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Learning in the Anthropocene

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Abstract: While the precautionary principle may have offered a sound basis for managing environmental risk in the Holocene, the depth and width of the Anthropocene have made precaution increasingly untenable. Not only have many ecosystems already been damaged beyond natural recovery, achieving a sustainable long-term global trajectory now seem to require ever greater measures of proactionary risk-taking, in particular in relation to the growing need for climate engineering. At the same time, different optical illusions, arising from temporary emissions reductions due to the COVID-19 epidemic and the local deployment of seemingly "green" small-scale renewable energy sources, tend to obscure worsening global trends and reinforce political disinterest in developing high-energy technologies that would be more compatible with universal human development and worldwide ecological restoration. Yet, given the lack of feedback between the global and the local level, not to mention the role of culture and values in shaping perceptions of "sustainability", the necessary learning may end up being both epistemologically and politically difficult. This paper explores the problem of finding indicators suitable for measuring progress towards meaningful climate action and the restoration of an ecologically vibrant planet. It is suggested that such indicators are essentially political as they reflect, not only different assessments of technological feasibility, but orientations towards the Enlightenment project.

Keywords: climate change; environmental humanities; precautionary principle; geoengineering

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1. Introduction

Considering the destruction that humanity has wrought upon the natural world, it is not surprising that much environmental discourse has an unforgiving undertone (Fremaux 2019; Hamilton 2017). Still, it is important to remember that what humanity is currently experiencing is the first (and largely unintentional) attempt to create something akin to a planetary modernity. In fact, it would have been very strange if a species could evolve towards technological maturity (Bostrom 2013) without encountering different biophysical limits. The question, as always, is rather where to go from here (Karlsson 2016) and to what extent humanity can ever become an agent capable of conscious planetary stewardship (Arias-Maldonado 2015, p. 82; Steffen et al. 2011a)?

First and foremost to these matters are questions of socio-political learning (Kawall 2021), in particular across spatial scales. As evident from the pandemic, even far-reaching behavioral restrictions at the local level do not necessarily translate into a more sustainable global trajectory (Forster et al. 2020). While intuitive methodological individualism may suggest that adopting a frugal and highly localized lifestyle would leave more room for nature, the lost resource efficiencies of global trade (Deudney 1990; Lewis 1992, p. 117) and the political knock-on effects of prolonged economic contraction, including the possible rise of anti-environmental populism (Lockwood 2018), may end up producing some very different outcomes. Similarly, much contemporary environmental thought fails to recognize exactly how far-reaching reductions in population numbers and consumption levels would have to be to actually deliver greater sustainability and not just economic mayhem (Trainer 2012, 2021). Alluring as a "low energy demand scenario" (Grubler et al. 2018) may be to academics with limited personal experience of agrarian poverty and the dominating social structures of village life, billions of people across the world are currently voting with their

feet and moving in the opposite direction, towards off-farm employment and emancipative urban lifestyles, eager to join the ranks of the global middle class and engage in precisely the kind of "imperial" activities (Brand and Wissen 2021) that environmental philosophers often disapprove of, such as international travelling. However, just as "degrowth" (Kallis et al. 2018), despite its vocal online advocacy, lacks a meaningful constituency in the real world, so does any alternative high-energy future (read *StarTrek*) that would render liberalism compatible with the environmental realities of the Anthropocene (Symons and Karlsson 2018). Instead, the political center appears stuck in managerial discourses of "Agenda 2030" and visions of renewable energy sprawl, extensive agriculture and industrial forestry that would essentially spell an end to the non-human natural world.

This discrepancy produces a conundrum; by what indicators should progress towards long-term global sustainability be measured? Speculative as this question may seem, it has some very real implications for human development and freedom in the present. However, almost regardless of what actions are taken today, the global environment is likely to continue to deteriorate for the foreseeable future given the long response times of the climate system in particular (Van Vuuren and Stehfest 2013). This means that it will take a considerable political effort to sustain any macro-level environmental policy regime in the face of "apparent failure" while at the same time remaining open for learning. This is even prior to factoring in the different optical illusions arising from the offshoring of carbon-intensive production and the existence of unique geographical features such as fast-flowing rivers suitable for hydropower that make some countries incorrectly appear as "climate leaders".

If the problem of finding suitable indicators were merely about measuring the physical environment, the hard sciences would stand ready with thousands of possible indicators, including everything from the atmospheric concentrations of different greenhouse gases to ocean acidity levels. However, a quick example will suffice to show why this is not the case. Imagine a society that is dependent on resource x which is both finite and rapidly running out. Clearly, the sustainability of that society would have to be assessed quite differently if (a) its researchers were one day away from inventing a perfect substitute for resource x or (b) no such research existed. As such, assessments of sustainability need to take a broader look at technological and social change over time if they are to avoid becoming mere static snapshots in the present. Still, more often than not, environmental discourse reproduces precisely this non-dynamic view by only accounting for the "consumption-side" of the sustainability equation. It is, for instance, commonly suggested that certain ecological demise would follow if "Western lifestyles" were to become universal (Blühdorn 2007) without simultaneously considering what capacity for technological innovation that would exist in a more equal world with such economic and human plenitude.

Exploring these arguments further, the aim of this paper is to problematize socio-political learning in the Anthropocene. Starting with the role of the precautionary principle, it is suggested that the depth and width of the Anthropocene have made precaution an increasingly untenable approach to environmental decision-making. While it has long been noted that, since there are always risks on all sides, it has never been possible to be globally "precautionary" (Sunstein 2005), the prospect of Solar Radiation Management (SRM) in particularly upends Holocene conditions and presents a highly vexed choice in the Anthropocene (Wissenburg 2019). The lack of a stable baseline, against which macro-level interventions in nature can be evaluated, and the difficulties of learning across spatial scales mean that political ideology will always be at the forefront of any long-term trend assessment. As such, by reaffirming the essentially ideological nature of these debates, the paper concludes by arguing the need to move beyond the binary denier/believer dichotomy with regard to global environmental change.

2. The Precautionary Principle

Despite its wide popularity across different legislatures, the precautionary principle lacks a single authoritative formulation (Freestone and Hey 1996). Instead, it can be

interpreted along a spectrum from weak to strong regarding what role that scientific evidence should play in environmental decision-making (Sunstein 2005). In its most cautious and weakest form, the principle simply says that a lack of absolute scientific evidence should not be used as an excuse for allowing activities that can reasonably be expected to be harmful for the environment to continue. In its stronger forms, it is taken to imply that a blanket "margin of safety" should be built around society. Along this spectrum, the precautionary principle more generally emphasizes caution, pausing, and review before actions that can have far-reaching ecological consequences. Uncontroversial as this may sound, such an approach presupposes the existence of a stable baseline of non-deployment. In a rapidly worsening situation, with, say, the climate system running out of control, no such baseline can be established. Then, even if the "cure", similar to chemotherapy in the treatment of cancer, may have many risks, it may still be better than the "disease". That, it can be argued, are in short the macro-political realities defining the Anthropocene.

Unpacking this argument, it is perhaps useful to first recognize that, stable as the Holocene may have seemed from a human perspective, life was always vulnerable to a number of cosmic risks, such as bolide collisions, risks that only advanced technologies can mitigate. Similarly, the Black Death of the 14th century should serve as a powerful reminder of the extreme vulnerability of pre-industrial societies at a microbiological level. Nevertheless, it is reasonable to think of the Holocene as providing a relatively stable baseline against which the ecological effects of technological interventions could hypothetically be evaluated. With most human activities being distinctively local, nature would for the most part "bounce back" (even if the deforestation of the Mediterranean basin during the Roman period is an example of that not always being the case) while larger geophysical processes, such as the carbon cycle, remained entirely beyond human intentional control. Even if there has been some debate about what influence human activities had on the pre-industrial climate (Ruddiman 2007), anthropogenic forcing was in any case both marginal and gradual.

All this changed with the onset of the Great Acceleration by which humans came to overwhelm the great forces of nature, causing untold damage to fragile ecosystems and habitats everywhere, forever altering the trajectory of life on the planet (Steffen et al. 2011b). In a grander perspective, humanity may one day become an interplanetary species and thus instrumental in safeguarding the long-term existence of biological life, but for the moment, its impact is ethically dubious at best as the glaciers melt, the oceans fill up with plastics, and vast number of species are driven to extinction.

Faced with these grim realities, it is of course not surprising that the first impulse is to seek to restore some kind primordial harmony and restrain human activities. Yet, it is important to acknowledge that, even if their aggregate impact may have been within the pattern of Holocene variability, pre-modern Western agricultural societies were hardly "sustainable" in any meaningful sense. Experiencing permanent scarcity, violent conflict was endemic (Gat 2013), and as much as some contemporary academics like to attribute all evils to "capitalism" (Malm 2016), pre-capitalist societies exhibited no shortage of religious intolerance and other forms of social domination. It is thus not surprising that some have argued the need to reverse the civilizational arc further yet and return to a preliterate hunter-gather existence (Zerzan 2008) even if this, obviously, has very little to do with existing political realities and social formations.

Under Holocene conditions, the short-term human tragedy may have been the same, but it did not undermine the long-term ability of the planet to support life. In a world of eight billion people, already accumulated emissions in the atmosphere have committed the planet to significant warming under the coming centuries, with an increasing probability that committed warming already exceeds the 1.5-degree target of the Paris Agreement even if all fossil-fuel emissions were to stop today (Mauritsen and Pincus 2017). This means that sustained negative emissions, presumably in combination with SRM, will most likely be needed just to stabilize global temperatures, not to mentioning countering the flow of

future emissions. According to the Intergovernmental Panel on Climate Change (IPCC), assuming that all the pledges submitted under the Paris Agreement are fulfilled, limiting warming to 1.5 degrees will still require negative emissions in the range of 100—1000 gigatons of CO_2 (Hilaire et al. 2019, p. 190). The removal of carbon dioxide at gigaton scales from the atmosphere will presumably require the existence of an advanced industrial society since low-tech options, such as afforestation, will be of limited use (Gundersen et al. 2021; Seddon et al. 2020), especially in a future of competing land-uses.

It is against this backdrop of worsening climate harms that the limits of "precaution", at least as conventionally understood, become apparent. While degrowth advocates tend to insist that behavioral change, even explicitly betting on a "social miracle" (Kallis 2019, p. 195), is always preferable to any technological risk-taking (Heikkurinen 2018), that overlooks both the scope of the sustainability challenge and the lack of public consent to any sufficiently radical political project (Buch-Hansen 2018). While there may be growing willingness to pay for, say, an electric vehicle (Hulshof and Mulder 2020), giving up private automobile use altogether is obviously a different animal, to say nothing about a more fundamental rematerialization of the economy (Hausknost 2020). Again, the problem is one in which change either (a) remains marginal yet ecologically insufficient or (b) becomes sufficiently radical yet provokes a strong political counterreaction. A similar dynamic can be expected to play out at the international level where countries that remain committed to growth would quickly gain a military advantage. To make matters worse, there is also a temporal element to this dynamic since any regime of frugality and localism would have to be policed indefinitely in order to prevent new unsustainable patterns of development from re-emerging later on.

All this begs the obvious question, if the political and economic enforcement of the planetary boundaries are fraught with such political and social difficulties, would it not be better to instead try to transcend them through technological innovation? Surprisingly, any high-energy future would most likely be subject to many of the same motivational and psychological constraints that hinder a low-energy future. While history shows that existing nuclear technologies could in theory displace all fossil fuels and meet the most stringent climate targets (Qvist and Brook 2015), it seems extremely unlikely, to put it mildly, that thousands of new reactors will be built over the course of the coming decades in response to climate change. Outside the world of abstract computer modelling, real world psychological and cultural inertia tends to ensure that political decision-making, at least for the most part, gravitates to what is considered "reasonable" and "common sense"—such as medium emissions electricity grids in which wind and solar are backed by biomass and gas—rather than what any utilitarian optimization scenario may suggest. Even if the global benefits of climate stabilization would be immense, the standards by which local nuclear risks are assessed, as clearly illustrated by the Fukushima accident which led to a worldwide retreat from nuclear energy despite only causing one confirmed death (which, though obviously regrettable, has to be put in relation to the hundred and thousands of people dying every year from the use of fossil fuels), underscores the uneven distribution of perceived local risks versus global benefits and the associated problem of socio-political learning across spatial scales.

Almost two decades ago, Ingolfur Blühdorn identified "simulative eco-politics" as a key strategy by which liberal democracies reconcile an ever-heightened rhetoric of environmental crisis with their simultaneous defense of the core principles of consumer capitalism (Blühdorn 2007). Since then, declarations that we only have "ten years to save the planet" have proliferated, and so have seemingly bold investments in renewable energy, most recently in the form of US President Joseph Biden's USD 2.25 trillion climate and infrastructure plan. Still, without a meaningful commitment to either radical innovation or effective degrowth, it is difficult to see how the deployment of yet more wind turbines or the building of new highways will in any way be qualitatively different from what Blühdorn pertinently described as sustaining "what is known to be unsustainable" (Blühdorn 2007, p. 253).

However, all is not lost in lieu of more authentic forms of eco-politics. Independent of political interventions, accelerating technological change, in particular with regard to computing and intelligent machine labor, may one day make large-scale precision manipulation of the physical world possible in ways that may solve many problems that today seem intractable (Dorr 2016). Similarly, breakthroughs in synthetic biology may hold the key to environmentally benign biofuels and carbon utilization technologies. Yet, all such progress remains hypothetical and uncertain for now. Given what is at stake, there is an obvious danger in submitting to naïve technological optimism. What is less commonly recognized is that naïve optimism with regard to the prospects of behavioral change may be equally dangerous. While late-capitalist affluence has enabled many post-material identities and behaviors, such as bicycling, hobby farming, and other forms of emancipatory self-expression, a collapsing economy could quickly lead to a reversal back to survivalist values, traditional hierarchical forms of domination, and violence (Quilley 2011, p. 77).

As such, it is far from obvious what actions would actually take the world as a whole closer to long-term sustainability. If sustainability could be achieved by a relatively modest reduction in consumption rates or behavioral changes, such as a ban on all leisure flights, then there would be a strong moral case for embracing degrowth. Yet, recognizing how far-reaching measures in terms of population control and consumption restrictions that would be needed, the case quickly becomes more ambiguous. While traditional environmentalism may suggest that retreating from the global economy and adopting a low-tech lifestyle would increase resilience (Alexander and Yacoumis 2018), it may do very much the opposite by further fragmenting global efforts and slowing the pace of technological innovation. Without an orderly and functioning world trade system, local resources scarcities would be exacerbated, as seen most recently with the different disruptions to vaccine supply chains. In essence, given the lack of a stable Holocene baseline to revert to, it becomes more difficult to distinguish proactionary "risk-taking" from "precaution", especially as many ecosystems have already been damaged beyond natural recovery. In this context, it is noteworthy that many of the technologies that can be expected to be most crucial for managing a period of prolonged overshoot (such as next-generation nuclear, engineering biology, large-scale carbon capture and SRM) are also ones that traditional environmentalism is most strongly opposed to.

3. Finding Indicators

From the vantage point of the far-future, at least the kind depicted in the fictional universe of *Star Trek*, human evolution is a fairly straightforward affair along an Enlightenment trajectory by which ever greater instrumental capacity is matched by similar leaps in psychological maturity and expanding circles of moral concern. With the risk of sounding Panglossian, one may argue that the waning of interstate war in general and the fact that there has not been any major nuclear exchange in particular, does vindicate such an optimistic reading of history. While there will always be ups and downs, as long as the most disastrous outcomes are avoided, there will still be room for learning and gradual political accommodation.

Taking such a longer view, it would nevertheless be strange if development was simply linear, that former oppressors would just accept moral responsibility or that calls for gender or racial justice would not lead to self-reinforcing cycles of conservative backlash and increasingly polarizing claims. Still, over the last couple of centuries, there is little doubt that human civilization has advanced significantly, both technologically and ethically (Pinker 2011), at least from a liberal and secular perspective. However, unless one subscribes to teleology, there is nothing inexorable with this development and, it may be that the ecological, social, and political obstacles are simply too great to ever allow for the creation of a Wellsian borderless world (Pedersen 2015) that would allow everyone to live a life free from material want and political domination. On the other hand, much environmental discourse tends to rush ahead in the opposite direction and treat the

climate crisis as ultimate evidence of humanity's fallen nature when the counter-factual case, that it would be possible for a technological civilization to emerge without at some point endangering its biophysical foundations, would presumably be much less plausible. From an astrobiological perspective, it is easy to imagine how the atmospheric chemistry of a different planet would be more volatile and thus more vulnerable to the effects of industrial processes (Haqq-Misra and Baum 2009), leaving a shorter time window for mitigation. Nick Bostrom has explored this possibility of greater climate sensitivity further in his "vulnerable world hypothesis" (Bostrom 2019) and it begs to reason that mitigation efforts would be more focused in such a world. However, since climate response times are longer and sensitivity less pronounced, climate mitigation policies have become mired in culture and media politics (Newman et al. 2018) but also a statist logic (Karlsson 2018) by which it has become more important for states to focus on their own marginal emission reductions in the present rather than asking what technologies would be needed to stabilize the climate in a future where all people can live a modern life.

Combined, it is not surprising that the larger picture gets blurred. Obviously, not everyone shares the cosmopolitan vision of a world of equal opportunity and, as such, chronic poverty abroad has emerged as somewhat of a silent "solution" to climate change. Even the most ambitious plans of renewable energy expansion (Jacobson et al. 2017), assume that energy access remains deeply unequal in the future and, correspondingly, there has been little serious discussion about the energy needs of a fully developed world (Arto et al. 2016). Instead, rich countries, which already have stable electricity grids thanks to a baseload supply of fossil fuels, have been able to deploy weather-dependent renewable energy sources at marginal costs below those of new fossil generation, creating a seemingly credible media narrative that renewable energy has become "cheaper than coal" while ignoring the full system costs of any hypothetical 100% renewable energy system (Clack et al. 2017) or if the Energy Return on Investment (EROI) of such a system would even be sufficient to support an advanced society in the first place (Capellán-Pérez et al. 2019). The latter point has become further obscured by the fact that rich countries do not have to take full responsibility for all embodied energy as they can import solar panels, wind turbines, and batteries from other countries. Taking a broader look, it is unlikely that renewable energy can ever meet present global energy use (Dupont et al. 2018; Moriarty and Honnery 2016), let alone allow for the 5–10 times higher energy levels that would be needed to make, say, Nordic energy consumption patterns universal. Despite the recent wave of net-zero emissions pledges, it is worth remembering that the share of fossil fuels in global primary energy consumption has remained fairly stable above 80% for many decades.

It is in this context that the search for meaningful indicators for sustainability must be understood. With regard to climate change, large-scale carbon capture technologies now appear essential for climate stabilization and restoration (Dorr 2016), especially since renewable energy sources are unlikely to have a sufficiently impact on global emissions trajectories to avert dangerous warming even if their widespread political popularity makes any move toward more broad-ranging and ambitious policies unlikely. Yet, large-scale carbon capture does not currently enjoy widespread political support (Moe and Røttereng 2018), in part perhaps because its deployment has been seen as a distraction aimed at prolonging the use of fossil fuels. The lack of political commitment to carbon capture technologies means that climate risks will continue to increase, most likely until the use of SRM, despite its profound governance challenges (Möller 2020), will become necessary if a full-blown climate disaster is to be avoided.

Outside the climate realm, indicators for sustainability are more elusive. To some extent, they remain linked to progress on climate change as maintaining a safe climate will be essential also for biodiversity protection but it would be incorrect to reduce all sustainability challenges to energy alone (Leiva and Schramski 2020). Whereas ecomodernists seek the liberation of nature through technology and a future of planetary-scale rewilding (Karlsson 2020), mainstream politics rather emphasizes the management of nature and the continuation of large-scale industrial and agricultural processes. Any comprehensive

decoupling of the economy from nature, as envisioned by ecomodernism, would require breakthrough innovations in molecular engineering and, in the long run, most likely large-scale space colonization. Accordingly, ecomodernism would suggest that indicators for sustainability must, again, take a much broader look at technological evolution. Degrowth advocates obviously reject this view, instead suggesting that human societies should seek to harmonize with nature and that economic flows should become re-embedded in their local contexts.

In essence, this means that indicators for sustainability cannot be understood apart from their ideological foundations and, ultimately, how they relate to the Enlightenment project (Bronner 2006). This is true all the way down to the evaluation of individual actions. For example, from an ecomodernist perspective, travelling helps bringing the world together while spurring technological innovation in key technologies such as aerospace. For someone advocating degrowth, travelling instead promotes an "imperial" way of living (Brand and Wissen 2021), disrupts local ties, and displaces environmental harms onto others. Considering that aviation clearly has negative environmental effects that can be scientifically established, the question for ecomodernists becomes how much short-term environmental harm that can be considered morally acceptable in pursuit of the longer hope of ultimate ecological redemption?

4. Interpreting Trends

For ecomodernists, the possibility of a civilization-wide Environmental Kuznets Curve should not be mistaken for a passive faith in the capitalist market. Instead, ecomodernist authors repeatedly stress the importance of publicly funded innovation (Symons 2019). Yet, such innovation in turn depends on broad public support, something that is currently missing (Rendall 2021). Instead of devising their own alternative visions of the future, those skeptical of the far-reaching behavioral and economic changes advocated by traditional environmentalism have, by and large, retreated into denying or downplaying the geophysical reality of climate change. Meanwhile, those most eager to acknowledge the looming threat have done so in part because they believe that "climate change supercharges the pre-existing case for virtually every progressive demand on the books, binding them into a coherent agenda based on a clear scientific imperative" (Klein 2011).

Both these tendencies are unfortunate as they conflate acceptance of scientific reality with the endorsement of a particular subset of possible mitigation policies. After all, the important question, and the one about which there can be reasonable disagreement, has never been whether global environmental change is happening (it is) but what to do about it politically. This is especially so when considering issues of global equality and for how long sustained poverty in the developing world can remain the primary way that a climate catastrophe is averted.

While there is certainly no shortage of survivalist rhetoric or activism (Mann and Wainwright 2018), the full consequences of an "energy descent" remain little discussed outside academic circles and, if they were known, support for radical environmentalism would probably be even thinner than today. However, as has been argued repeatedly above, that does not necessarily translate into political support for a sufficiently radical agenda in the opposite direction. Thanks to the displacement of environmental harms through trade, rich countries are not directly confronted with the unsustainability of the current socio-ecological regime and are even likely to see some percentage of emissions reductions every year thanks to spontaneous decarbonization (Pielke 2018) as well as the offshoring of carbon intensive production, all inviting the interpretation that they are on a path to carbon neutrality even as the core of their economies remain firmly fossil.

As such, after a short dip during the pandemic, global carbon emissions are again on the rise with atmospheric concentrations reaching a record of 420 ppm in 2021. Needless to say, human impacts will continue to warm the planet until net emissions reach zero, not in response to temporary dips in the rate of emissions. Even if there would be dramatic cuts in the flow of new emissions (which, again, seems unlikely given the current technological

trajectory), emissions levels are still far above natural sequestration rates, meaning that the atmospheric stock of carbon dioxide will continue to build up for many years unless large-scale carbon removal is initiated. Consequently, SRM is slowly gaining traction as an emergency measure should temperatures continue to rise with possibly devastating effects on biodiversity and livelihoods (Preston 2016). A recent study outlined the risk of ultra-extreme heatwaves in the Middle East and Africa with excessively high temperatures (above 56 degrees Celsius) and extended duration (Zittis et al. 2021), conditions that would be life-threating without access to air conditioning, but climate change will obviously have far-reaching impacts across the planet, including the melting of polar ice.

In the current post-truth media landscape, it is reasonable to expect that SRM would add another polarizing layer of confusion and possibly conspiracy theories (Tingley and Wagner 2017), creating uncertainty about what extreme events that can be attributed to the increasing concentrations of greenhouse gases (Otto 2016) and the SRM program, respectively. As such, making political sense of global environmental change may become increasingly difficult as more warming is being masked by SRM, underscoring the lack of a stable baseline of non-intervention in the Anthropocene. Under such circumstances, the room for radical voices will presumably grow and social polarization increase further yet. At the local level, it is relatively easy to imagine radical degrowth experiments and strictly enforced perfectionist regimes of frugality, but it is much harder to see how sufficiently radical forms of environmentalism will become politically attractive at the global level. Nevertheless, given the near-hegemonic position of Malthusianism in contemporary environmental discourse, many people still instinctively associate "sustainability" with fewer children and less consumption (Wynes and Nicholas 2017) rather than, say, research into atomically precise manufacturing (Umbrello and Baum 2018) or new nuclear technologies (Brook et al. 2015). As a consequence, there has been little discussion about the relative distance from where the world is today to the futures of degrowth and ecomodernism, respectively or their relative compatibility with what we know from history about human motivation and social dynamics. Clearly, Year Zero experiments such as those of Pol Pot in Cambodia do not bode well for the preservation of freedom in the building of agrarian utopias, yet degrowth advocates would of course reject any such parallels, insisting that the rollback of industrial society will be fundamentally different this time around. Overall, the political Left has come to show little appreciation for the Enlightenment legacy (Mann and Wainwright 2018, p. 81), often reducing it to nothing but racism, colonialism and sexism, which makes it easier to argue that there is little of value to lose anyhow. For those who read history differently, the stakes are obviously much higher. During the 1960s, when high modernism was the dominant paradigm, there was undoubtedly a need for corrective criticism and a more reflexive stance with regard to technology. However, today, one may argue that it is the lack of utopian public imagination, rather than its excesses, that represents the greatest obstacle to a bright future.

Given the lack of immediate feedback between the global and the local level, not to mention the role of culture and values in shaping perceptions of sustainability, learning about Anthropocene environmental realities and possible remedies would always be immensely difficult. Yet, while time is quickly running out on the goals of the Paris Agreement, a coming period of overshoot must be managed, one way or the other and, as such, it is becoming increasingly urgent to move beyond the current denier/believer dichotomy and instead open up the envelope of the Anthropocene with all its difficult trade-offs to democratic debate. So far, climate activists have been able to occupy the moral high ground by reducing these trade-offs to a Manichean struggle against malevolent fossil corporations (Klein 2014; Mann 2021) rather than having to spell out the full human and ecological implications of any alternative low-energy future (or reflecting on what kind of populist response such a future might trigger in turn). Meanwhile, right-wing voices have consistently trivialized climate risk and, more recently, tried to shift blame to the countries that have become responsible for producing carbon-intensive goods.

5. Conclusions

At least prior to the pandemic, more radical perspectives were gaining popularity thanks to the vocal activism of Fridays for Future, Extinction Rebellion and other similar organizations. Even among the broader public, it has become common to associate climate action with different forms of sacrifice (Maniates and Meyer 2010). Reflecting a kind of banal methodological individualism, children in left-bourgeois families today are brought up to a reductionist language of carbon debt and ecological footprint calculators that puts their own existence at odds with the planet. Instead of seeing the possibilities of transformative technologies (be it molecular assemblers or next generation nuclear energy) and their own role in innovating a climate-restored future of universal freedom and prosperity, it is thus not surprising that many children have come to experience different forms of climate anxiety (Clayton 2020) or that their parents have been drawn into neo-Malthusian fears of climate refugees or "overpopulation" (Cafaro and Crist 2012).

Over the last decade, ecomodernism has emerged as a discursive counterpole founded on the Enlightenment legacy but its impact has, so far, remained primarily academic. The aim of this paper has been to problematize socio-political learning in the Anthropocene, an exercise that does not lend itself to great optimism about the prospects of meaningful change. Instead of a democratic debate, many countries have come to experience an ironic and ambivalent political dynamic, or "simulative eco-politics" to speak with Blühdorn, by which neither the political center nor radical voices are held to account for their respective claims. Even if the learning needed to safely navigate the Anthropocene may be both epistemologically and politically difficult in the present, a certain cognitive humility seems warranted, recognizing not only the novelty of the challenges that humanity faces but also acceptance of the fundamentally traumatic character of modernity, yet not losing track of the bigger picture of where humanity might be heading in a few centuries hence.

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