distribution of economic opportunities, but makes no critical assessment of the precarious dependencies upon foreign directed or local extractive economies or the decreasing stability possible with environmental decline.

What would a new limits-to-growth cognizant index look like? Perhaps it would calculate the ability of countries to sustain themselves, equitably and peacefully, in the face of disruptions to global supply chains and climate or ecological disasters. Would national borders still hold significance for this kind of measure, or would other regional or social/political/economic configurations take precedence?

Beyond diagnostics, a limits-to-growth framework can also help recalibrate how peace scholars and peacebuilders organize their work in conflict-ridden areas. As traditional growth-based economic theory may conceptualize the resource curse as a question of how countries can make the best use of their own natural resources in order to profit from extractive industry, development and growth-oriented peacebuilding asks how to achieve the best redistribution of this growth-based income. Acknowledging the planet’s limits to growth necessitates also recognizing that growth-based solutions are linked into a global commodity system that contributes to global warming and ecological decline, even under fairer economic conditions. This requires, to use mining as an example, acknowledging the geological fact that, no matter who owns the mine or how they manage it, you cannot construct a gold or uranium mine without altering the integrity of the area’s

water and leaving behind environmentally harmful waste. (And it's worth reiterating that mining has already proven time and again to alter local economies, exacerbating conflicts, inequities, and violence.) A limits-to-growth framework acknowledges that the costs of extractive industries like mining run beyond labor to include ecological, economic, and social insecurity at the local and global levels. It also asserts that simply helping countries to gain a more favorable exchange rate for their commodities is not enough to address these other harms.

With this in mind, a limits-to-growth framework could inspire generational thinking. What will engagement in extractive industries now mean for the next generation that inhabits the areas where these projects are located or the next generation to inhabit the planet? What are the political, economic, social, cultural, and ecological paths being paved by extractive industries in the face of global limits to growth? Peacebuilders may be pressed to address the violence and suffering of the present, but this does not mean they must abandon consideration of the consequences bequeathed to the future. A limits-to-growth framework invites a sober reckoning with the implications of present engagements upon future outcomes.

The movement of refugees also takes on new importance within this framework. The limits-to-growth perspective sheds light on the scramble for new resources to be understood as just that—a scramble. The process by which land is acquired to produce coveted resources most often means that the peoples who previously inhabited that land are forced to move. Conversely, people may choose to move because of reduced access to clean water or increased insecurity that interferes with their ability to safely sustain their lives and livelihoods without attack or exploitation.

Ahuja's (2021) *Planetary Specters* traces how extractive industries have reshaped the Earth's geographic terrain, displacing people in the process. When moving across the new borders defined by modern racial capitalism, Ahuja argues, climate refugees face a different kind of limits-to-growth thinking among global consumer and financier nations that pine for goods but reject the people that accompany the flow of commodities into the Global North. Journalists continue to document this phenomenon as it happens within nations too. Farmers fleeing extreme heat and desertification in southern Iraq are heading north, where migrants are unwanted (Loveluck & Salim, 2022). In Zimbabwe, farmers have fled their flooded highland homes to dwell in lands now designated as timber plantations, where they clash with the companies managing those lands (Mambondiyani, 2022). Cities in Bangladesh are swelling with climate migrants from around Southeast Asia (Lowenkron, 2021) as weather shocks and land displacements caused by extractive industries drive rural Brazilians inward to live in *favelas*, or city slums (Vorobyov, 2020). It is estimated that approximately 17 million people have left their homes due to environmental disruptions worldwide (Internal Displacement Monitoring Centre, 2019) and over 143 million migrants are predicted to migrate within their countries (World Bank, 2021). In light of these facts, states around the world have begun deliberating what their migration policies should be in response to future waves of climate migration. New kinds of conflict are predicted to arise in response to both closed and open border policies (Boas, 2015; McLeman, 2019; Piguet, Pecoud & de Guchteneire, 2011). How should peace studies contend with relative growth in populations as migration expands across the globe?

Finally, a limits-to-growth perspective also reframes the likelihood for different responses to extractive conflicts to succeed. Specifically, the limits-to-growth framework may put forward the hypothesis that conflict resolution strategies that allow for some amount of growth—such as including local voices in negotiating fairer contracts—will be more successful than those that resist it. Preventing extractive development projects in particular areas, for example, may be successful if companies are able to extract the resources they desire from somewhere else. But the planet's limits to growth ultimately means that these short-term strategies of humanist “improved” growth will undercut people and the planet's long-term ecological well-being. This will be a hard pill to swallow for those focused on the urgency of social justice in the present system. Still, here, Audre Lorde's thesis that “the masters tools will never dismantle the masters house” is apropos, as is Einstein's maxim of “quantum insanity:” doing the same thing over and over again and expecting different results. Is there a new kind of peace to strive for in an age of ecological decline?

A strong tradition within structural peace studies points to the fundamental role of equality and shared access to the resources necessary for human well-being in ensuring the possibility of peace. How then shall we navigate development strategies for peacebuilding while acknowledging that industrial and extractive capitalism threaten our biosphere's ability to support human life?

Some scholars have taken a strong stance against the possibility of increasing global equity through Western development. Gilbert Rist's (2014) *The History of Development* has been pivotal in this area. Rist critically deconstructs the intricate relationship between the historic decisions that led to the rise of a global Western development industry in the postcolonial world and the ideological imperatives to push for universal “stages of growth.” Although these stages have never fully materialized in the developing world, this imperative continues to evolve through public relations makeovers that promise more humanistic and inclusive practices.^{vi} In Liberia, for example, these cosmetic changes are seen in the gender mainstreaming and environmental standards discourses that run through the programmatic statements of foreign investment institutions purporting to prevent inequities, ecological decline, and the displacement of people faced with these problems with pledges to equality. Evidence of practice proves otherwise.

Despite predicting a “groundswell” of internal climate migration fueled by environmental decline and rising poverty, organizations like the World Bank continue to pursue growth by mapping out areas where extractable resources remain to be tapped. This paradoxical orientation toward continued growth despite knowledge of its negative impacts means countries like Liberia are targeted for ongoing development projects. In 2022, the World Bank's reporting on Liberian markets declared that “the **country is rich in natural resources** which include iron ore, diamonds, gold, fertile soil, fishery, and forestry. However, the economic potential of these assets **remains largely untapped.**” This statement, highlighted in line with the original text, vividly illustrates the endurance of the resource curse in current economic practices. While the World Bank invests in research on inequities and environmental outcomes, its ultimate objective is to finance growth-based development through the extraction, production, and sale of commodities. Its work continues to push a growth-oriented paradigm of economic development that makes poor countries not only the target of development programs, but the object of extractive economic growth, with little

benefit but much detriment experienced by targeted countries. Case in point, all sixteen world development goals depend on mining (Marshall, 2020).

As the work of the World Bank demonstrates, understanding the limits to growth on our finite planet need not necessarily be coupled with a moral stance calling into question the harms of an extractive economy. These limits to growth have long been thoroughly understood by some of the most powerful global institutions perpetuating global environmental decline, including global financial and investment circles. It has been documented that the oil industry, for example, has extensive knowledge of the life-threatening effects of human-caused global warming (Franta, 2021; Weart, 2021). Recently, stories of billionaires building bunkers to escape societal collapse and resource shortages have also gained attention in the global news (Dobson, 2020; Rushkoff, 2022). Even military planners take into account the strategic shifts that will become necessary as resources become scarce, commodity chains are interrupted, and climate-change driven weather catastrophes become more frequent (Boas, 2015; Brzoska, 2012; Smith, 2007; Thomas, 2017). Meanwhile, global financiers of polluting industries poke fun at the magical thinking of advocates for green technology, resolving instead to profit from fossil fuels and related extractive industries as much as they can for as long as they can (Cembalest, 2021). These different stakeholders recognize definitive limits to growth but respond according to their own strategic interests.

The field of peace studies, in contrast, has long embraced a commitment to understanding how conflicts and violence work for the express purpose of preventing wars and acts of aggression, ameliorating the suffering of those who experience them, and expediting the reconciliation and rebuilding process after wars have concluded. The limits-to-growth framework presents an opportunity to expand our understanding of structural peace, traditionally defined as including both the absence of violence as well as the absence of psychological and economic harm (Galtung, 1969).^{vii} A positive form of peace can be defined by the presence of equity and equanimity among peoples who also enjoy security in every sense, including political, economic, and social. A structural peace that accounts for the nature of the human species as dependent upon its ecology on a finite planet is one that has long been promoted by ecofeminists. Shiva and Mies (2014) have argued that a fundamentally objectifying world view underlies the supposed binary oppositions between man/woman, man/nature, North/South, industrial/indigenous. Each of these binaries, they suggest, are organized around domination, including the industrial extractive production and accumulation processes that result in violence against people and planet. Ariel Salleh's work illustrates the distinct contributions ecofeminism has made to deepening ecological understanding. In her essay "'Holding' a Just and Ecological Peace," Salleh (2020) presents integrative, life-affirming exchanges between humans and nature as fundamental to overcoming the Othering and violence of patriarchal, racist, and colonial military industrial systems. This approach necessitates an understanding of the politics of everyday life as intrinsically rooted in social systems with consequences that may or may not be deeply felt depending on one's position within and among those systems. Degrowth is the first step toward peace, she urges, as one cannot disengage from the systemic violence of systems primed toward the consumption of others without interrupting those systems.

Structural peace in an ecologically grounded sense should include clean water, clean air, the ability to grow food, and access to a healthy environment that is not depleted or fundamentally compromised by extractive endeavors. While some humanists committed to social justice have argued that this paradigm values the natural world over human life, an ecofeminist ethos infused with more-than-human understanding is compatible with the scientific insights of a limits to growth perspective that positions humans as one valuable member of our biosphere's community of species. This view articulates that humans cannot survive in a dominant position over other beings. It further puts forth that our current ecological predicament stems from a historic period of human supremacy powered by fossil fuels. An ecofeminist ethos rejects the commodification of isolated beings as objects as well as the humanist tradition that places humans in competition with other beings and presents human supremacy as a given. While human life may be deeply valued and cared for within an ecofeminist framework that advocates strongly for the well-being of marginalized women, more-than-human strands of ecofeminism recenter humans as one animal species within a system of species that must be in balance if all are to survive and thrive. In this sense, an ecofeminist response to the false dichotomy posed by the humans versus other species debate mirrors a feminist response to debates about men versus women. Many feminists and ecofeminists alike do not believe that competition between sexes or species is necessary or productive and consider these dichotomies to be systemically destructive because they deter the cooperation necessary for a sustainable reciprocity.

Such an ecological expansion of the idea of structural peace has the potential to shift the framework's focus onto economic equality and redistributive programs in addition to cultural and social forms of peacebuilding. It would necessitate new conversations about how a species growing exponentially in a post-fossil fuels world of historically unique machine and medical technology^{viii} can live peacefully within the ecosystem without exhausting its resources or polluting that ecosystem beyond its tipping point.

Interdisciplinary insights may also benefit this environmental regrounding of structural peace. There has been a proliferation of different concepts that can organize the discussion of effective responses to ecological overshoot. The ideals of "degrowth," "circular economies," and "doughnut economics" have all begun to attract intellectual and advocacy attention (Heikkurinen, 2019; Kircherr, Reike, & Hekkert, 2017; Raworth, 2017). These concepts have a lot in common with earlier models such as the steady state economy devised by Hermann Daly and the traditional model of subsistence economies lauded by Shiva and Mies. Still, understanding structural foundations for peace through the lens of a limits to growth framework will require some of the most difficult conversations and dialogues the field has had yet. It will mean engaging with the full implications of the scientific understanding of the possibility of human extinction (Jackson & Jensen, 2022) and the loss of many of the Earth's other species, hundreds of which continue to go extinct on a daily basis (Safina, 2021).

One way peace scholars can broach such a dialogue will be to consider how we should respond to the myth of Western development and "catching up" discussed above (Rist, 2014; Shiva & Mies, 2014). Catch up to what, we might ask, an extraction-based growth economy? At what price, it should follow, to the planet and to people? Social justice for whom and how, if not for the next

generation? We might also explore to what extent the activities of global extractive industries need to be reduced or eliminated in order to bring the use of resources by the present population back within the Earth's boundaries, what peace might look like without growth, and, is it even possible to continue along the path of green technological solutions without engaging in environmentally destructive extractive industries? Interdisciplinary inquiries into this last question have already responded, resoundingly, no.^{ix} Leaders of human rights institutions have been sounding the alarm about the future landscape of global suffering and rights abuses if we do not heed these limits to growth as a moral imperative. What will be the response of peace studies? Can we imagine peace studies as a field that intentionally disengages from the "technological fundamentalism" of the industrial age? (See, again, Jackson & Jensen, 2021.)

New ecological strains and disasters will bring about new kinds of conflicts and violence. What practical insights might peace studies offer for addressing the developing problems of our present extractive age?

The possibility of embracing low-intensity, local, sustainable subsistence lifestyles must be checked by the reality of contemporary geopolitical tensions and ongoing conflicts. The extractive economy's insistence on rapid expansion in the face of negative environmental impacts must be considered by strategic and protective measures as well. One need only review the lofty goals of COP26 or the ceremonious pledges to offer financial assistance at COP27 to realize that calls to transition off coal and fossil fuels and curtail deforestation are not being heeded. Beyond these first two aspirations, the second two principal goals of COP26, to transition to electric vehicles and renewable energy sources, both require an expansion of the extractive economy that geologists consider physically impossible given the known and even projected availability of the minerals necessary to achieve these goals (Poulton et al., 2013; USGS, 2020).

In this case, the de jure presentation of conflicts in the global energy field is to frame them as problems of political will and investment. But careful research on the infeasibility of these proposals, even granting unlimited political will and funding, reveals the de facto conflict as one characterized fundamentally as a limits-to-growth problem (see, for example, Friedemann, 2021). Environmental peacebuilding work has extensively documented conflicts at the local level that disproportionately shape the distribution of resources, namely the corruption of local elites and those who would stand to benefit from extractive economies while their communities suffer. Critics of the development paradigm add criticism over the enduring ideological appeal of the promise of growth, despite its improbability. For these reasons, new conflicts may continue to arise over access to limited but highly coveted resources. Also, new conflicts may arise between those who would wish to protect and conserve those resources and those who seek to extract and develop them. Certainly, conservation work has already provoked armed struggles in many parts of the world (Gaynor et al., 2016; Lombard, 2016).

It may follow, then, that stakeholders could be organized according to (1) those who prioritize growth and care little or less about ecological and equity impacts, (2) those who fail to understand the true human and ecological costs of global commodity chains, green technology included, and continue to strive for redistributive equity within a growth-oriented system, (3) those who struggle for access to essential resources as they become more scarce, (4) those willing to make

compromises along some or all of these lines, and (5) those who consciously align themselves with a deep ecological approach embracing simpler ways of living as a moral choice. To respond to each of these orientations, peace scholars must consider the added challenges of a world increasingly organized through a public relations approach as well as a general willingness to put forward deceptive intentions in order to avoid political commitments and moral standards. Savvy portrayals of ecological commitment and investments in social justice may be, intentionally or unintentionally, decoupled from practice as they capitalize on the good will of claimsmakers. Public relations “greenwashing” and social justice commitment portrayals have already had significant demobilization effects on environmental movements (Aronczyk and Espinosa 2022; Brulle and Werthman 2021).

Furthermore, this last overarching question could include new questions regarding military responses to the many changes and challenges ecological transformations and ecosystem decline will bring. Although military strategic planning is largely confidential, evidence suggests that militaries are planning for a number of future crisis scenarios, including supply shortages (Ahmed, 2020; Newburger, 2021; Schultz, 2010). Military discussion of future “water wars” is one poignant example of the relationship between population growth and dwindling access to resources (Newburger, 2021; Marino & Mountain, 2015). There is also a growing diversity of climate security discourses that range from national adaptation to global mitigation. In response, McDonald (2018) has suggested that we think through an “ecological security discourse” that considers threats posed by both ecological decline and different kinds of militarization. Ongoing research indicates that fuel supplies have taken on new centrality, most recently in response to the Russian invasion of Ukraine. Thus, new directions in the study of environmental security, militarization, mining, fossil fuels, and the pollution created in the production and use of weaponry will be warranted.

Finally, peace studies may require an epistemological transition due to how the field’s analytical pathways have relied on a paradigm of limitless growth, but the difficulty of facing these terrible environmental predictions cannot be understated. Scholars have postulated the sociological underpinnings of both conscious and unconscious climate denialism through research and reflections on the psychology of denial (Bendell, 2018) and climate anxiety (Pihkala, 2019), a theology of hopelessness (De La Torre, 2017), and the cultural and cognitive obstacles that block collective contemplation of worst-case scenarios, even upon the admonishments of experts (Cerulo, 2006).

What will it take, then, to pivot the field to face these frightening prospects? Some have taken a sober approach of acceptance and practical transition, arguing that the political implications of ecological crises demands an urgent reprioritization of human wants versus needs, including everything from luxuries to medical services (Cox, 2020; Heinberg, 2010; Rees, 2020). Some advocate for a redistribution of wealth to ensure all needs are fairly met. Some emphasize the role of cultivating spiritual resources to socially reconcile with our failure to overcome the challenges of a new climate-change defined epoch through technological interventions (Jackson & Jensen, 2022). Peace scholars and peacebuilders may explore working within these socioscapes to continue their work on violence, conflict, war, and reconciliation.

If the field is to take seriously the scientific warnings that planetary limits to growth have already been passed, peace scholars must begin to have conversations about what unique insights we can offer to address the escalation of conflict, violence, and related human suffering that will characterize the world's future. One final epistemological challenge may be to acknowledge that our field is one based in a strong moral stance on what scholars hold as ethical and just. To this end, religious, spiritual, and explicitly morally grounded conversations may hold the greatest potential to bring about the transformation required to deal with the difficult questions posed by scientific reality, including some that may develop from Christian theologies and indigenous and more-than-human cosmologies that position planet Earth as a sacred home (see, for example Camilleri & Guess, 2020; Conradie, 2005; Kimmerer, 2023).^x Ecofeminist orientations towards the defense of Mother Nature may not embrace an explicitly religious framework, but they are also rooted in a consensus about what is sacred. This kind of discourse does not detract from the potential for secular dialogue, but rather offers another path for approaching political conversations about what is possible and scientific revelations about what is probable in on our planet.

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Endnotes

ⁱ The 1997 Kyoto Protocol, on the other hand, marked the rise of a counter-paradigm which departed from conservationist goals toward market-oriented “sustainable development” and carbon trading. The protocol outlined a three-pronged approach to reducing seven greenhouse gases defined as dangerous to atmospheric warming in two commitment periods, from 2008 to 2012 and, following the Doha Amendment, from 2012 to 2020. A total of 191 countries, not including the United States, have backed the agreement. Still, greenhouse gas output has continued to increase. By the 2010s, as scientists continued to produce policy papers urging lawmakers to implement actionable plans to reduce emissions, climate adaptation pledges experienced rapid and global diffusion. These tended to focus on national adaptation and insular protective measures rather than global mitigation (Masseti & Bellon, 2022; Massey et al., 2014). In 2015, the Paris Accords were adopted, reframing the nature of climate change as a global phenomenon. This relaxed the invisible barriers that had protected the consumption practices of the developed world, which are now widely recognized as responsible for many of the emissions producing practices of the developing world.

ⁱⁱ Steffan and colleagues (2015) have also provided a helpful update to this model with an explanation of how to understand the crossing of planetary boundary thresholds on a regional level.

ⁱⁱⁱ The global Environmental Peacebuilding Association is among the most visible of institutions showcasing this work. The association was created through a collaboration between the Environmental Law Institute, the United Nations Environment Programme, and a number of academic partners. The institute brings together political, economic, and academic leaders from around the world and has published hundreds of case studies of conflicts linked to extractive politics in over sixty countries or territories.

^{iv} This work draws on the framework of ecofeminism developed by Maria Mies and Vandana Shiva (2014) with input from Maria Mies’ earlier work, *Patriarchy and Global Accumulation* (2014). There, Mies opines that both colonialism and postcolonial global capitalism have benefitted from patriarchy, which relegates women to the status of objects. This opens women and the planet to domination by a global economy based on the extraction, production, and consumption of things.

^v On the fundamental colonial ethos embodied in pollution and waste of the chemical age, see Liboiron (2021) and Liboiron and Lepwasky (2022).

^{vi} Shiva and Mies (1988) also address the “myth of catching up” propagated by development industries and often accepted by the recipients of their programs.

^{vii} It is interesting to note that Galtung (1973) directly addressed the 1972 *Limits to Growth* report raising concerns over the class politics that he felt would be perpetuated by following up on the authors’ proposed solutions. In so doing, he ironically put forth his own Global North liberal biases, which are rooted in a global growth-based economy that focuses on pragmatic solutions to making the growth paradigm more internally equitable. He has since refined his views on growth (Galtung, 2005) to include new considerations of ecological limits with positive support for imposing no limits on spiritual and emotional growth for well-being. Nevertheless, Galtung’s is not an ecofeminist framework and stands to benefit from the insights ecofeminists have offered to theories of structural peace (Confortini, 2006) and deep ecology (Salleh, 1984).

^{viii} Numerous scholars have scrutinized the history of population growth to prove again and again that, until the introduction of widely extracted and processed fossil fuels, the world’s population was stable at no more than around 1 billion people. These new resources have led to rapid population growth beyond previous thresholds by increasing agricultural yields and reducing

infant mortality and extending the human lifespan through modern medical interventions (see Smil, 2021).

^{ix} For many who have already been convinced by advocates for the green technological transition, this point requires time and space to unpack. But there is already extensive research on the energy dynamics and extractive techniques of each and every green solution (including electric cars, biofuels, and solar, wind, hydro, hydrogen, and nuclear energy sources) refuting the claim that these technologies meaningfully reduce harmful emissions and environmental pollution (see Friedemann, 2021).

^x Of course, debates over humanism versus more-than-humanism persist in theological traditions as well, including in Judeo-Christian faiths which have historically adopted and been shaped by Greek humanist sentiments. A tradition of ecological theology began to develop in the 1950s. Examples include Lynn White's (1967) critical essay "The Historical Roots of Environmental Crises" relating these crises to Greco-Judeo-Christian cosmologies based on human supremacy and H. Paul Santmire's (1985) *The Travail of Nature: The Ambiguous Ecological Promise of Christian Theology*. My thanks to Deborah Guess for helping me to consider this point.

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